Preface

Purpose

Highway plans must ultimately satisfy many needs. In addition to the obvious needs of contractors who build the project, plans must serve the needs of designers, project engineers and inspectors, reviewers, and other interested parties. These plans become a part of the construction agreement and serve as an historic record.

Since highway plans incorporate the expertise of many specialty governmental units, organizations and personnel, various reviews are necessary throughout the plan preparation process.

Application

The guidelines contained in this manual are considered a primary source of reference by personnel involved in the preparation of highway plans for the State of Ohio.

Although this manual is an attempt to standardize the form and the process for highway plan preparation in Ohio, it is recognized that many projects will involve unusual circumstances which will require deviation from these guidelines.

Preparation

This Plan Preparation Manual has been developed by the Office of CADD and Mapping Services. Errors and omissions should be reported to the Administrator, Office of CADD and Mapping Services, Ohio Department of Transportation, P.O. Box 0899, Columbus, Ohio, 43216-0899.

Format and Revisions

A separate set of Sample Construction Plans is available, and considered to be, an integral part of the Plan Preparation Manual.

Manuals and revisions may be downloaded from the Design Reference Resource Center web page. Users are encouraged to sign up on this page for electronic (email) notification of revisions.

ODOT's Internet address is http://www.dot.state.oh.us.

Unit of Measure

Plans are to be prepared using the English system of units.

Standard Construction Drawings (SCDs) are listed using only the root number of the drawing (e.g., BP-3.1 rather than BP-3.1M). Highway plans must always use the SCD showing the most up-to-date details available. The most current SCD may be in English and/or dual (English and metric) units.

PREFACE

Ohio Counties

County	Code	District	County	Code	District
Adams	ADA	9	Knox	KNO	5
Allen	ALL	1			
Ashland	ASD	3	Lake	LAK	12
Ashtabula	ATB	4	Lawrence	LAW	9
Athens	ATH	10	Licking	LIC	5
Auglaize	AUG	7	Logan	LOG	7
			Lorain	LOR	3
Belmont	BEL	11	Lucas	LUC	2
Brown	BRO	9			
Butler	BUT	8	Madison	MAD	6
			Mahoning	MAH	4
Carroll	CAR	11	Marion	MAR	6
Champaign	CHP	7	Medina	MED	3
Clark	CLA	7	Meigs	MEG	10
Clermont	CLE	8	Mercer	MER	7
Clinton	CLI	8	Miami	MIA	7
Columbiana	COL	11	Monroe	MOE	10
Coshocton	COS	5	Montgomery	MOT	7
Crawford	CRA	3	Morgan	MRG	10
Cuyahoga	CUY	12	Morrow	MRW	6
			Muskingum	MUS	5
Darke	DAR	7			
Defiance	DEF	1	Noble	NOB	10
Delaware	DEL	6			
			Ottawa	OTT	2
Erie	ERI	3			
			Paulding	PAU	1
Fairfield	FAI	5	Perry	PER	5
Fayette	FAY	6	Pickaway	PIC	6
Franklin	FRA	6	Pike	PIK	9
Fulton	FUL	2	Portage	POR	4
			Preble	PRE	8
Gallia	GAL	10	Putnam	PUT	1
Geauga	GEA	12			
Greene	GRE	8	Richland	RIC	3
Guernsey	GUE	5	Ross	ROS	9
Hamilton	HAM	8	Sandusky	SAN	2
Hancock	HAN	1	Scioto	SCI	9
Hardin	HAR	1	Seneca	SEN	2
Harrison	HAS	11	Shelby	SHE	7
Henry	HEN	2	Stark	STA	4
Highland	HIG	9	Summit	SUM	4
Hocking	HOC	10			
Holmes	HOL	11	Trumbull	TRU	4
Huron	HUR	3	Tuscarawas	TUS	11
Jackson	JAC	9	Union	UNI	6
Jefferson	JEF	11			

County	Code	District
VanWert	VAN	1
Vinton	VIN	10
Warren	WAR	8
Washington	WAS	10
Wayne	WAY	3
Williams	WIL	2
Wood	WOO	2
Wyandot	WYA	1

PREFACE

ODOT Districts

District 1
1885 N. McCullough St.
Lima, OH 45801-0040
419-222-9055
fax: 419-222-0438

District 2
317 East Poe Rd.
Bowling Green, OH 43402-1330
419-353-8131
fax: 419-353-1468

District 3
906 North Clark St.
Ashland, OH 44805-1989
800-276-4188 or 419-281-0513
fax: 419-281-0874

District 4
2088 S. Arlington Rd.
Akron, OH 44306
800-603-1054 or 330-786-3100
fax: 330-786-2232

District 5
9600 Jacksontown Rd., S.E.
PO Box 306
Jacksontown, OH 43030
740-323-4400
fax: 740-323-3715

District 6
400 East William St.
Delaware, OH 43015
800-372-7714 or 740-363-1251
fax: 740-833-8100

District 7
1001 St. Marys Ave.
SR 29 PO Box 969
Sidney, OH 45365-0969
937-492-1141
fax: 937-497-9734

District 8
505 South SR 741
Lebanon, OH 45036-9518
800-831-2142 or 513-932-3030
fax: 513-932-7651

Central Office
1980 W. Broad Street
Columbus, OH 43223
614-466-7170
fax: 614-644-8662
ODOT Web Site:
http://www.dot.state.oh.us

District 9
650 Eastern Ave. PO Box 467
Chillicothe, OH 45601
740-773-2691
fax: 740-775-4889

District 10
338 Muskingum Dr. PO Box 658
Marietta, OH 45750
800-845-0226 or 740-373-0212
fax: 740-373-7317

District 11
2201 Reiser Ave.
New Philadelphia, OH 44663
330-339-6633
fax: 330-308-3942

District 12
5500 Transportation Blvd.
Garfield Heights, OH 44125-5396
866-737-8112 or 216-581-2100
fax: 216-584-2274

Glossary of Terms

As Per Plan Item: A standard pay item whose requirements need to be modified from that which is defined by the standard drawings, Construction and Materials Specifications, or Supplemental Specifications.

Backslope: The slope from the back of a ditch to the existing ground surface.

Benchmark: A marker of known elevation and location used in surveying for establishing vertical control.

Calculation Sheet: Highway plan sheet used to show the derivation of quantities.

Centerline of Construction: The reference line used for construction of a project. Normally located at the median centerline on a divided highway or at the normal crown point location on an undivided highway.

Centerline of Right-of-Way: The reference line used for the right-of-way of a project. Normally located at the center of a highway's existing right-of-way.

Centerline of Survey: The reference line used in the field survey of a project. Although it is usually the same as the centerline of construction, it may be a separate survey line established for convenience. With modern surveying instruments, surveys are no longer completed based on a centerline of survey.

Construction Limits: Lines shown on a plan view that outline the lateral extent of the work. Typically placed 4 feet outside the point where the backslope touches the existing ground unless additional room is required for construction activities.

Construction Plan Tracings: The original copy of a highway plan.

Cross Section: A view produced by a vertical plane cutting through the roadway, usually at right angles to the centerline or baseline, showing the transverse profile of the existing ground surface and proposed grade lines. The main use of cross-section sheets is for calculation of earthwork and seeding quantities.

Cross Slope: The rate of change of elevation along a straight line from one point in a cross section to another.

Design Designation: Information shown on the Title Sheet expressing basic factors which control design (Current ADT, Design Year ADT, Design Hourly Volume, Directional Distribution, Percent B&C Vehicles, Design Speed, Legal Speed, Functional Classification).

Design Exception: A document which explains the engineering and/or other reasons for allowing certain design criteria to be relaxed in extreme, unique, or unusual circumstances.

Drainage Details: A portion of a highway plan which includes design details for all prefabricated structures as well as other drainage related items.

Federal Project Number: A number assigned to a project when Federal participation is involved.

Foreslope: The slope from the edge of the graded shoulder to the bottom of the ditch.

General Notes: A portion of a highway plan containing those plan notes required to clarify construction items not adequately covered by the specifications or plan details.

General Summary: A portion of a highway plan used to summarize the total estimated quantities with complete pay item descriptions, item numbers, item extensions and funding splits.

PREFACE

Item Code: A nine-digit character used to catalog pay item descriptions.

Item Master: A list of acceptable item codes and their corresponding pay item descriptions and units of measure.

Item Special: An item that does not exist in the standard drawings, the Construction and Material Specifications or Supplemental Specifications.

Landscaped Area: An area containing an arrangement of plant materials specifically selected and located based on principles of design (line, form, color, texture, repetition, variety, balance and emphasis) for one or more of the following functions: visual control, architectural uses, climate control, noise control, erosion control, aesthetics and wildlife habitat.

Landscaping Plan: A portion of a highway plan dedicated to highway landscaping, including all plans, details and quantities required for landscaping items.

Lighting Plan: A portion of a highway plan dedicated to highway lighting, including all plans, details and quantities required for highway lighting items.

Location Map: A map on the Title Sheet showing the area in which the project is located and the project limits.

Maintenance of Traffic Plan: A portion of a highway plan which includes the notes and details required for maintaining traffic during construction.

Miscellaneous Details: A “catch-all” portion of a highway plan for details that do not specifically fall into another category.

Plan and Profile Sheet: A portion of a highway plan showing horizontal and elevation views an area before and after proposed construction: including quantities, dimensions, and other reference items required to lay out and construct a project.

Plan Insert Sheet: Special detail drawings furnished by ODOT and used with the original set of tracings as normal numbered plan sheets.

Profile Grade Point: The point on a typical highway cross-section which correlates with the profile grade line shown on the plan and profile sheets.

Project Designation: The identification assigned to a particular project. This includes county, route, section number and local name for projects on county or township systems, or county and local name for city street improvements.

Project Length: The total distance between the project limits, adjusted for station equations and suspensions, measured along the centerline of construction.

Project Limits: Points on the mainline centerline of construction where the proposed improvement, as described in the project description, begins and ends. This is generally defined as the beginning/ending of full-depth, full-width pavement. Project limits do not include incidental construction, such as: pavement feathering and tapering, traffic control devices, drainage, guardrail, drives, side roads, service roads, etc., unless this type of work is the primary reason for the improvement.

Proposal Note: A note that is a part of a project's proposal that alters a pay item, standard drawing, Construction and Materials Specification or Supplemental Specification.

Reference Balloon: A circle with a leader line used to tie construction items to pay quantities on Plan and Profile sheets and to the legend on Typical Sections.

Reference Monument: An object that marks a point of known location. Used in surveying to establish horizontal control.

Reference Points: Fixed marked points, located on permanent objects in the field, from which various points on the reference line can be established using distances and directions.

Right-of-Way Plan: A portion of a highway plan showing a graphical representation of a highway improvement and its relation to adjacent property, the parcels or portions thereof needed for highway purposes, and other pertinent information.

Sanitary Sewer Plan: A portion of a highway plan dedicated to construction of sanitary sewers, including all plans, profiles, details and quantities required for sanitary sewer items.

Schematic Plan: A portion of a highway plan which shows the geometric location of a roadway in relation to existing features, such as; political boundaries, waterways, railroads, utilities, etc.

Service Road: Sometimes referred to as a Frontage Road or Access Road, it is a roadway, generally running parallel to the mainline, which provides access to commercial, residential or farm areas.

Simplified Plans: An abbreviated highway construction plan format consisting only of that information necessary to describe the type of work and its limits. Particularly adaptable to special types of projects (minor emergency relief, resurfacing, pavement markings, etc.)

SPEDuP Plans: Simplified Plans – Expedited Delivery Project Plans are a straightforward letter-size format which reduces the time to process, advertise and bid a project. Projects which qualify for this type of format are routine maintenance-type projects which have minimal design, and no complexities such as funding splits, right-of-way, utilities, or environmental impacts.

Staged Review Process: A series of review submissions at various stages in the design process.

Standard Construction Drawings: Detail drawings, identified by a specific number, published by ODOT, of items which are frequently used in plans and would otherwise require redrawing for each plan and have been pre-approved for general use.

Standard Pay Item: An item whose requirements are defined by the standard construction drawings and the Construction and Materials Specifications or Supplemental Specifications.

Station: A point or position on a measured line using 100-foot increments as a base of reference.

Straight Line Distance (SLD): Distance based on the centerline of the roadway as measured from the western or southern county line or other true beginning.

Subsummary Sheet: Plan sheets used to gather quantities prior to carrying them to the General Summary.

Supplemental Specifications: Detailed specifications for items which are in the development stage or are used only occasionally. These specifications supplement or supersede the Construction and Material Specifications.

Tie Points: Any three points used to verify the location of the control point for the centerline of construction.

Title Sheet: The cover sheet in a set of highway plans showing project identification and location, sheet index, design parameters, specifications, standard construction drawings, approvals, and other pertinent information.

Traffic Control Plan: A portion of a highway plan dedicated to signing, signalization, pavement marking and other traffic control details.

Typical Section: A portion of a highway plan showing typical cross-sectional views of the existing pavement and the roadway after construction is complete.

Waterwork Plans: A portion of a highway plan dedicated to construction of waterwork items including all plans, profiles, details and quantities required for waterwork items.

Work Limits: The extreme longitudinal limits of the contractor's responsibility, including all temporary and incidental construction (except temporary traffic control devices). Identified by the "Work Limit" station on the centerline of construction on the mainline and on the centerline of all side roads, cross roads, and other construction generally running perpendicular to the project or separated from the project.

TABLE OF CONTENTS

(Revised July 2013)

1200 PLAN PREPARATION

Figures (1200 Plan Preparation):

1300 PLAN COMPONENTS

1400 REVIEW SUBMISSIONS

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 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

With the exception of local-let projects and SPEDuP plans **[Section 1301.3]**, plans shall be submitted in a TIFF electronic image format. SPEDuP plans shall be submitted in PDF format. Information related to the creation, submission, minimum image properties, and file naming of electronic images is available through the **Office of Contracts** website:

http://www.dot.state.oh.us/Divisions/ContractAdmin/Contracts/Pages/default.aspx

Some external agencies do not allow submission of electronic images as final documents. For example, many county conveyance standards require submission of the Centerline Plat Sheet on a specific size of mylar. In instances where hard copy (i.e., paper) documents are required, the District Planning and Engineering Administrator will determine whether the hard copy document will be created by the District or by the consultant. The requirement to produce hard copy documents shall be included in the Scope of Services document.

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

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. With the exception of SPEDuP plans, electronic image files shall be formatted to be 22 inches by 34 inches and shall be capable of being bound and punched when printed as shown in **Figure 1201-1**.

Simplified plans shall be formatted to quarter size (11 inches by 17 inches).

SPEDuP plans shall be formatted to be letter size (8 ½ inches by 11 inches). See **Location and Design Manual**, Sections 1301.3 and 1316 for additional information on SPEDuP plan requirements.

SECTION 1200

Plan Preparation

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) 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 title 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. Title blocks are not required for SPEDuP plans.

1201.5.2 Sheet Numbers

Sheet numbers are shown in the split circle in the lower right corner of the sheet. 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. Sheet numbers on SPEDuP plans shall be located in the lower right of the page footer, using the PAGE X of XX format.

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. Formal Title blocks are not required for SPEDuP plans, but items as described in **Sections 1201.6.2, 1201.6.3, 1201.6.4**, and **1201.6.5** shall be shown on the SPEDuP Title sheet [**SP 1302-8**].

1201.6.2 Railroad Involvement

The names of all railroads involved in the project must be entered in the space provided on the title sheet. 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 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 on the title sheet. 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 inch by 34 inch full-size plan sheets will be reproduced to 11 inch by 17 inch prints prior to distribution.

SECTION 1200

Plan Preparation

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.

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. The lettering in SPEDuP plans shall be Arial Bold, with a minimum font size of 10.

1202.3 Cross-Section Grids

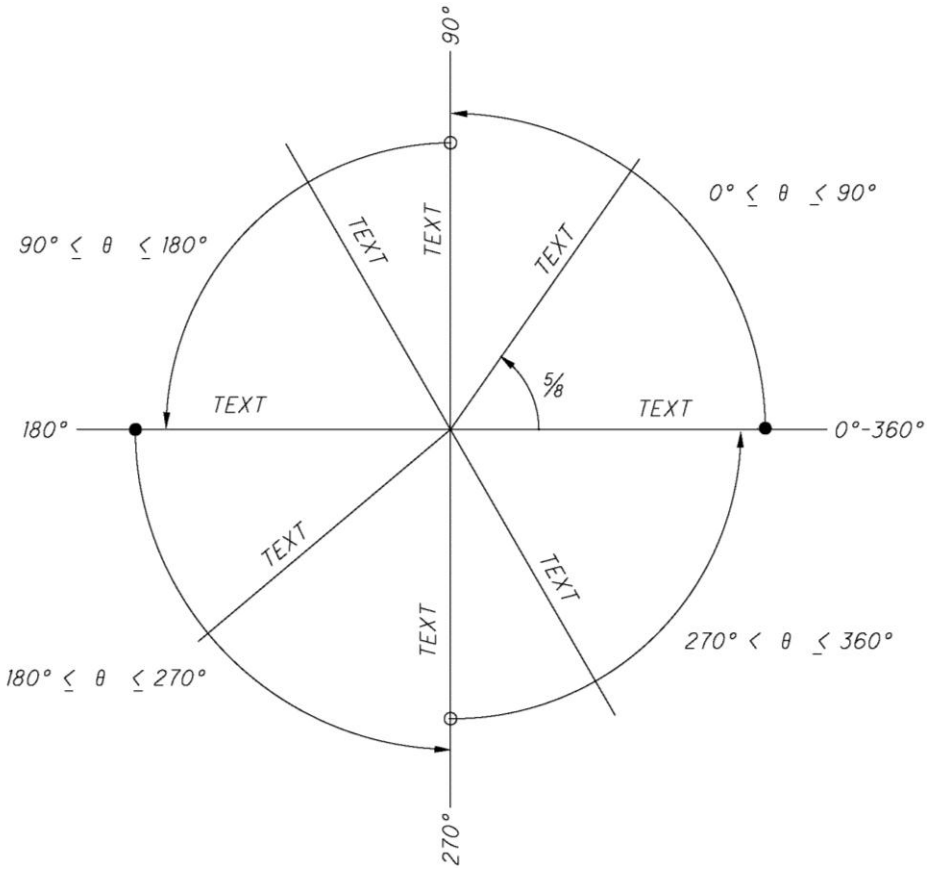
Acceptable grid systems for cross-sections and profiles are shown in **Figure 1202-1**. Letters and lines should be bolder when they are superimposed over cross-section grids.

1202.4 Drafting Conventions

The following sections present the preferred standard drafting guidelines for roadway construction plans. Standard drafting symbols are available from the Office of CADD and Mapping Services, CADD section's website.

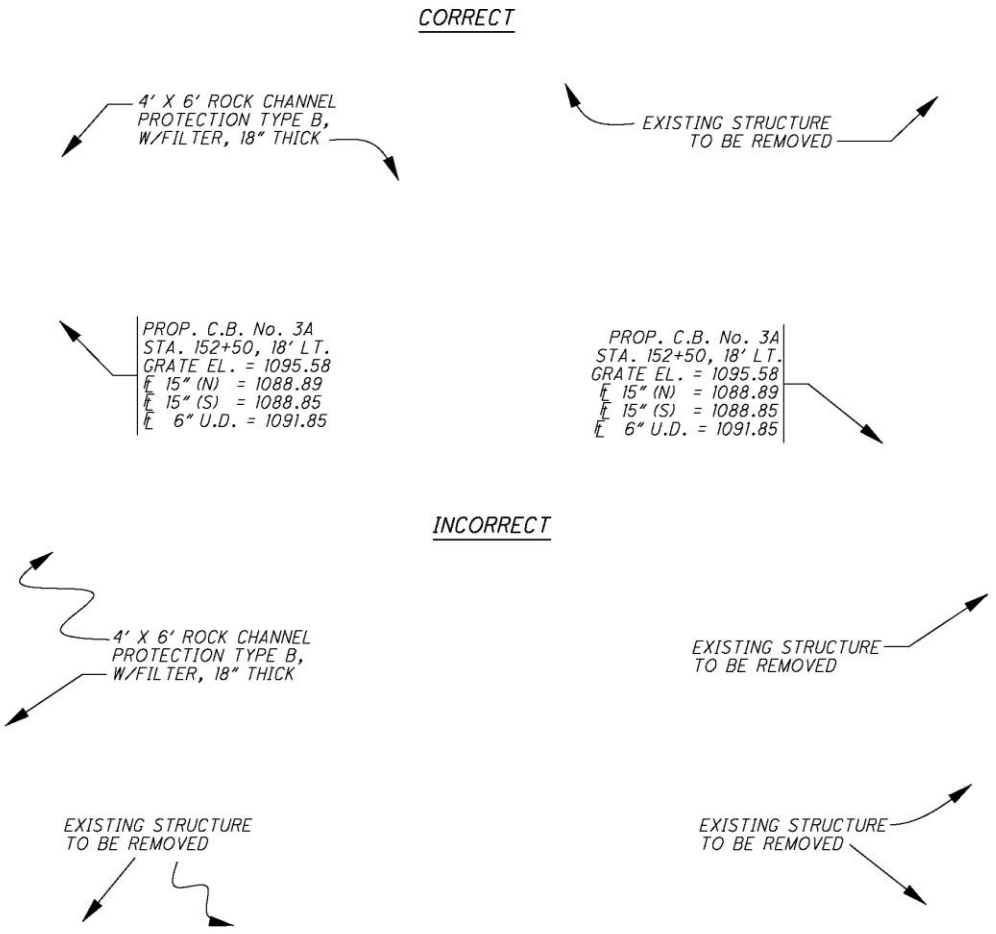
1202.4.1 Text Orientation

Text on inclined lines should be orientated as shown.



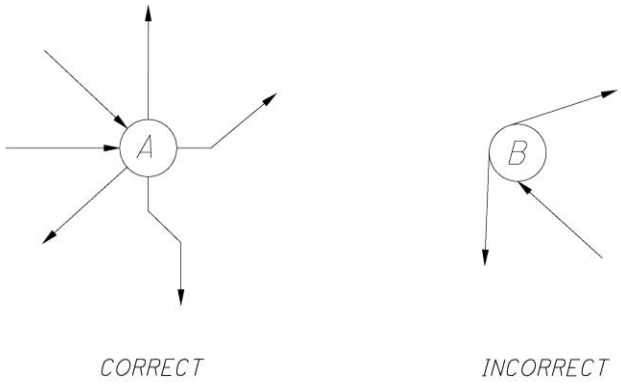
1202.4.2 Placement of Leaders from Notes

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.



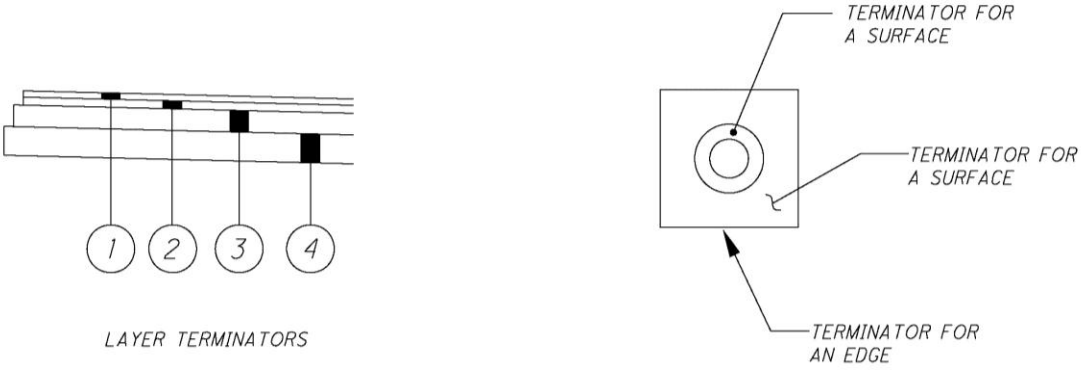
1202.4.3 Placement of Leaders to, or from, a Circular Object

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



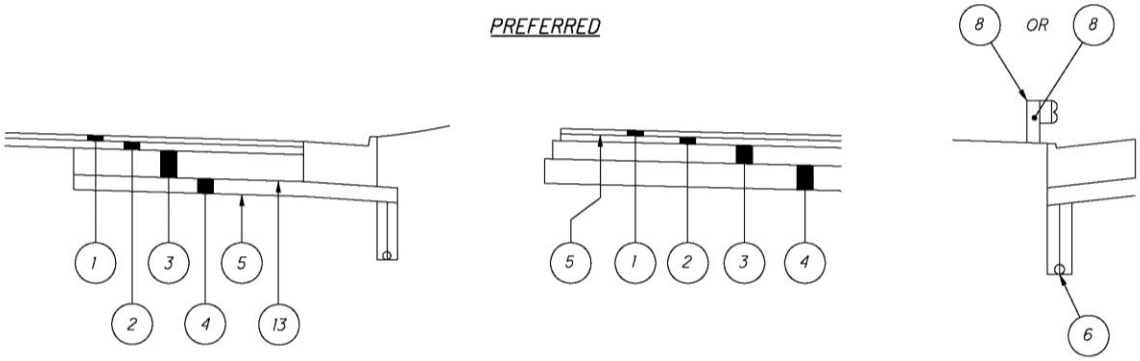
1202.4.4 Terminators

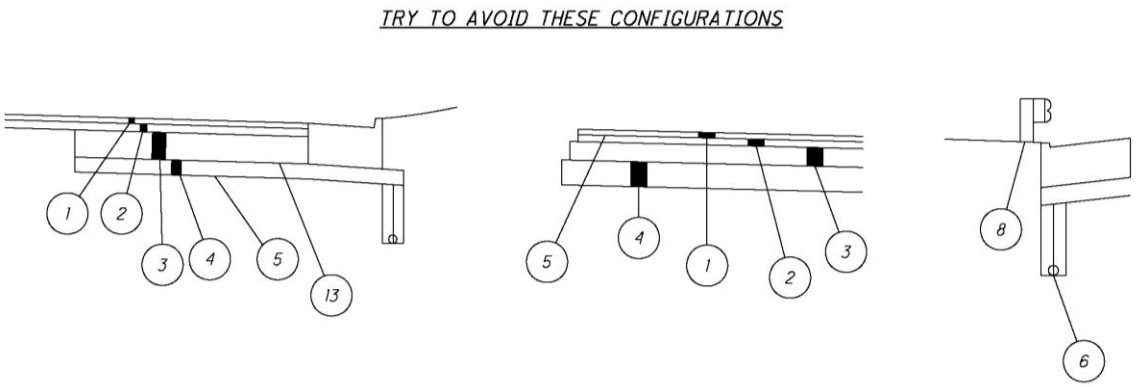
Leaders should terminate with an arrowhead when pointing to an object or to an edge, and should terminate as shown when pointing to a surface or layer.



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.





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.

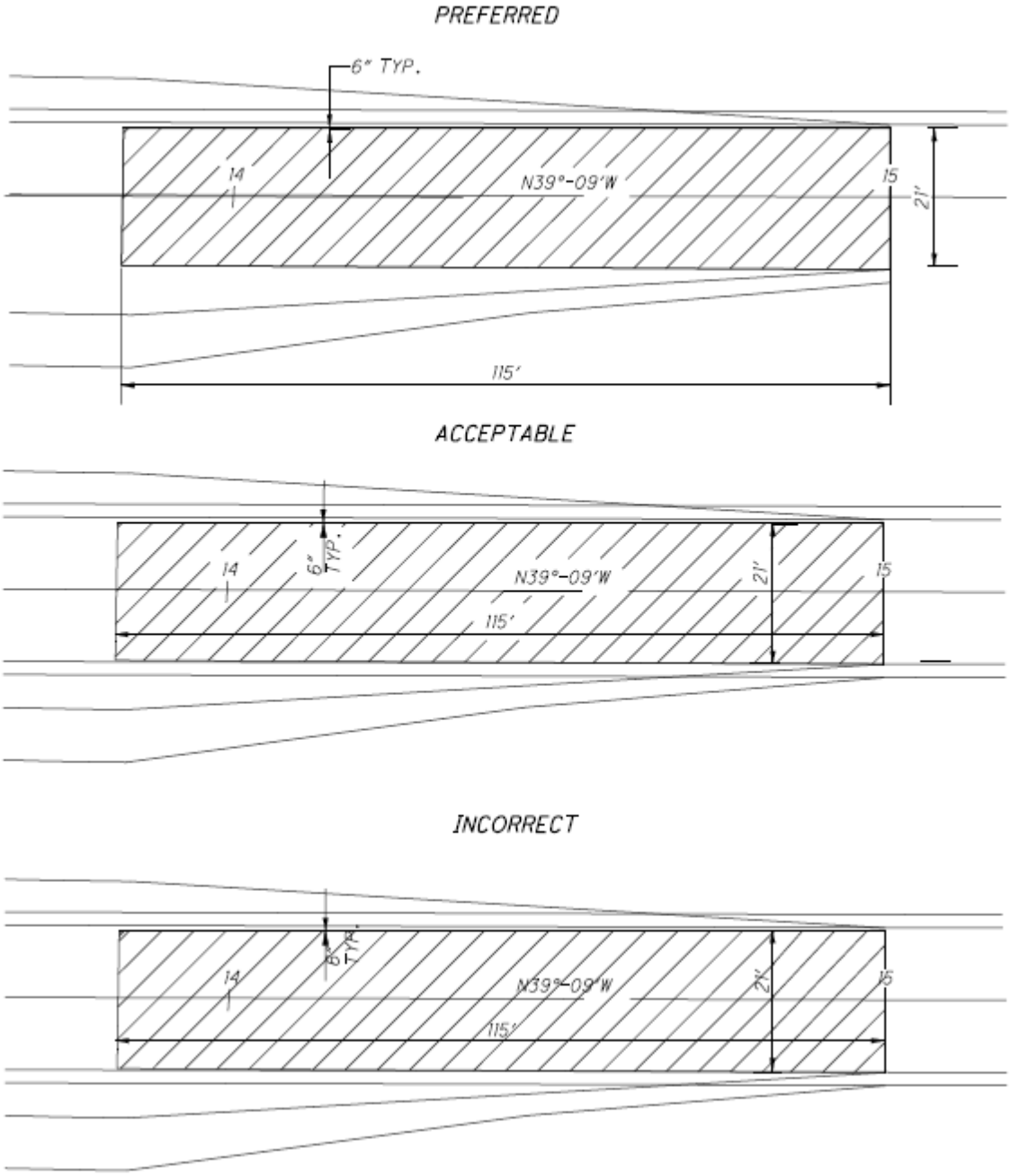
ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION
				ROADWAY
606	13000	11650	FT	GUARDRAIL, TYPE 5
606	13050	175	FT	GUARDRAIL, TYPE 5A
606	25000	12	EACH	ANCHOR ASSEMBLY, TYPE A
606	26500	23	EACH	ANCHOR ASSEMBLY, TYPE T
606	35000	36	EACH	BRIDGE TERMINAL ASSEMBLY, TYPE 1
606	35100	4	EACH	BRIDGE TERMINAL ASSEMBLY, TYPE 2
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	

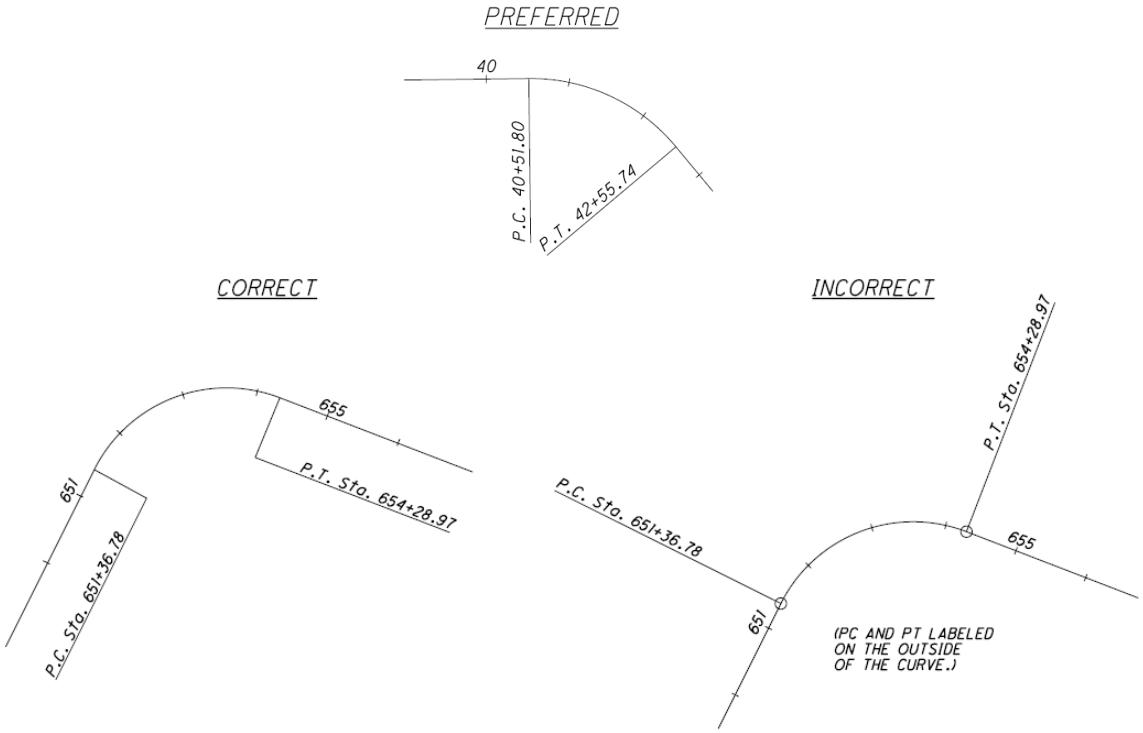
1202.4.7 Overdrafting

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.

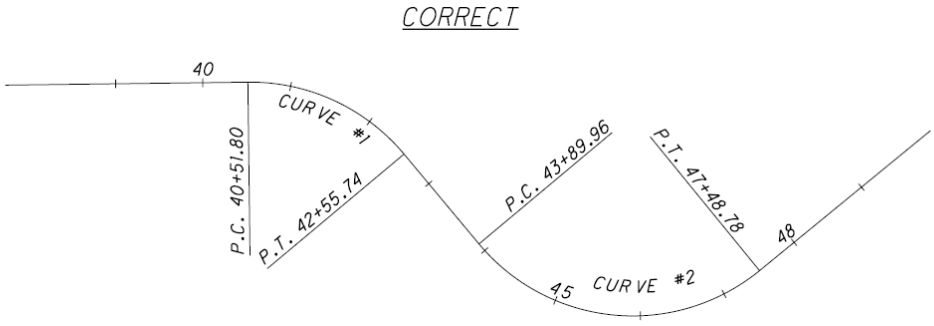


1202.4.8 Horizontal Curve Data

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.



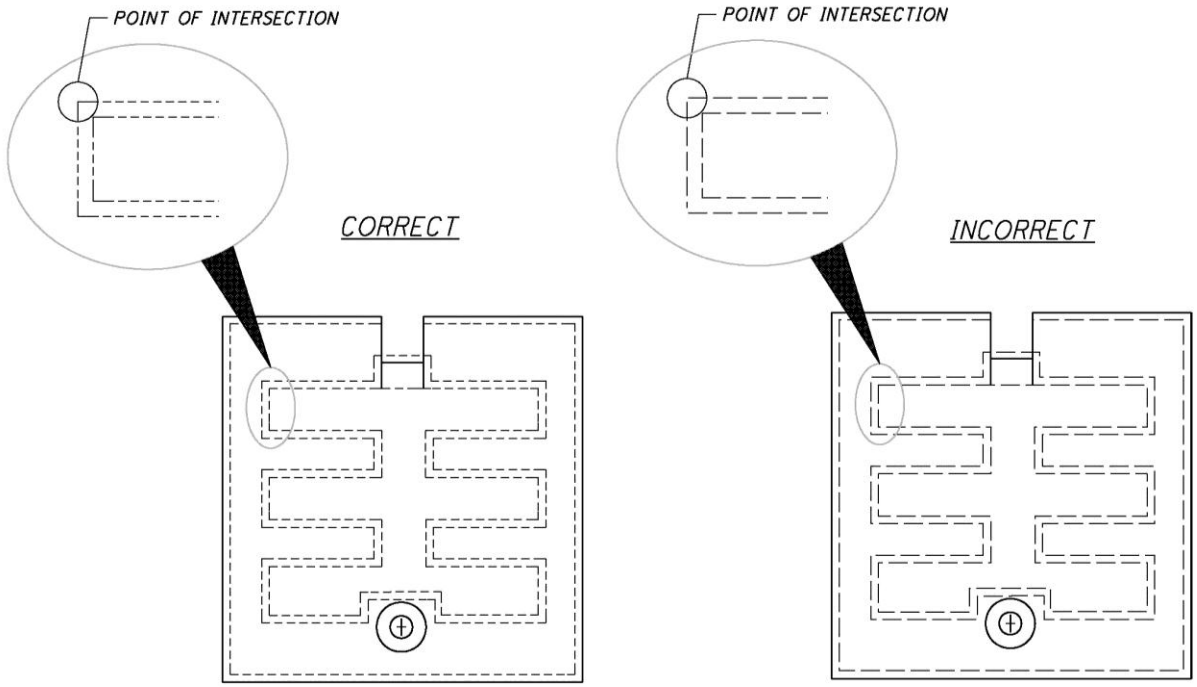
When space prohibits or when an alignment has a large number of horizontal curves, label each curve and tabulate the curve data. If it is necessary to tabulate curve data for a few curves along an alignment, then all curves should be tabulated to provide consistency.



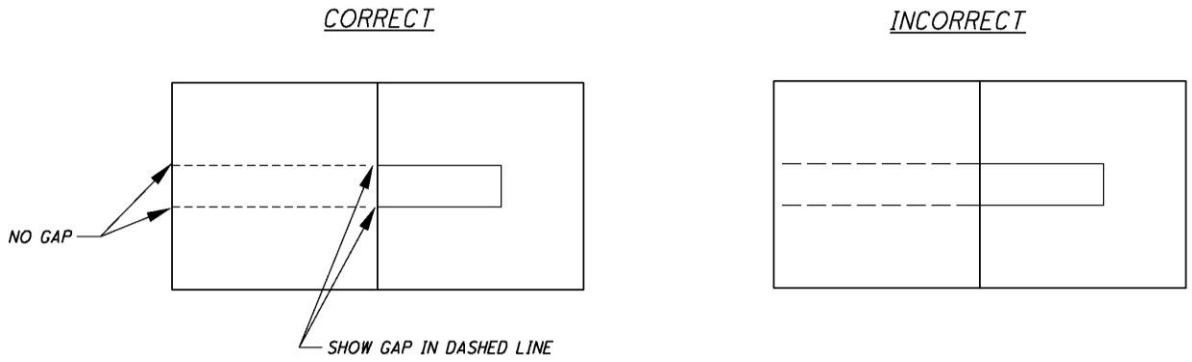
CURVE #1 DATA	CURVE #2 DATA
P.I. STA. 41+61.02, ℄ CONST. TRUMP RD.	P.I. STA. 46+17.51, ℄ CONST. TRUMP RD.
Δ = 50° 48′ 16″ RT.	Δ = 89° 23′ 07″ LT.
D_C = 24° 54′ 40″	D_C = 24° 54′ 40″
R = 230.00′	R = 230.00′
T = 109.22′	T = 227.55′
L = 203.94′	L = 358.82′
E = 24.62′	E = 93.54′
e_{max} = 0.025	e_{max} =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

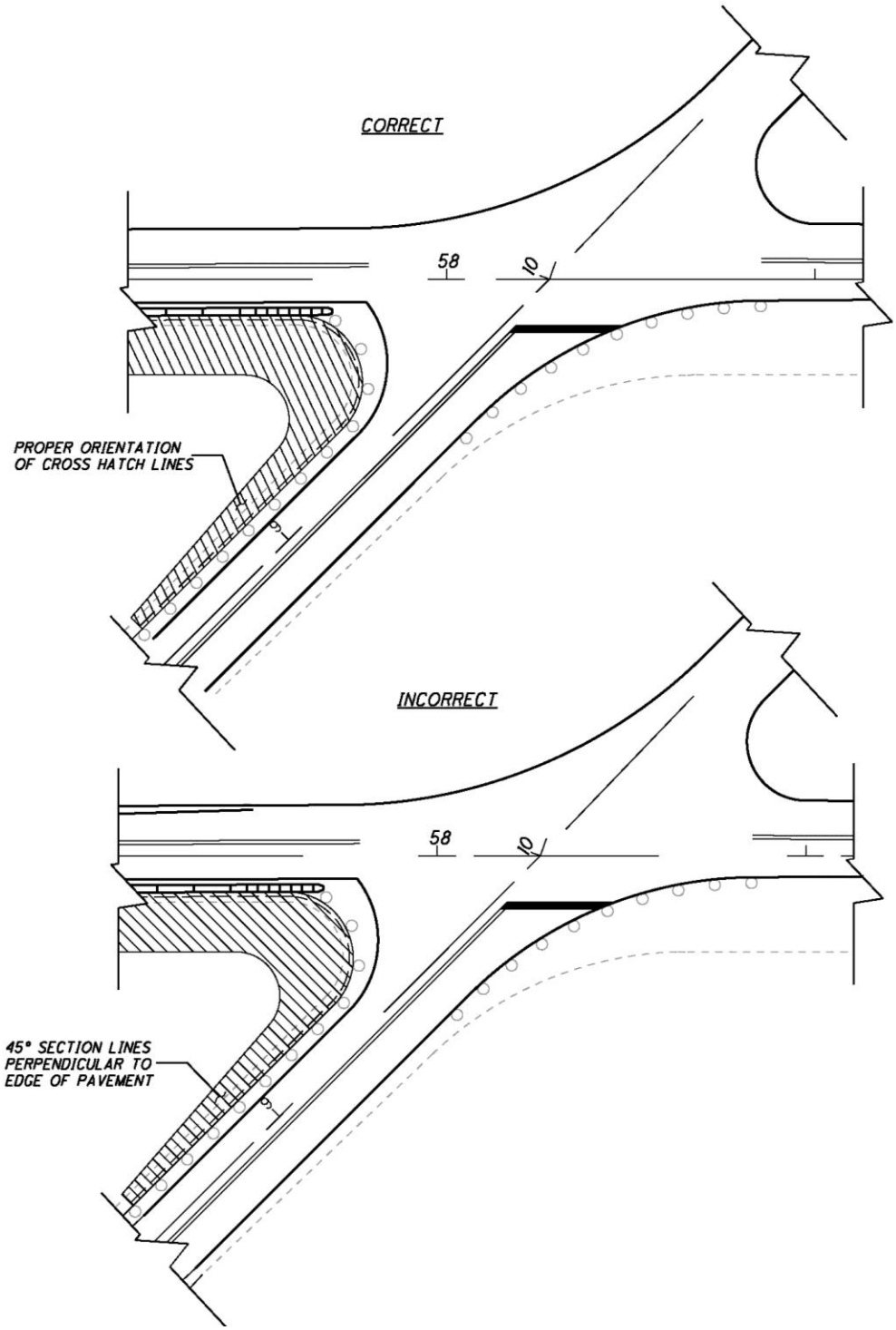


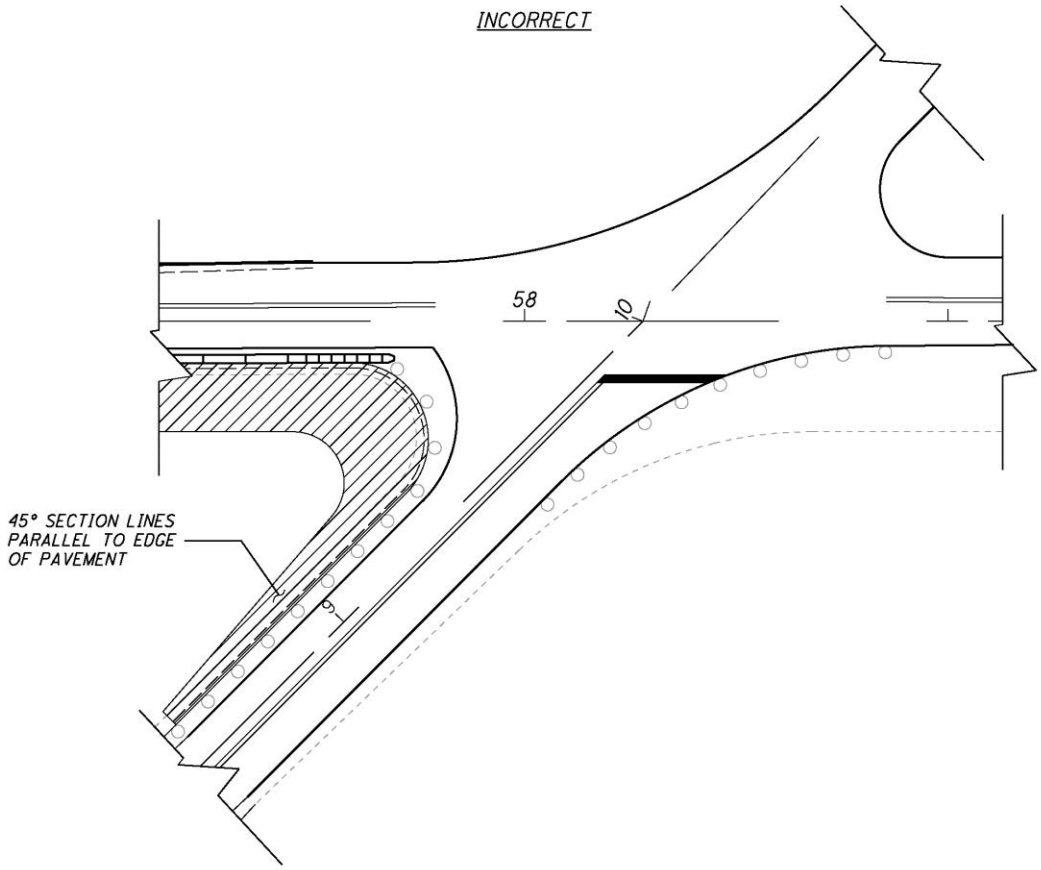
When needed for clarity, a gap should be shown at all locations where a visible edge becomes hidden by another surface as shown below.



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.

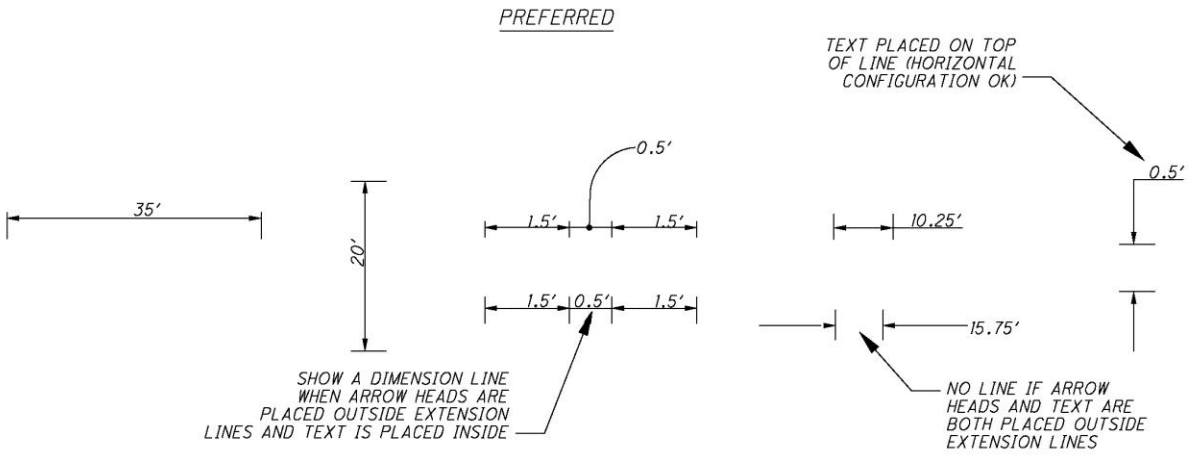


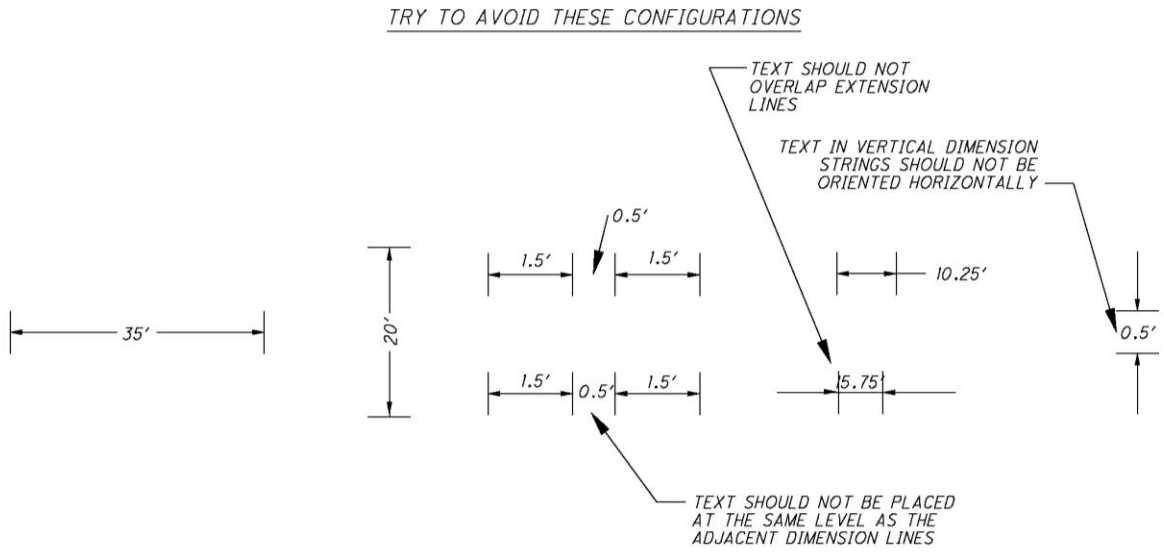


1202.4.11 Placement of Dimension Text

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.

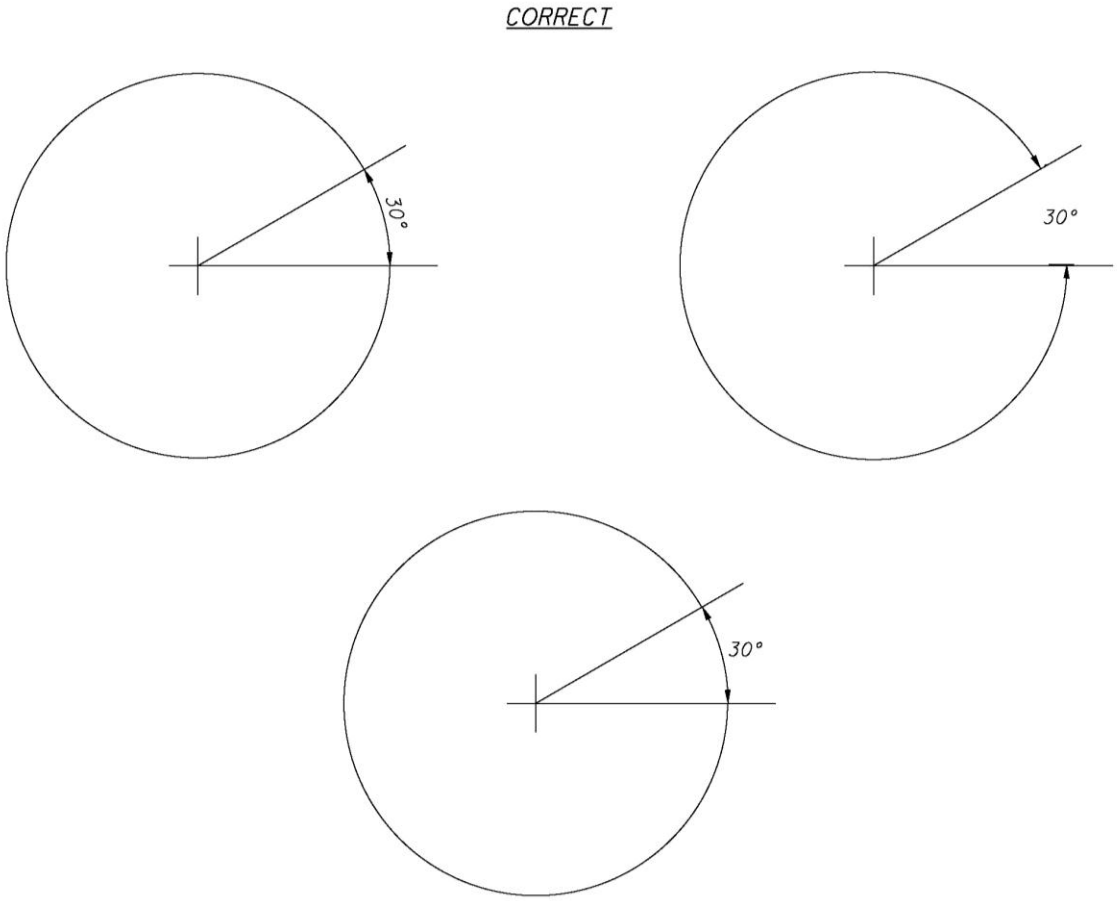
Additional dimension text preferences are shown on the following page.

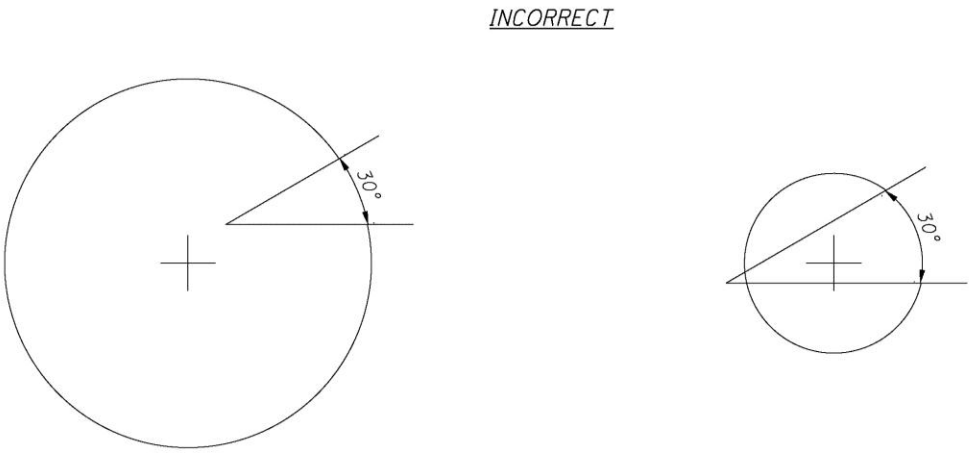




1202.4.12 Angular Dimensions

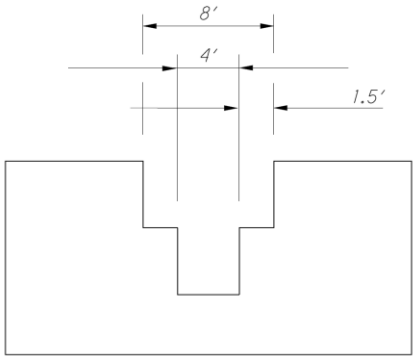
Angular dimensions should be placed with an arc drawn from the vertex of the angle.





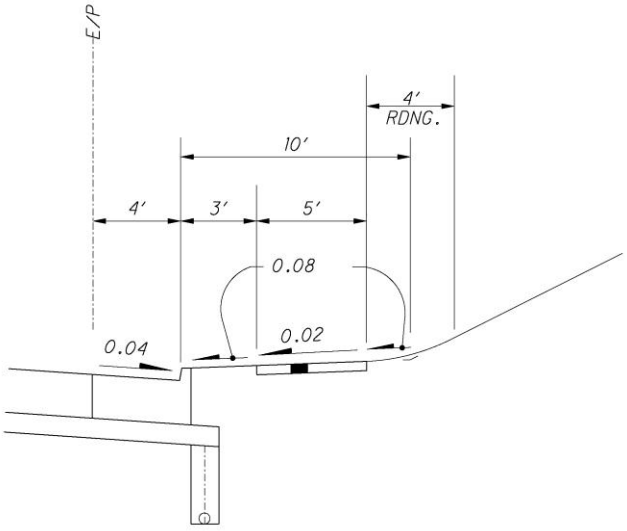
1202.4.13 Dimension in Crowded Conditions

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



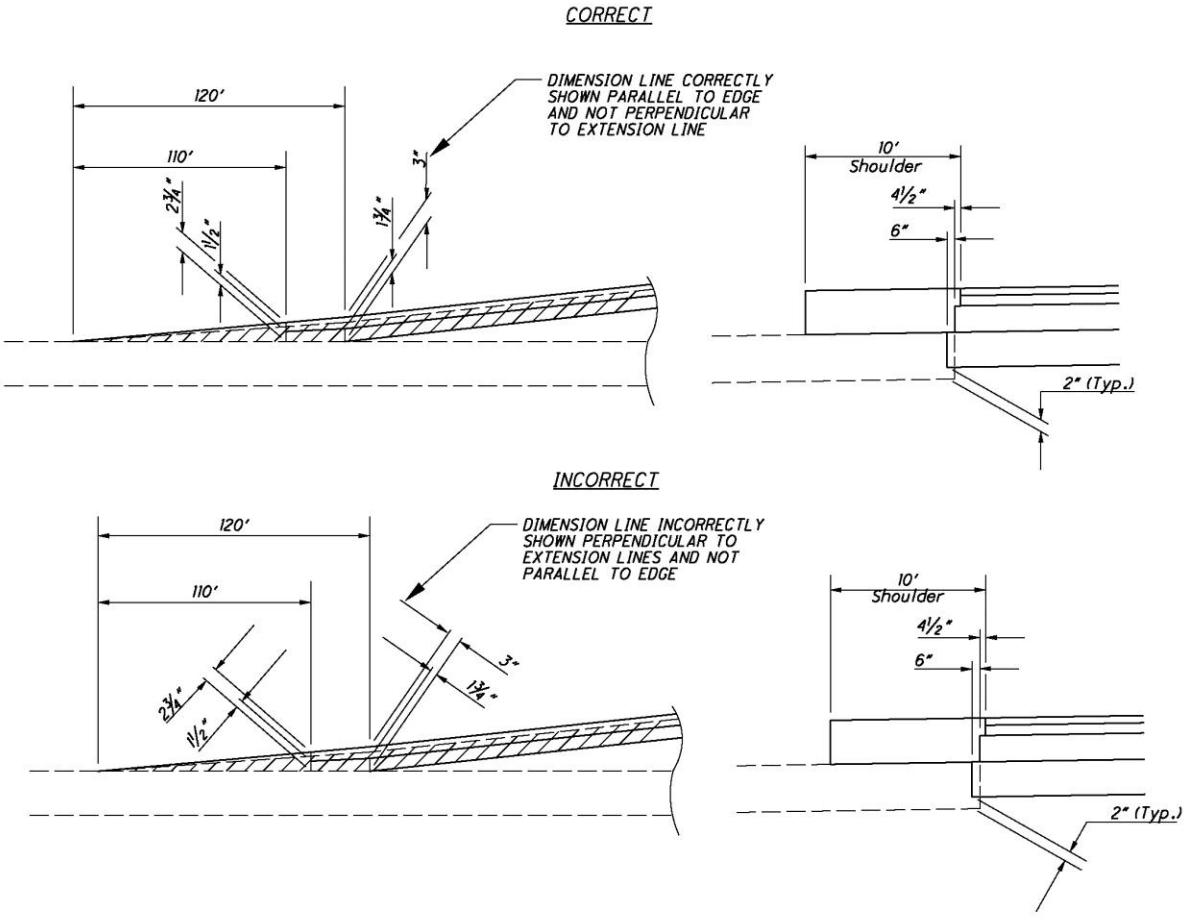
1202.4.14 Dimensioning with a Dot

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



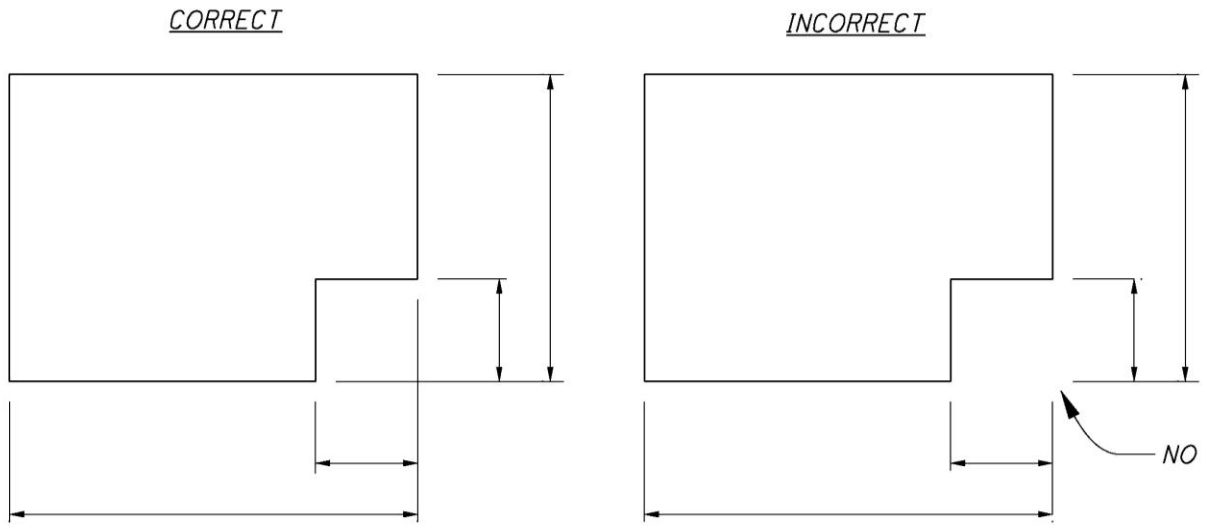
1202.4.15 Dimensioning at Angles

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.

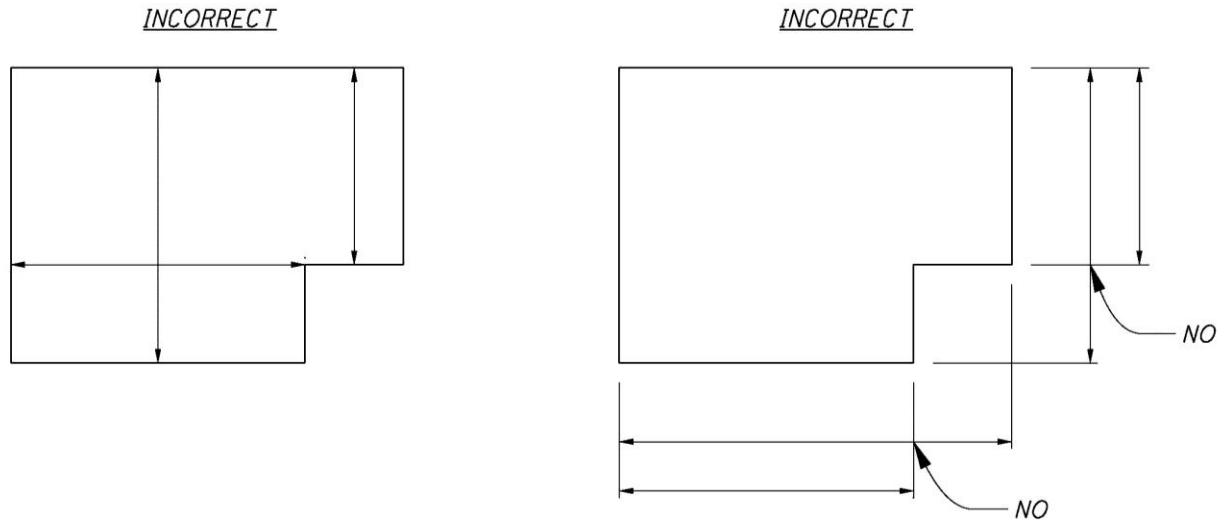


1202.4.16 Dimensioning an Object

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.

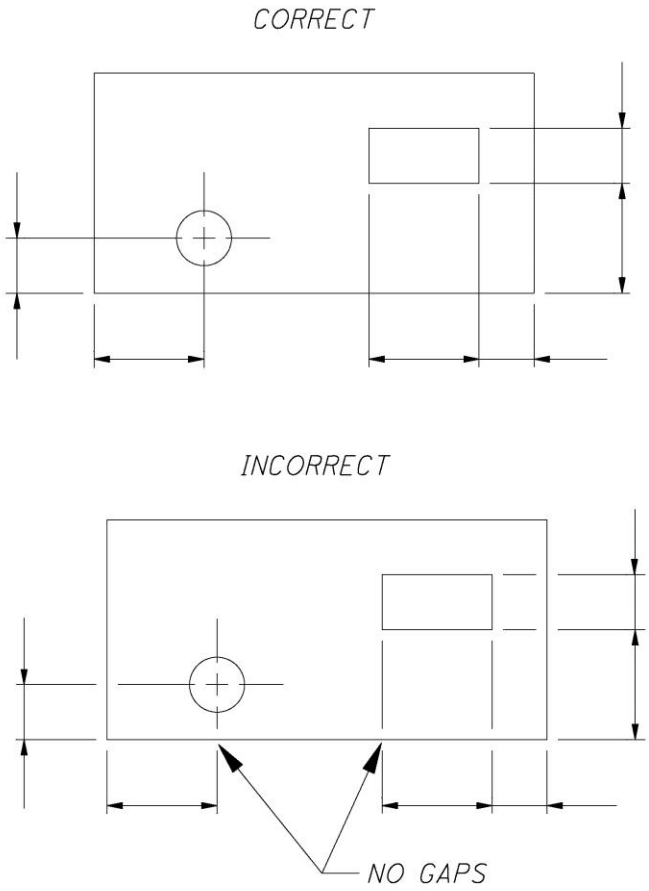


Extension lines should not be shortened. Also, a dimension line should never coincide with or form a continuation of any line of the drawing. If possible, dimensions should always be placed off the object.



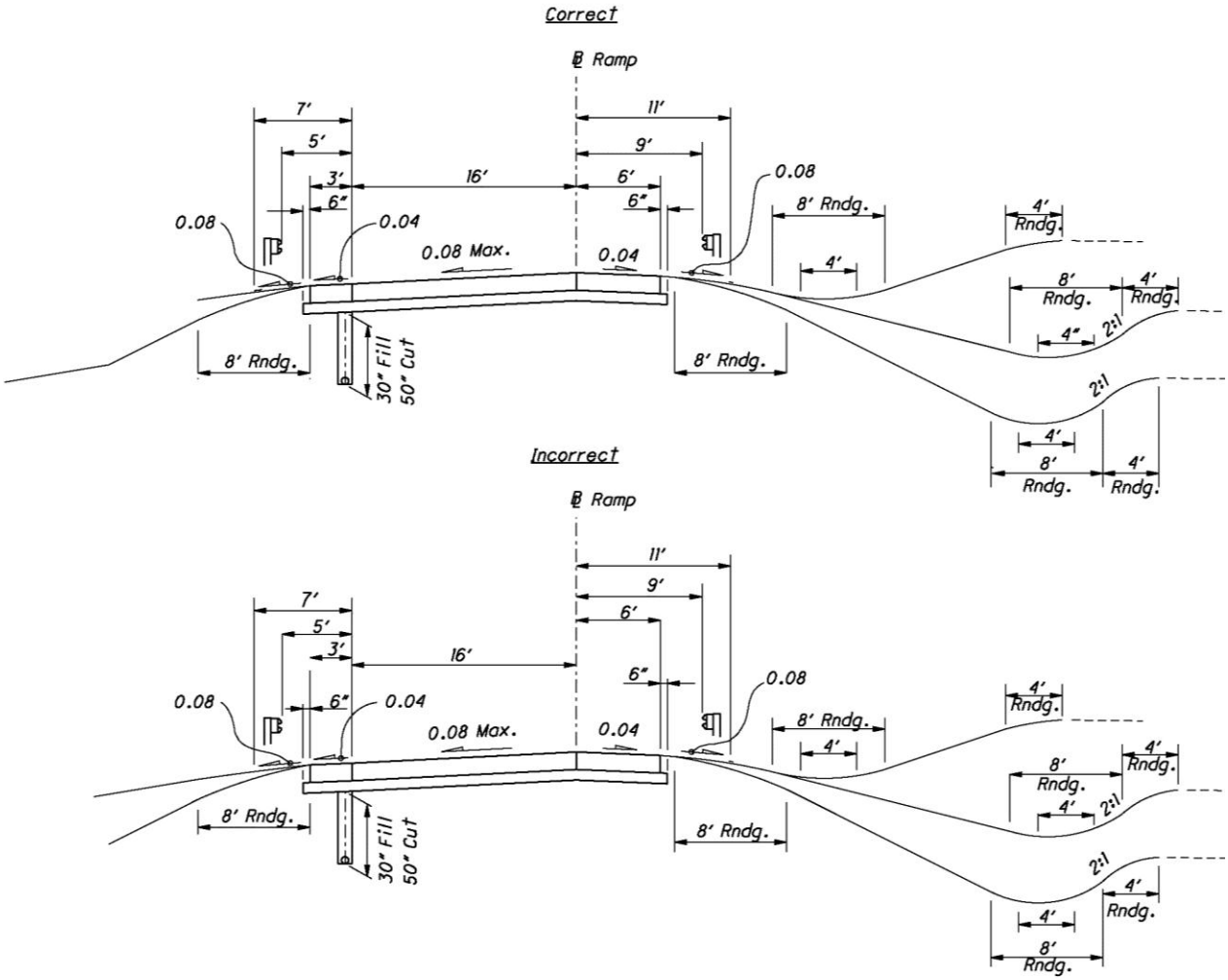
1202.4.17 Crossing Dimension Lines

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



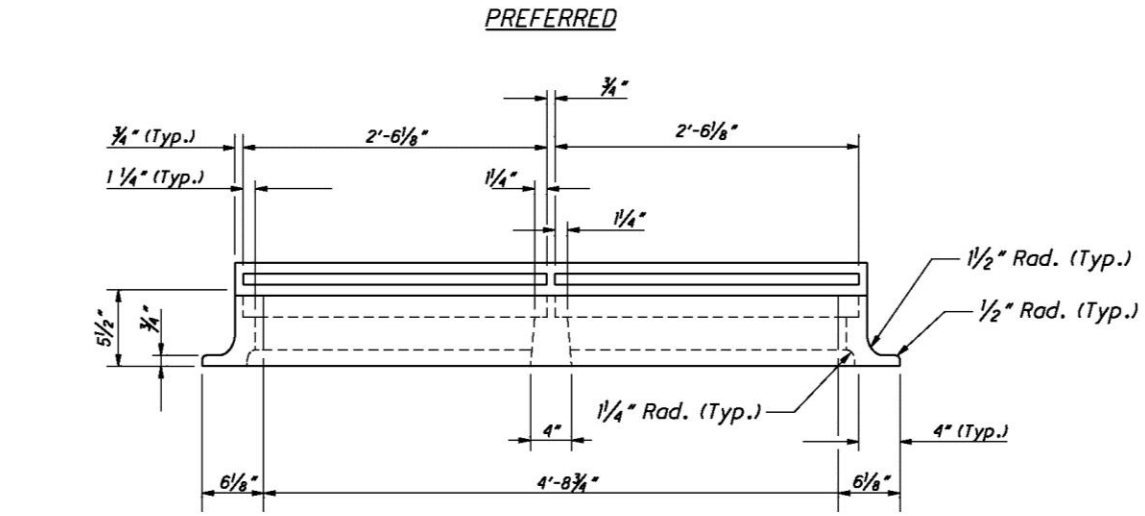
1202.4.18 Grouped Dimensions

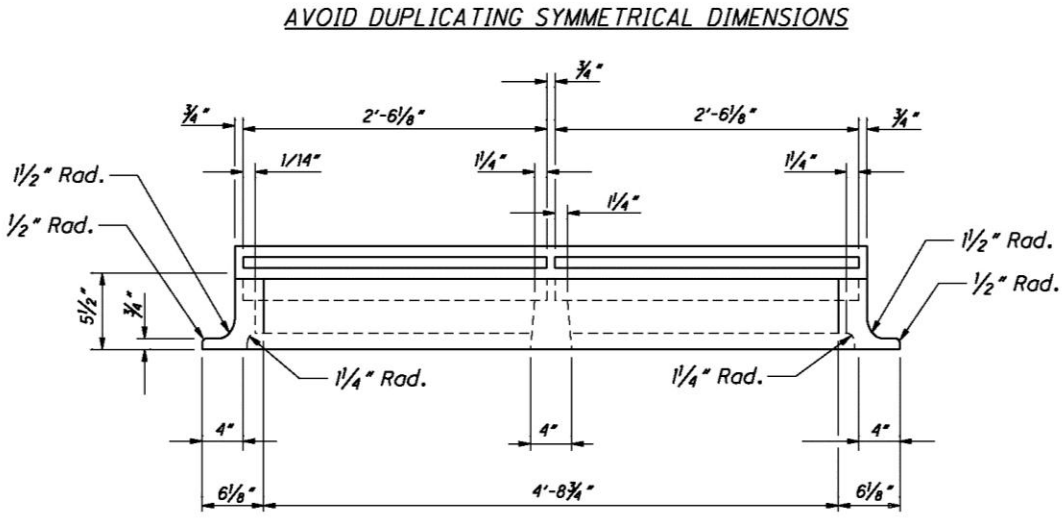
Grouped dimensions should be in line, evenly spaced and off the object being dimensioned.



1202.4.19 Use of "Typical"

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





1202.5 Computer Aided Drafting and Design (CADD)

ODOT customizations and standards for MicroStation and GEOPAK software are available from The Office of CADD and Mapping Services' website:

http://www.dot.state.oh.us/Divisions/Engineering/CADDMapping/CADD/Pages/default.aspx

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 their associated revision dates, must be listed on the Title Sheet.

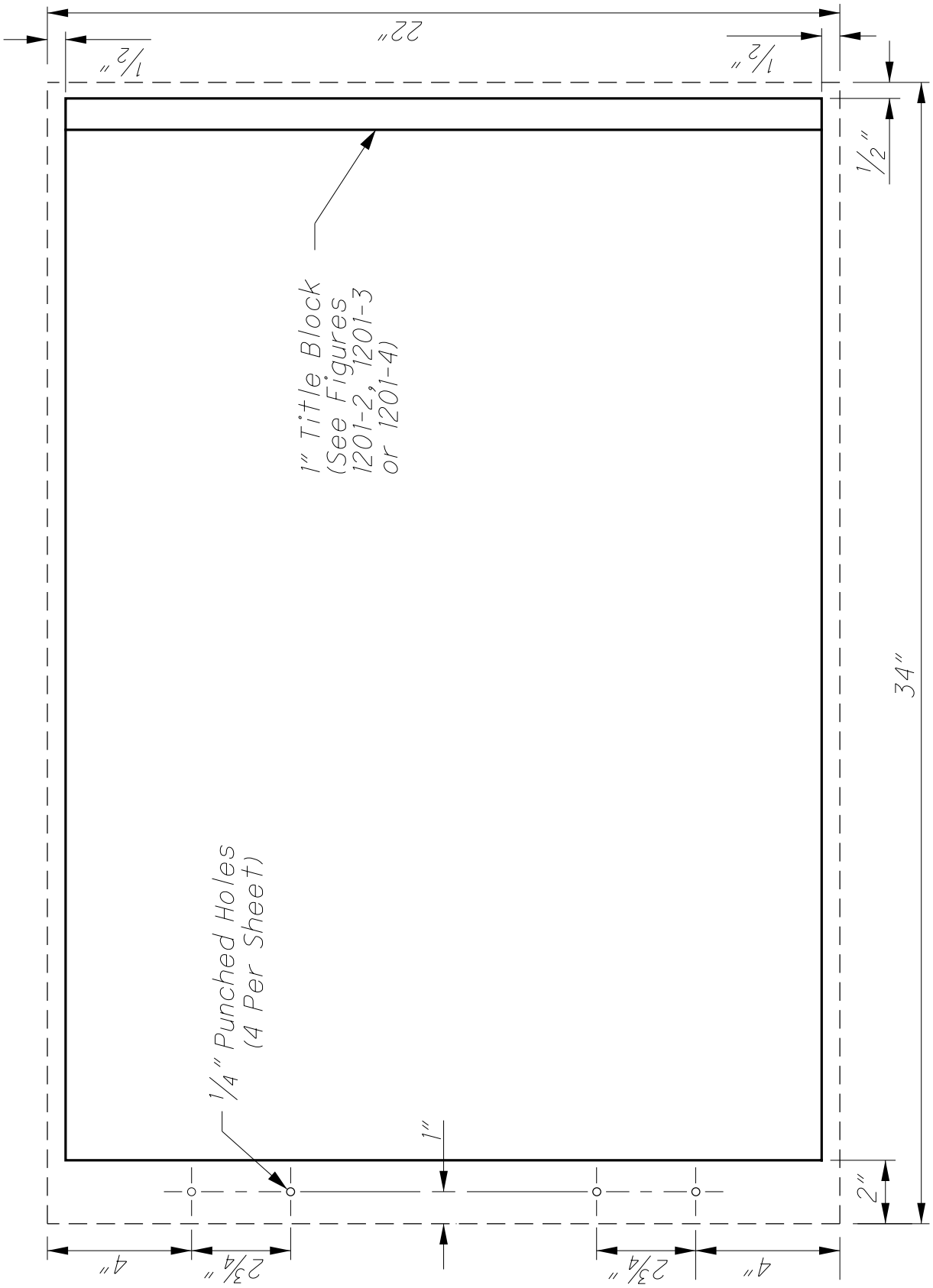
1203.2 Plan Insert Sheets

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.

PLAN SHEET DIMENSIONS

1201-1

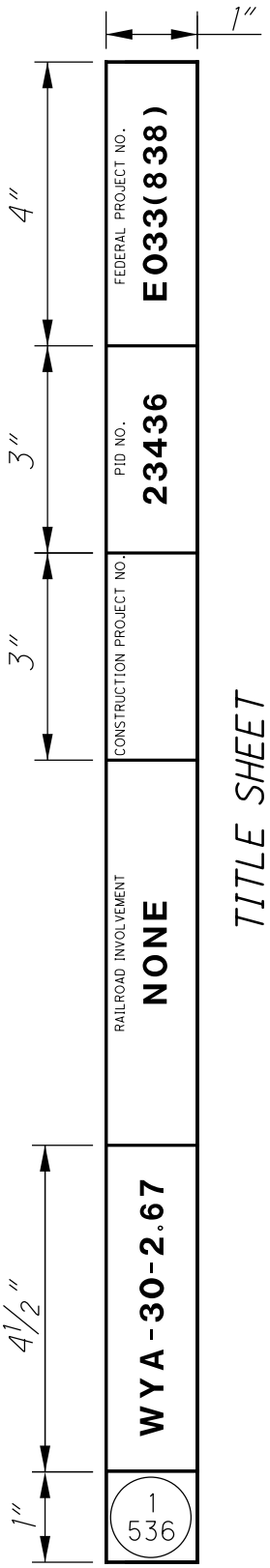
REFERENCE SECTION
1201.4, 1201.5



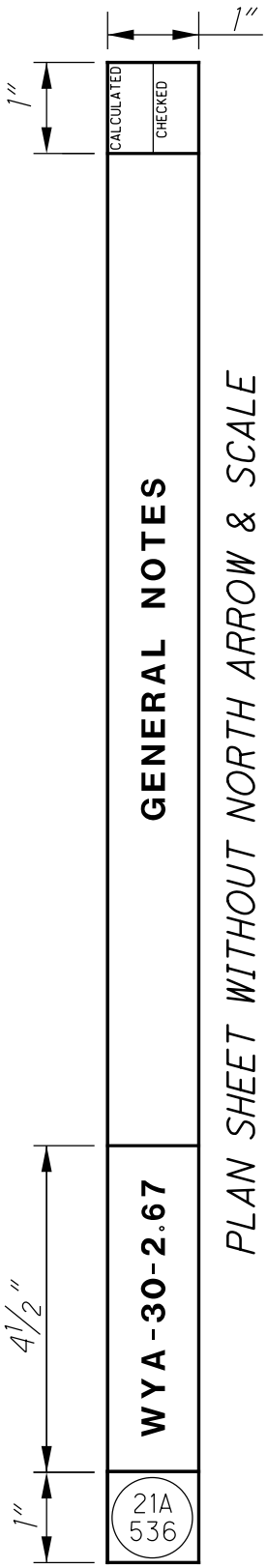
TITLE BLOCK EXAMPLES FOR ROADWAY PLANS

1201-2

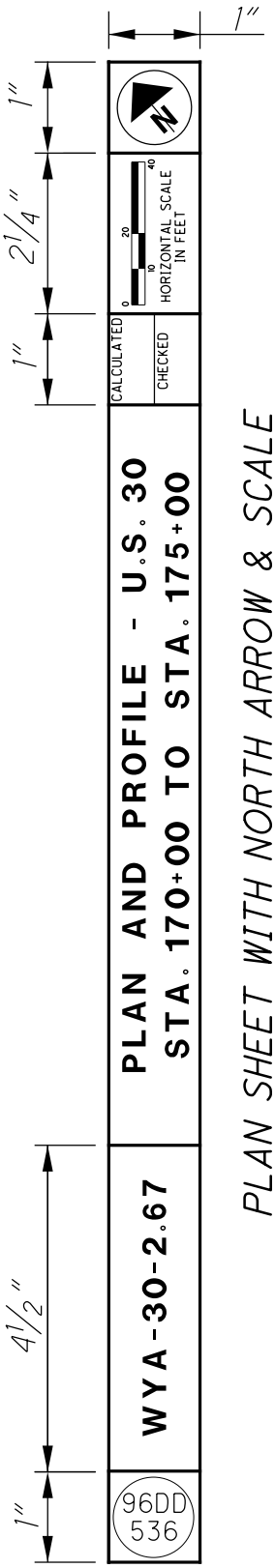
REFERENCE SECTION
1201.5



TITLE SHEET



PLAN SHEET WITHOUT NORTH ARROW & SCALE



PLAN SHEET WITH NORTH ARROW & SCALE

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.

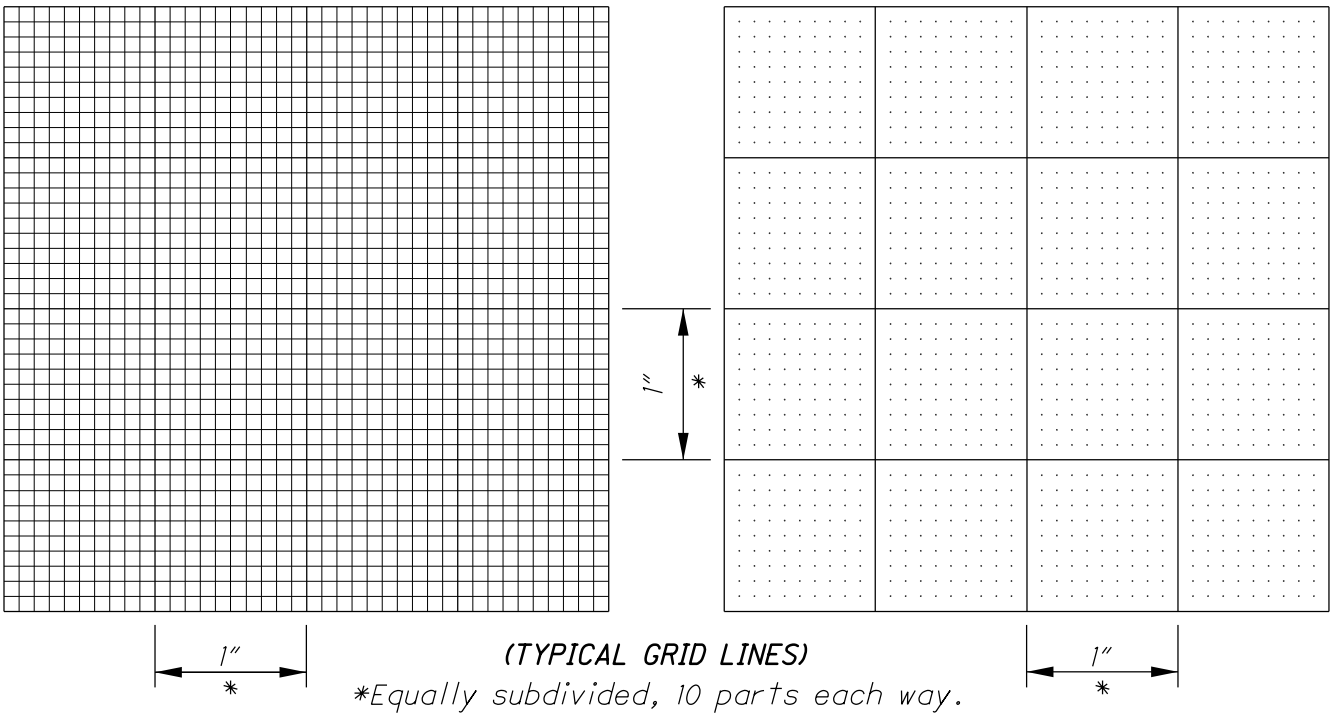
January 2013

ACCEPTABLE GRID SYSTEMS

1202-1

REFERENCE SECTION
1202.3

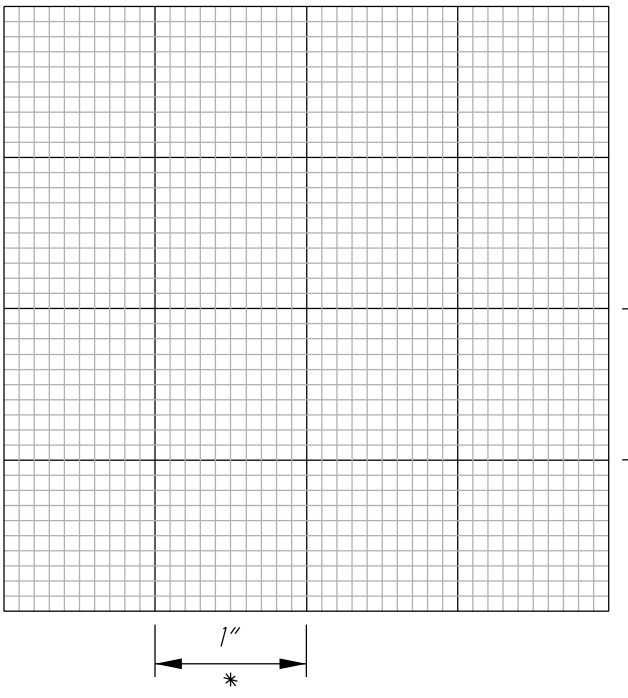
CROSS SECTIONS



(TYPICAL GRID LINES)

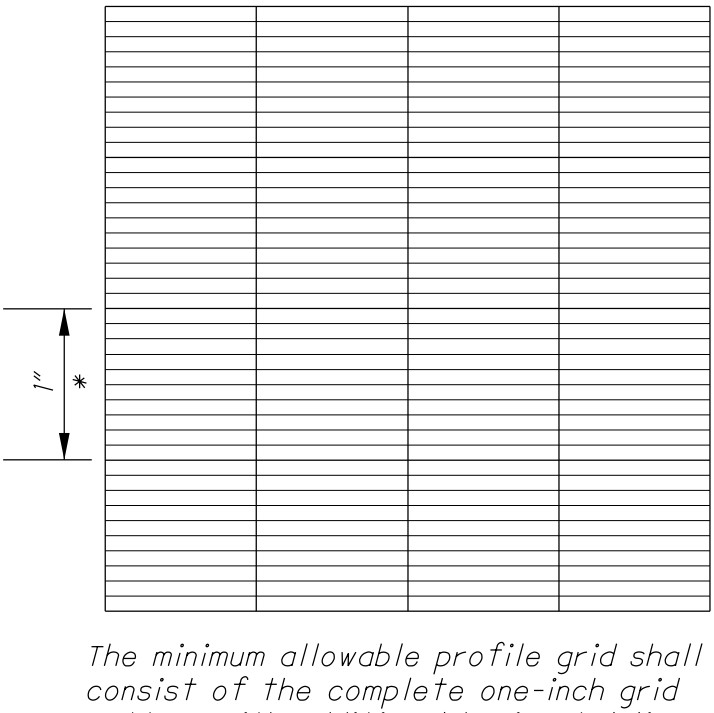
*Equally subdivided, 10 parts each way.

CROSS SECTIONS



(DITHERED GRID LINES)

PROFILES



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

Section 1300
Plan Components

1301 Introduction

Plan development relies on standards and guidelines to provide clear, concise, and accurate construction documents. Detailed construction plans include illustrations of proposed work, plan notes, specifications, and quantities enabling contractors to bid and execute an ODOT project. Section 1300 has been developed to provide general guidelines under which to develop ODOT construction plans.

Section 1300 combines many components of final plan development and outlines the content required in each plan set. The subsections listed within this document are intended to provide details related to plan format and **not** design standards. ODOT maintains specific manuals related to design standards (i.e. **Bridge Design Manual**, **Location and Design Manual, Volume 1**, **Traffic Engineering Manual**, etc.) which establish design criteria required for the facility.

Section 1300 includes references to Figures and Sample Plans. The figures are tables and diagrams presenting plan sheet requirements. The figures are referenced with bold text. The following is an example: **Figure 1302-1**.

The Sample Plans are examples of ODOT plan sheets (i.e. Title Sheet, Schematic, Typical Sections, etc.). The Sample Plans are intended to be used as a "guide" to assist the designer with plan development. The Sample Plans are not all inclusive and final plan development in accordance with ODOT standards is the responsibility of the designer. Structural plans (**Bridge Design Manual**) and Right-of-Way plans (**Right-of-Way Manual**) shall be developed according to their respective manuals. The Sample Plans are referenced with brackets and bold text. The following is an example: **[SP 1302-1]**.

1301.1 Standard Plans

Standard highway plans are made up of several components. Most of these components are discussed in detail in this section. Except for very complex projects, seldom will all of the components be required in a plan. However, when they are required, they should be located in the order indicated below.

- Title Sheet
- Schematic Plan
- Typical Sections
- General Notes
- Maintenance of Traffic (Notes and Plan Details)
- General Summary
- Subsummaries
- Calculations
- Project Site Plan
- Plan & Profile (Mainline)
- Plan & Profile (Side Roads, ramps, etc.)
- Cross-Sections (Mainline)
- Cross-Sections (Side Roads, ramps, etc.)
- Superelevation Tables

Section 1300
Plan Components

- Interchange Details
- Intersection Details
- Drive Details
- Storm Sewer Profiles
- Culvert Details
- Channel Details
- Channel Cross-Sections
- Drainage Details
- Retaining Walls (not associated with Structures)
- Sanitary Sewer
- Water Work
- Miscellaneous Details
- Traffic Control
  - Pavement Marking
  - Signing
  - Signals
- Lighting
- Landscaping
- Structures (under 20')
- Structures (20' and over)
  - Site Plan
  - General Plan
  - General Notes
  - Estimated Quantities
  - Stage Construction Details
  - Foundation Plan
  - Abutment Details
  - Retaining Wall Details
  - Pier Details
  - Superstructure Details
  - Reinforcing Steel List
- Fence Plan
- Right-of-Way
  - Right-of-Way Legend Sheet
  - Centerline Plat
  - Property Map
  - Summary of Additional Right-of-Way
  - Detailed Right-of-Way

- Railroad or Government Land Plats, Soil Profile/Foundation Investigation (These sheets are not included in the sequential numbering of the construction plan. On the Title Sheet list "Soil Profiles" without sheet numbers. Soil profiles should be numbered separately from the construction plans.)

1301.2 Simplified Plans

Simplified Plans are appropriate when the proposed work is simple and straightforward. Some examples include: guardrail upgrading, pavement marking, herbicidal spraying, mowing, fencing, and resurfacing projects.

Simplified plans contain only the information necessary to minimally describe the type and location of the work. Typically, such plans consist of the following components:

Title Sheet **[SP 1302-7]**
Typical Sections
General Notes
General Summary, Subsummaries, Calculations
General plan, sketch, line drawing, or plan and profile
Special Details

Simplified plans may be used provided they give sufficient information to adequately describe the work so that a contractor can properly bid and construct the project. In some cases, this information can be presented entirely in written format, without the use of drawings. See **Section 1315** for additional information regarding simplified plan content.

1301.3 SPEDuP (Simplified Plan – Expedited Delivery Project) Plans

Simplified Plan Expedited Delivery Projects (SPEDuP) are considered to be fairly straight forward with minimal design needed, no Federal funding, no right-of-way issues, no utility impacts, and no environmental impacts. The SPEDuP program expedites the delivery of these routine maintenance-type projects, while providing a reliable product for construction personnel.

SPEDuP plans are required when the proposed project meets the following criteria:

- PDP Path 1 project as identified by ODOT's Project Development Process (no right-of-way impacts, no impacted utilities, environmentally exempt)
  - Link*: http://www.dot.state.oh.us/projects/pdp/Pages/PDP_Path_Matrix.aspx*
- Maintenance – proposed work is simple and straightforward
- 100 % State funded
- Maximum number of letter size (8 ½" x 11") plan sheets = 30

Some examples of eligible projects could include: guardrail upgrading, pavement marking, herbicidal spraying, mowing, fencing, 2-lane resurfacing, signal installations, slide repairs, 2-lane and multi-lane pavement patching.

SPEDuP plans are NOT permitted when the proposed project involves any of the following:

- Right-of-Way involvement
- Utility involvement
- Federal funding
- Local funding
- Maintenance of Traffic detailing required
- 4-lane divided Interstate or Interstate lookalike resurfacing

Section 1300
Plan Components

- Significant plan detailing required

SPEDuP plans must provide sufficient information necessary to minimally describe the type and location of the work. This information may be presented entirely in written format, without the use of drawings. Typically such plans consist of the following components:

Title Sheet [SP 1302-8]
Typical Sections
General Notes
General Summary, Subsummaries, Calculations
General plan, sketch, line drawing, or plan and profile
Special Details

See Section 1316 for additional information regarding SPEDuP plan content.

1301.4 Order of Precedence

As defined in the **Construction and Materials Specifications**, the order of precedence for all contract documents is:

1. Addenda.
2. Proposal and Special Provisions.
3. Plans.
4. Supplemental Specifications.
5. Standard Construction Drawings.
6. Standard Specifications.

1302 Title Sheet

1302.1 General

The title sheet serves as a preface for the remainder of the construction plan. It gives a brief description and the length of the project, shows the general location of the project, sets up the specifications under which the project is to be built, states whether traffic is to be maintained or detoured, lists earth disturbed areas, gives an index of all sheets in the plan (except for SPEDuP Plans [SP 1302-8]), lists standard construction drawings, supplemental specifications, and special provisions, and contains the signature of approval by the proper officials.

Simplified Plan Expedited Delivery Projects (SPEDuP) have a more streamlined format than traditional plans. Therefore, the title sheet for a SPEDuP plan will not require the same amount of information as a traditional plan. For more information on SPEDuP plans, see Section 1316.2.1.

The information to be included on the Title Sheet is discussed in the following sections.

1302.2 Plan Title

1302.2.1 Heading

All construction plans processed by the Ohio Department of Transportation must show in bold letters at the top of the Title Sheet, “STATE OF OHIO, DEPARTMENT OF TRANSPORTATION”.

1302.2.2 Project Designation

1302.2.2.1 Projects in One or Two Counties

A. On-System Projects - Projects on the State system are identified by county code, route number and section number to the nearest hundredth of a mile (straight-line mileage) as shown in the following example **[SP 1302-4]** for a project in Wyandot County, on Route 30, beginning at straight-line mileage 9.11.

WYA-30-9.11

The county code consists of the first three letters of the county name with the following exceptions:

County	Code
Ashland	ASD
Ashtabula	ATB
Champaign	CHP
Harrison	HAS
Meigs	MEG
Monroe	MOE
Montgomery	MOT
Morgan	MRG
Morrow	MRW

The route number is identical to the actual route number assigned to the highway on which the improvement is located. The section number is the straight-line mileage (SLM) at the point where the project begins, measured from the county line in miles from west to east for east-west routes or from south to north for north-south routes, as the route is viewed across the entire state.

Listed below are several special conditions which may be encountered in determining a project designation for a project on the State system.

County Line Located on Project Centerline
The county code letters should be in accordance with the predetermined straight-line mileage assignment as listed in the Straight-Line Diagrams.

Project Limits Extend into Adjacent County
A project designation must be shown for each county.

FRA-3-26.18, DEL-3-0.00

or

FRA/DEL-3-26.18/0.00

Work Limits Extend into Adjacent County
The adjoining county code letters are shown in parentheses.

TUS-77-10.64(STA)

More than One Route (Not Overlapping)
A separate project designation is used for each.

UNI-31-8.19, UNI-37-2.04

or

UNI-31/37-8.19/2.04

For projects with various work types on three or more routes and/or ramps that are all included in the work, the primary route number, and reference to the various routes, should be shown followed by the primary route SLM and reference to the secondary route(s) various SLMs, as shown below.

MAH-224/VAR-13.62/VAR

Overlapping Routes - For projects on overlapping highways of different systems (Interstate, U.S. or State), only the project designation for the highest-classed system should be used. For overlapping routes on the same system, the project designation for the lowest route number is used.

Intersecting Routes - A separate project designation is not required when other routes intersect the proposed improvement (junction or grade separation) unless it is determined that the intersecting route will have different funding than the principal route.

Suspended Projects - A separate straight-line mileage section number is used at the point the project limit is resumed. The example below and **[SP 1302-2]** shows a project limit that begins at SLM 21.73, is suspended for a distance, then is resumed at SLM 22.83. For additional information on how to determine project limits, see **Section 1303.6**

DAR-121-(21.73) (22.33)

For projects with numerous suspend/resume, the words “and various” may be used within the project designation as shown as follows and in **[SP 1302-5].**

ERI-2-30.51 and various

B. Off System Projects - The project designation for improvements on county or township road systems include the county code, county or township route number, and local name (if any). A section number may also be included, if appropriate. **[SP 1302-6(a)]**

CRA-C.R. 6–1.61 (Boundary Rd.)

POR-T.R. 233D (Asbury Road)

If a route number is not available, City street improvements simply use the county code letters and the street name as the project designation. **[SP 1302-1]**

JEF-FERNWOOD RD.

1302.2.2.2 District-Wide Projects

District-wide projects are defined as projects that involve work in three or more counties within the District. The project designation for a District-Wide project is as follows: District Identifier - Project Type - Fiscal Year. The following example is for a district-wide pavement marking plan in District 4 that is scheduled to be awarded in fiscal year 2012.

D04-PM-FY2012

There may be a need to have multiple projects of the same project type, in the same district, in one fiscal year. If this is the case, the project designation is as follows:

D04-PM-FY2012(A)

and

D04-PM-FY2012(B)

The following is a list of project types. Contact the **Office of CADD and Mapping Services** if another project type is needed.

BC	Bridge Cleaning
BH	Bridge Repair
BI	Bridge Inspection
BK	Generic PIDs (Block)
BP	Bridge Painting
CB	Catch Basins
CH	Cleaning/Sweeping highways
CHIP	Chip Seal
CR	Small Culvert Repair/Replacement (Rise<60", round or elliptical conduit only)
CS	Crack Sealing
FEN	Fence
ENV	Environmental
GT	Geotechnical
GES	General Engineering Services Contract

GR	Guardrail
HS	Herbicidal Spraying
IMC	Interstate Maintenance Contract
ITS	Intelligent Transportation Systems
LG	Lighting
LOOP	Loop Detector Repair
MOW	Mowing
NW	Noise Walls
PM	Pavement Marking
PR	Pruning, Tree/Brush removal
PS	Pavement/Shoulder Sealing
RPM	Raised Pavement Markers
RS	Ride Share
RUM	Rumble Strips
SIGN	Signing
SP	Spot Paving (less than 1000' in length)
ST	Surface Treatment (spot locations)
TSG	Traffic Signals
WIM	Weigh-In-Motion

1302.2.2.3 Statewide Projects

Statewide projects should use the same project designation as District-wide projects; except, the District Identifier is replaced with STW. For example: STW-ITS-FY2013.

1302.2.3 Political Subdivisions

Whenever any work is located within a political subdivision, it is necessary to include the name of the subdivision. If the improvement is located entirely within the corporate limits of a city or village, the township name is omitted. The order of political subdivisions from top to bottom is: city, village, township, and county. If the work limits extend into an adjoining county, the county is shown in parentheses. The following example shows how a title would read when portions of the improvement are located in several political subdivisions and the work limits extend into the adjoining county.

TUS-77-0.00 (STA)

CITY OF TROY

VILLAGE OF SPARTAN

OXFORD TOWNSHIP

TUSCARAWAS COUNTY

(STARK COUNTY)

1302.2.4 Railroads

When the improvement involves a railroad separation, the involvement must be indicated by a subtitle under the project designation **[SP 1302-3]**.

Grade Crossing Elimination - When an existing railroad grade crossing is to be eliminated by constructing a separation or relocating the highway, the following subtitle should be used:
GRADE CROSSING ELIMINATION WITH THE _____ RAILROAD

Separation Constructed Without Elimination - When the highway is to be separated from a railroad and the existing railroad grade crossing is not eliminated, use the following subtitle:

GRADE SEPARATION WITH THE _____ RAILROAD

Existing Separation Rebuilt - When an existing separated crossing is to be rebuilt, the subtitle should read:

RECONSTRUCTION OF EXISTING SEPARATED CROSSING WITH THE _____ RAILROAD

Projects with grade separations or any other railroad involvement, should list the railroad company name in the Railroad Involvement portion of the title block.

It should be noted that some companies are incorporated as railroads and some as railways. Verify the proper name is placed on the title sheet.

1302.2.5 Title Block

See **Section 1201.5** for required title block information. The Construction Project Number will be filled in during final plan processing. For projects that do not use federal funds list “Non-Federal” under Federal Project Number. For projects without Railroad Involvement list “None” in the Railroad Involvement block.

1302.3 Design Designation

The Design Designation is an expression of the basic factors that control the design of the highway. It may be included in the plan for any type of construction project, but it is required on any improvement having pavement work or geometric changes.

Normally, only one representative Design Designation is necessary. On improvements involving interchanges, major intersections, or other major traffic generators that materially affect traffic volumes, additional Design Designations are required. Design designations are necessary for side roads if relocation, or significant improvements, equal to or greater than three-hundred feet (300’) are involved. If only one Design Designation is used, it should be shown on the Title Sheet. On improvements requiring more than one Design Designation, they should be shown on a special sheet or on the Schematic Plan with the location noted in the Index of Sheets.

The following is an example of the Design Designation format **[SP 1302-1 through 1302-6(b)]**:

DESIGN DESIGNATION (ENGLISH UNITS)

Current ADT (2012)	10,390
Design Year ADT (2032)	25,200

Design Hourly Volume (2032)	2,520
Directional Distribution	55%
Trucks (24 hour B&C)	2.6%
T_d	4%
Design Speed	50 MPH
Legal Speed	40 MPH
Design Functional Classification	Urban Arterial
NHS Project	Yes

Current ADT is the Average Daily Traffic for the anticipated opening year of the project. Design year is defined in **Location and Design Manual, Volume 1, Section 102.2**. T_d is the percentage of trucks during the design hour in the design year, and is required for interstates, other freeways and expressways only.

Legal speeds are defined by the Ohio Revised Code in miles per hour.

If the project design is based on 3R **[SP 1302-1]** values the phrase "3R Project" should be used in lieu of the design speed. If a project mixes 3R work with other work that does not qualify as 3R, it is necessary to delineate or tabulate the non-3R portions and indicate the applicable design speeds.

The Design Functional Classification is based on **Location and Design Manual, Volume 1, Section 101** and includes Rural Interstate, Rural Freeway (Expressway), Rural Arterial, Rural Collector, Local Road, Urban Interstate, Urban Freeway (Expressway), Urban Arterial, Urban Collector, and Local Street. For projects with multiple design designations (e.g., more than one route), this information may be shown on a sheet other than the title sheet. The title sheet must include a reference to the sheet(s) where these items are shown. **[SP 1302-5]**

1302.4 Design Exceptions

Design Exceptions are required as specified in **Location and Design Manual, Volume 1, Section 105**. The difference between the actual design and the normal design criteria must be clearly denoted on the appropriate plan sheet in the construction plans.

Design exceptions should be shown on the plan sheets in accordance with the guidelines on **Figure 1302-3** and on the Title Sheet **[SP 1302-1]** utilizing the following format.

DESIGN EXCEPTIONS

Design Feature	Approval Dates	Sheet Numbers
Lane Width	7/7/10	24
Bridge Width	7/7/10	46

If there are no design exceptions, indicate this by adding the words "None Required".

1302.5 Index of Sheets

The index serves as a table of contents for the entire set of plans. Soil profile and structure foundation sheets should appear in the index without sheet numbers. Eight and one half inches by eleven inches geotechnical data from geotechnical reports may be included as special provisions.

Since sheets are often added, deleted or rearranged during plan development, the final sheet numbering is usually deferred until the Stage 3 Review. To assist the reviewer in describing review comments, sheets should be designated with numerical or alphabetical characters for each review submission.

As a last resort, sheets may be inserted into the plan by alphabetizing (Example: 88A, 88B, 88C, etc.). All alphabetized sheets must be shown in the Index of Sheets. The last actual sheet number in the plan is never alphabetized. **[SP 1302-4]**

Sheet numbers that are not used must be noted as "Not Used". **[SP 1302-4]**

It is extremely important that the Index of Sheets agrees exactly with the plan sheet numbering system, to ensure that the plan is complete.

An Index of Sheets may be omitted from a SPEDuP plan. If utilized, it shall be located on page 2 of the plan set.

1302.6 Plan Preparer Identification

1302.6.1 Engineer's Seal

All construction plans, including those prepared by ODOT staff, must be sealed by a Registered Professional Engineer **[SP 1302-1]** in accordance with Ohio Revised Code. More than one Engineer may seal the title sheet or different Engineers may seal different portions of a plan (e.g., seal on bridge site plan to cover all bridge work). It must be clear what design elements each seal covers. **[SP 1302-2]** A single Engineer's seal on the Title Sheet is assumed to cover the entire plan; unless otherwise noted.

Any design changes after the plans have been sealed should be performed by the Engineer who sealed the plans. If this is not possible, all design changes shall be clearly noted and sealed somewhere in the plans. This may be accomplished by a general note listing all changes or by a revision block on each sheet that is affected. **[SP 1302-6(a)]**

Sample Plan sheets [SP 1302-1 through 1302-8] show the normal placement of the Engineer's seal. The Engineer must sign and date the plans immediately below the seal.

Requirements for sealing plans by Professional Surveyors (e.g., Right-of-Way plans) are covered in the **Right-of-Way Manual**.

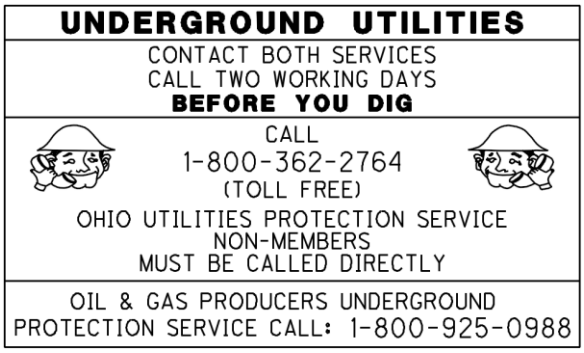
1302.6.2 Design Firm Information

The name and address of the firm preparing the plan shall be shown **[SP 1302-1 through 1302-8]**.

1302.7 Underground Utilities Note

The "Before You Dig" warning note must be shown on the Title Sheet for all plans. The note is shown below and in the Sample Plan sheets **[SP 1302-1 through 1302-8]**.

Section 1300
Plan Components



1302.8 Location Map

The Location Map **[SP 1302-1 through 1302-8]** shows the general area in which the project is located and the project limits. The map should be approximately 7" x 7", for a full size plan, and 3 1/4" x 3 1/4", for a simplified plan or a SPEDuP plan, with north pointing toward the top of the sheet. A scale of 1" = 1 mile is often used, however, the map scale shall be such that the limits of the project are clearly identified and the lettering clearly legible on an 11"x17" reduced set of plans.

The Location Map shall contain sufficient information to clearly show the location of the improvement with respect to: federal, state, county and township roads; identifiable streets in urban areas; villages, cities, townships and counties; and rivers and creeks. ODOT maintains an application for use in placing location maps. The application is available for download from the ODOT web site.

Detour routes should be shown on the Location Map **[SP 1302-2]** if possible. If not, the detour shall be shown on the Schematic Plan or Maintenance of Traffic Sheets **[SP 1302-6(a)]** and so noted in the Index of Sheets.

The latitude and longitude shall be provided for the project. Latitude and Longitude shall be measured to the center of the project and shall be accurate to the nearest 5 seconds of a degree. Latitude and longitude are required for all projects because the geographic references are used to identify project locations for use in estimating software and in computer analysis of bid data. The latitude and longitude values need to be presented accurately to provide reliable results when utilizing the estimating software.

On multiple segment contracts, the latitude and longitude used shall be the approximate center of the segments of work. The approximate center can be established by visual inspection.

On district-wide contracts, the latitude and longitude used shall be the locations in the following table:

DISTRICT	LATITUDE	LONGITUDE
1	40°46’18”	84°05’34”
2	41°23’07”	83°38’48”
3	40°52’38”	82°17’41”
4	41°00’57”	81°29’30”
5	39°57’06”	82°24’41”
6	40°17’52”	83°02’58”

7	40°17’49”	84°09’40”
8	39°25’52”	84°17’03”
9	39°19’28”	82°57’47”
10	39°26’28”	81°27’36”
11	40°27’19”	81°24’29”
12	41°24’54”	81°36’54”
Statewide	39°57’21”	83°03’13”

1302.9 Supplemental Specifications

A list of the Supplemental Specifications (including the current revision date) applicable to the project shall be included on the Title Sheet **[SP 1302-1]**. Supplements, 1000 series and above, are not to be listed on the Title Sheet.

Supplemental Specification 800 is used as a boiler plate specification. That is, it is updated quarterly to include errata and other corrections to the Construction and Materials Specifications (CMS). It must be specified on all projects. In order to ensure that the most recent version of Supplemental Specification 800 is specified, the current revision date used on the Title Sheet should match the quarterly revision date that will be in effect when the Engineers Estimate is completed by the **Office of Estimating**. The date when the Engineers Estimate is completed by the **Office of Estimating** is approximately 8 weeks prior to the Sale Date for the project. The Letting Schedule, including Sale Dates, is established by the **Office of Estimating** and published on the **Office of Contracts** website.

A suffix indicating the applicable year of the specification book should be provided on the title sheet (i.e., when using the 2008 Construction and Material Specifications, Supplemental Specification 800-2008 should be used). The suffix is required because Supplemental Specification 800 will vary with each edition of the CMS.

1302.9.1 Special Provisions

When a special provision is needed for a project, the title and date of the special provision shall be listed on the Title Sheet **[SP 1302-1]**. See **Section 1305.3.**

1302.10 Standard Construction Drawings

A list of up-to-date Standard Construction Drawings (including the current revision date) applicable to the project shall be included on the Title Sheet. Standard Construction Drawings are published in three sets. The sets include Roadway Drawings, Bridge Drawings, and Traffic Drawings and are maintained by the following offices:

1. Roadway Drawings

Drawing Series:	Office:
BP (Base Pavement) (BP-1.1; 2.1;2.2;2.3;2.4;2.5;2.6;3.1;6.1;8.1)	**Office of Pavement Engineering**
BP (BP-4.1;5.1;7.1;9.1)	**Office of Roadway Engineering**
CB (Catch Basins)	**Office of Hydraulic Engineering**
DM (Drainage Miscellaneous)	**Office of Hydraulic Engineering**
F (Fence)	**Office of Roadway Engineering**

MGS (Guardrail)	**Office of Roadway Engineering**
HW (Headwalls)	**Office of Hydraulic Engineering**
I (Inlets)	**Office of Hydraulic Engineering**
LA (Landscaping)	**Office of Roadway Engineering**
MH (Manholes)	**Office of Hydraulic Engineering**
RM (Roadway Miscellaneous)	**Office of Roadway Engineering**
WQ (Water Quality)	**Office of Hydraulic Engineering**

2. Bridge Drawings

Drawing Series:	Office:
A	**Office of Structural Engineering**
AS	**Office of Structural Engineering**
BR	**Office of Structural Engineering**
CPA	**Office of Structural Engineering**
CPP	**Office of Structural Engineering**
CS	**Office of Structural Engineering**
DBR	**Office of Structural Engineering**
DS	**Office of Structural Engineering**
EXJ	**Office of Structural Engineering**
FB	**Office of Structural Engineering**
GSD	**Office of Structural Engineering**
ICD	**Office of Structural Engineering**
PCB	**Office of Structural Engineering**
PSBD	**Office of Structural Engineering**
PSID	**Office of Structural Engineering**
RB	**Office of Structural Engineering**
SB	**Office of Structural Engineering**
SBR	**Office of Structural Engineering**
SICD	**Office of Structural Engineering**
TBR	**Office of Structural Engineering**
TST	**Office of Structural Engineering**
VPF	**Office of Structural Engineering**

3. Traffic Drawings

Drawing Series:	Office:
HL (Highway Lighting)	**Office of Roadway Engineering**
MT (Maintenance of Traffic)	**Office of Roadway Engineering**
TC (Traffic Control)	**Office of Roadway Engineering**

The Title Sheet includes a table listing the Standard Drawings that apply to the project. During plan preparation the drawings should be grouped by set, listed in alpha-numeric order within that set, and added to the Title Sheet **[SP 1302-1]**.

1302.11 Project Description and Earth Disturbed Areas

1302.11.1 Project Description

The Project Description consists of a brief note describing the primary purpose of the improvement and the project length.

The project length is the total distance between the begin and end project points, adjusted for suspensions and station equations, measured along the centerline of construction. It is calculated to the nearest hundredth of a mile. In addition, the Project Description should describe other incidental construction. Incidental construction may include the following items (unless they are included in the primary construction): bridge work, interchanges, major connecting roads, lighting, traffic control, etc. The descriptions should use words and phrases such as: resurfacing of; widening and resurfacing of; reconstruction of; relocation of; construction of; rehabilitation of; replacement of; etc.

1302.11.2 Earth Disturbed Areas

For Routine Maintenance Projects per **Location and Design Manual, Volume 2, Section 1112.2**, the following items should be included in the Project Description: **[SP 1302-7 and SP1302-8]**

Project Earth Disturbed Area = N/A (Maintenance Project)
Estimated Contractor Earth Disturbed Area = N/A (Maintenance Project)
Notice of Intent (NOI) Earth Disturbed Area = N/A (Maintenance Project)

For non-Routine Maintenance projects involving very little to no earthwork, such as light strain pole and weigh-in-motion device installation, the following descriptions apply:

Project Earth Disturbed Area = N/A
Estimated Contractor Earth Disturbed Area = N/A
Notice of Intent (NOI) Earth Disturbed Area = N/A

For non-Routine Maintenance projects involving some earthwork, but less than one acre of total earth disturbing activity (EDA), such as a small bridge replacement, provide the estimated Project and Contractor EDA, but identify that a Notice of Intent (NOI) is not required. Use the approach shown in the following example description:

Project Earth Disturbed Area = 0.5 Acres
Estimated Contractor Earth Disturbed Area = 0.2 Acres
Notice of Intent (NOI) Earth Disturbed Area = N/A (NOI not required)

All other projects must list acreages for the following: **[SP 1302-1]**

Project Earth Disturbed Area:
Estimated Contractor Earth Disturbed Area:
Notice of Intent (NOI) Earth Disturbed Area:

Section 1300
Plan Components

1302.12 Notes

1302.12.1 Limited Access

The following note shall be used on the Title Sheet when any portion of the existing or proposed right-of-way is designated as limited access (includes cases where bridges span a limited access facility): **[SP 1302-4]**

LIMITED ACCESS

THIS IMPROVEMENT IS ESPECIALLY DESIGNED FOR THROUGH TRAFFIC AND HAS BEEN DECLARED A LIMITED ACCESS HIGHWAY OR FREEWAY BY ACTION OF THE DIRECTOR IN ACCORDANCE WITH THE PROVISIONS OF SECTION 5511.02 OF THE OHIO REVISED CODE.

1302.12.2 Specifications

The following note shall be used to indicate the publication date of the Construction and Material Specifications used on the project. The current specification revision year shall be used. Plan details and pay items must be modified to reflect the specification year used.

_____ SPECIFICATIONS

THE STANDARD SPECIFICATIONS OF THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, INCLUDING CHANGES AND SUPPLEMENTAL SPECIFICATIONS LISTED IN THE PROPOSAL SHALL GOVERN THIS IMPROVEMENT.

1302.12.3 Maintenance of Traffic Endorsement

All contract plans are to be endorsed. One of the notes below shall be used on the Title Sheet, as appropriate. It may be necessary to alter these notes to some degree so that the intent clearly and accurately reflects the project conditions. **[SP 1302-5]**

Traffic Not Rerouted

I HEREBY APPROVE THESE PLANS AND DECLARE THAT THE MAKING OF THIS IMPROVEMENT WILL NOT REQUIRE THE CLOSING TO TRAFFIC OF THE HIGHWAY AND THAT PROVISIONS FOR THE MAINTENANCE AND SAFETY OF TRAFFIC WILL BE AS SET FORTH ON THE PLANS AND ESTIMATES.

Traffic Rerouted

I HEREBY APPROVE THESE PLANS AND DECLARE THAT THE MAKING OF THIS IMPROVEMENT WILL REQUIRE THE CLOSING TO TRAFFIC OF THE HIGHWAY AND THAT DETOURS WILL BE PROVIDED AS INDICATED ON SHEET _____ .

Traffic Rerouted for Brief Time Periods

I HEREBY APPROVE THESE PLANS AND DECLARE THAT THE MAKING OF THIS IMPROVEMENT WILL NOT REQUIRE THE CLOSING TO TRAFFIC OF THE HIGHWAY EXCEPT AS NOTED ON SHEET ____ , AND THAT PROVISIONS FOR THE MAINTENANCE AND SAFETY OF TRAFFIC WILL BE AS SET FORTH ON THE PLANS AND ESTIMATES.

Traffic Rerouted Majority of Time

I HEREBY APPROVE THESE PLANS AND DECLARE THAT THE MAKING OF THIS IMPROVEMENT WILL REQUIRE THE CLOSING TO TRAFFIC OF THE HIGHWAY EXCEPT AS NOTED ON SHEET _____ , AND THAT DETOURS WILL BE PROVIDED AS INDICATED ON THE PLANS.

Traffic Rerouted Approximately Half Time

I HEREBY APPROVE THESE PLANS AND DECLARE THAT THE MAKING OF THIS IMPROVEMENT WILL REQUIRE THE PART-TIME CLOSING OF THE HIGHWAY TO TRAFFIC, AS NOTED ON SHEET _____. DURING WHICH TIME DETOURS WILL BE PROVIDED AS SHOWN HEREIN. PROVISIONS FOR THE MAINTENANCE AND SAFETY OF TRAFFIC WILL BE AS SET FORTH ON THE PLANS AND ESTIMATES.

Traffic Rerouted for Side Road Closure

I HEREBY APPROVE THESE PLANS AND DECLARE THAT THE MAKING OF THIS IMPROVEMENT WILL NOT REQUIRE THE CLOSING TO TRAFFIC OF THE HIGHWAY EXCEPT FOR THE SIDE ROADS AS DESCRIBED ON SHEETS _____ AND THAT PROVISIONS FOR THE MAINTENANCE AND SAFETY OF TRAFFIC WILL BE AS SET FORTH ON THE PLANS AND ESTIMATES.

1302.12.4 Prima Facie Speed Limit

The following note is to be used on the Title Sheet, located immediately above the plan signatures, for all projects where speed limits are legally reduced through work zones. **[SP 1302-5]**

UNDER AUTHORITY OF SECTION 4511.21, DIVISION (H) OF THE OHIO REVISED CODE, THE REVISED PRIMA FACIE SPEED LIMITS AS INDICATED HEREIN ARE DETERMINED TO BE REASONABLE AND SAFE, AND ARE HEREBY ESTABLISHED FOR THE DURATION OF THIS PROJECT. THE PRIMA FACIE SPEED LIMIT OR LIMITS HEREBY ESTABLISHED SHALL BECOME EFFECTIVE WHEN APPROPRIATE SIGNS GIVING NOTICE THEREOF ARE ERECTED.

1302.13 Plan Signatures

Approval spaces shall be provided for the following:

- District Deputy Director
- Director, Department of Transportation

When additional signatures are desired, such as those for city or county officials, they shall appear directly above the District Deputy Director **[SP 1302-1, SP 1302-6(a)]**. Local officials should sign the Title Sheet prior to submission of final tracings to the district office.

1302.14 Combined Plans

When construction plans for two or more projects are combined to be sold as one construction project, the following Title Sheet **[SP 1302-6(a), SP 1302-6(b)]** changes should be made:

Section 1300
Plan Components

- Add “Part 1” after the project designation on the first title sheet. Add “Part 2”, “Part 3”, etc. to each succeeding plan title sheet.

- Cross reference all parts on all title sheets. For example, on the first title sheet for a three part project, add “For Part 2 see _____” and “For Part 3 see _____ .”

- Expand the Standard Construction Drawings, Supplemental Specification and Special Provisions lists on the Part 1 title sheet to include those required for all parts. Remove Standard Construction Drawing, Supplemental Specification and Special Provisions lists from all subsequent title sheets and add a cross-reference to Part 1.

In addition to the above title sheet changes, the type of Field Office specified in each plan should be adjusted to provide for the combined construction costs; and, the maintenance of traffic should be coordinated for all parts.

During the design phase of a project that will use Combined Plans, two or more separate PIDs may be established to reference each Part of the project. However, the construction contract must utilize only one PID. Update Ellis to provide cross-references that correlate the design phase and construction PIDs.

Items 614, 619, 623, and 624 should be provided on all parts where they are applicable.

1303 Schematic Plan

1303.1 General

The purpose of a Schematic Plan **[SP 1303-1]** is to show the geometric location of proposed roadway segments in relation to existing roadway segments and other features. All projects shall include a Schematic Plan unless the project is short enough to be shown entirely on less than four Plan & Profile sheets.

Schematic Plans are normally prepared to a scale of 1"=100', 1"=200', or 1"=400'. It is preferable to limit the Schematic Plan to one sheet. The scale shall be shown in bar format.

Many of the features included on a Schematic Plan are discussed in the following sections. Other features may be added, as necessary, to provide a clearer picture of the proposed improvement and its relationship to existing facilities.

1303.2 Reference Lines

All reference lines should be clearly shown on the Schematic Plan **[SP 1303-1]**. These include the centerline of construction, baselines of ramps, directional roadways and other similar facilities. The centerline of construction and centerline of Right-of-Way should normally be the same. When they differ, their relationship to each other must be shown in the plan. Typically, the relationship is only shown on the Right-of-Way plan sheets.

With modern survey technology, topographic surveys are no longer completed based on a centerline of survey. Consequently, survey centerlines are a misnomer and should not be shown.

The intersection angle, as well as the intersecting stations, should be shown for all intersecting roadways. It may be more convenient to show this information on an intersection detail.

1303.3 Stationing

In general, tick marks shall be shown at full stations (100 ft. intervals) along the center and base reference lines. The centerline stationing on a project should reflect the straight-line mileage shown on the "section" (County-Route-Section). Centerline stationing may also be established based on existing monumentation, bridges and prior projects. Stationing shall increase in the direction of the straight-line mileage.

The Schematic Plan should generally be oriented in such a manner that the stationing on the mainline will increase from left to right, regardless of the north direction **[SP 1303-2]**.

Ramp stationing should be a continuation of mainline stationing from the exit or entrance nose, and should increase or decrease along the ramp as it does along the mainline. In general, it is not desirable to use ramp stations in the terminal area, as the required pavement slopes and transitions can be laid out using the mainline stations.

Station equations, if necessary, are to be indicated on the reference line by stating the station back and station ahead **[SP 1303-3]**.

If the basis for centerline stationing is unclear or there is a lack of monumentation, structures or prior project stationing documentation, the designer establishing the centerline stationing shall coordinate with the District Survey Section and/or District Real Estate Section to determine the appropriate basis for centerline stationing.

1303.4 Bearings

Bearings shall be shown for the tangent sections of all reference lines.

1303.5 Horizontal Curve Data

Horizontal curve data, and deflections without curves, for all existing and proposed alignments must be shown on the Schematic Plan. **Figures 1303-1 through 1303-3** show elements and data for simple curves, spiral curves, and for when combining spirals between two simple curves. Curve data (except angles) should be shown to two decimal place accuracy. Deflections without curves are identified as follows:

P.I. = Sta. _____

Deflection = _____

NO CURVE

Use "e_{max} = NC" to indicate that normal crown is provided.

1303.6 Project Limits

Project limits are points on the mainline centerline of construction where the proposed improvement, as described in the project description on the Title Sheet (excluding incidental construction), begins and ends. Project limits are generally defined as the beginning/ending of proposed full-depth, full-width pavement. Incidental construction includes all work required to complete a project in addition to the primary purpose for the improvement. Work such as pavement feathering and tapering, traffic control

devices, drainage, guardrail, drives, side roads, service roads, etc. may be considered as incidental construction and not be included in the project limits.

Where the primary work on the mainline is suspended for a substantial distance, suspend and resume project points must also be shown. Begin Project, End Project, Suspend Project, and Resume Project are each shown on the Schematic Plan and the Plan & Profile sheets by both stationing and straight-line mileage (SLM).

1303.7 Work Limits

Work Limits are the extreme limits of the contractor's responsibility on a project, including all temporary and incidental construction, with the exception of work zone traffic control devices required for maintenance of traffic. Work Limit stations are shown along the centerline of construction of the mainline facility and along the centerline of all side roads, cross roads, and other construction generally running perpendicular to the project or separated from the project.

1303.8 Federal Project Flags

Federal Project Flags, including Federal Project numbers, should be placed at the project limits **[SP 1303-2]**. The flags should always point toward the project. If more than one Federal number is used, the limits of each Federal number should be shown, again pointing to the portion of the project to which it applies.

1303.9 Political Boundaries

All county, township, corporation limits, and other political boundaries shall be labeled. The station where these boundaries intersect the centerline of construction shall be shown. When the political boundary is located along the centerline, stationing shall be shown at the points where the political boundary meets and leaves the centerline.

1303.10 Waterways

All waterways (lakes, rivers, streams, creeks, ponds, etc.), crossing or adjacent to the proposed improvement, shall be shown by name, and the direction of flow shall be indicated. This includes any relocated waterways. See Office of Environmental Services' Waterway Permits Manual for more information on waterways.

1303.11 Bridges

All bridges, existing and proposed, shall be shown at their appropriate location and identified by their structure number, including left and right notation.

1303.12 Roads for Maintaining Traffic

The location of all roads for maintaining traffic located on an independent alignment shall be shown. Roads for maintaining traffic may be shown using centerline only.

1303.13 Railroads

All railroads in the vicinity of the proposed improvement shall be shown. If a railroad intersects the highway, the station shall be indicated.

1303.14 Utility Lines

High voltage power lines and other major overhead utilities shall be shown. High pressure underground utility lines shall also be shown. Include size/voltage and ownership for these lines **[SP 1303-3]**.

1303.15 Pipelines

All major pipelines shall be located and shown.

1303.16 Service/Public Roads

All existing and proposed service roads and other public roads shall be shown and identified by the name and number.

1303.17 Culverts and Sewers

All existing and proposed culverts shall be shown at their appropriate location and the size indicated. Include flow arrows showing direction of flow in the culvert. List the structure number for any structure on the State/Federal system having a span greater than or equal to 10 feet.

Outfall sewers shall be shown.

Drive pipes do not need to be shown.

1303.18 Landscaped Areas

All existing and proposed landscaped areas should be shown. If no landscaped areas exist, then include the phrase “There are no existing landscaped areas within the work limits.”

1303.19 Participation Splits

All participation split locations shall be shown. Participation splits are necessary when portions of the project are financed under different Federal Project Numbers, are split by municipal corporation lines, or there are areas to be paid for by only one agency.

1303.20 Contractor’s Use of ODOT Right-of-Way

On large projects it may be economical for the Department to permit the contractor to use ODOT property to dispose of waste material and construction debris, excavate borrow material or place a portable plant.

These areas should be checked to ensure that their use is in keeping with all design criteria, environmental regulations and public involvement commitments. When evaluating an area for waste material, the designer should consider future widening and the location of underground utilities.

Areas where the above activities are permissible should be identified in the plans (i.e., on the schematic plan, on the plan and profile sheets, on the cross-sections, in a plan note). Grading restrictions should be identified on the cross sections or specified in the General Notes. Unless additional requirements are provided in the plans, there are no limits on the type of waste material that can be used (e.g., plant material, stumps, etc.). The plan should show whether environmental and/or FEMA permits have been obtained or if the contractor is required to obtain them.

1303.21 Wetlands

All existing wetlands within 100 feet of the proposed construction limits shall be shown. Wetlands are located and delineated as per the **Office of Environmental Services Ecological Manual**.

1303.22 Project Control and Reference Points

All necessary survey/mapping parameters should be conveyed in the General Notes as established in Sample Plan Note G105 in Appendix B. Points used to establish project control and reference points should be shown in the Schematic Plan **[SP 1303-1]** or listed in the General Notes **[SP 1305-1]**.

For projects scoped prior to October 15, 2010 that are not utilizing the ODOT Survey and Mapping Specification, the following information regarding project control and reference points should be provided:

- All reference points needed to reestablish the highway alignment must be shown with corresponding coordinates (northing/easting). Reference points shall be shown near each end of the project and at intervals, not to exceed 1500 feet.
- Benchmarks establishing vertical and/or horizontal project control are to be shown at minimum intervals of 1000' along the alignment and on each side of streams that show evidence of continuous or intermittent flow. Provide corresponding coordinates (northing/easting) for each benchmark.

Unless otherwise directed in the scope of services document, the survey/mapping for projects scoped on or after October 15, 2010 should be developed utilizing the ODOT Survey and Mapping Specification. The following information regarding project control and reference points should be provided for these projects:

- A table listing the primary project control monuments, azimuth marks and/or temporary benchmarks (see the Survey and Mapping Specification for descriptions of these items).

  The table should include the following:

  - Point number
  - Grid and scaled coordinates in U.S. Survey feet (northing/easting)
  - Orthometric Height (Elevation)
  - Description (i.e. Primary Project Control - steel rod set in concrete)

See **SP 1305-1** for an example of the project control table. The Survey and Mapping Specification is available through the ODOT Design Reference Resource Center website.

1304 Typical Sections

1304.1 General

The Typical Section is a portrayal, with dimensions, of how a cross-sectional view of the roadway would appear after construction is completed. Except in the case of some ramps, typical sections should be shown relative to the direction of increasing stationing regardless of the direction of travel. Sections should generally be drawn to the same scale horizontally and vertically, although the vertical scale of the pavement thickness may be exaggerated to show the thickness of the various layers. The scale should be large enough to clearly show the proposed section, as well as existing features. No scale should be shown on the typical section. Although sections on the same sheet are usually drawn to the same scale, enlarged details may be used to show items such as pavement edge treatment. Ground lines, existing pavement and all other existing features should be shown (if relevant) using dashed lines.

Mainline, ramp and other roadway typical sections should be grouped together.

Most of the features included in the Typical Sections are discussed in the following sections. Other features may be necessary to cover special circumstances. Examples are included in the Sample Plan Sheets.

1304.2 Typical Section Type and Limits

Unless they have identical typical sections, separate sections must be shown for the mainline, side roads, crossroads, ramps, and other roadways involving paving or earthwork. The typical section of the adjoining pavement including type, thickness, and cross slopes of all pavement courses should be provided.

Sections should be shown for each roadway when: the pavement build-up changes, the type of median changes, guardrail and concrete barriers begin or end, lanes are added or dropped (minimum and maximum limits are sufficient), and in superelevated areas. Separate sections and lane widths are not required for intersections.

Varying pavement widths in intersection return areas should also be disregarded. A reference to the sheet containing the intersection detail may be added, if necessary. Each section must be adequately labeled to indicate if it is a normal or superelevated section and the roadway and station limits where it applies. Partial sections may be applicable for: changes in treated shoulder build-up; shoulder slope changes in superelevated sections; cut and fill slopes; and other similar situations.

Special sections may be required for speed change lanes, approach slabs, linear grading, etc. Typical sections should also be shown where pavement composition is adjusted over culverts with shallow fill.

Under each section, the station limits where the typical section is applicable shall be indicated. Calculation of the lengths where these typicals apply is not necessary.

Limiting stations for side road typical sections shall break at the side road stations of the extended mainline edges of pavement.

1304.3 Reference Line Location

The location of the centerline or baseline of construction must be shown on each typical section.

Section 1300
Plan Components

1304.4 Rounding

Rounding of slopes shall be shown on each typical section where applicable.

1304.5 Profile Grade Point

The location of the profile grade elevation (normally the crown point) shall be noted on each typical section. Its location should be clearly identified. On a divided highway the profile grade for both sides shall be shown. When the crown-line and profile-grade line are not the same **[SP 1304-5]**, their relationship to each other must be shown.

1304.6 Dimensions

Items on each typical section shall be dimensioned. All dimensions must be shown either in a vertical or horizontal plane. None are to be measured along slope lines. When referring to items detailed in the Standard Construction Drawings, dimensions may be omitted.

If a dimension varies within the limits of a typical section, it should be noted as “varies”, the maximum and minimum dimensions within the limits shall be identified. The limits shall be clearly shown; either on the Typical Section, the Plan and Profile Sheet, or other appropriate detail sheet.

Vertical dimensions include: pavement course thicknesses, edge thicknesses, underdrain depths, ditch depths, etc. Where variations in a pavement course thickness are proposed, the typical section should show the thickness as “varies” and the variations shown in tabular form. Vertical dimensions shall normally be in inches.

Horizontal dimensions include: widths of pavement, graded shoulders, treated shoulders, steps at edges of pavements, ditches, sidewalks, approach slabs, rounding, pavement widening, medians, barrier offsets, etc. On projects with multilane configurations or curbed shoulders, the lane locations and widths should be shown. Variations in horizontal dimensions due to intersections, etc. should not be included in the typical section. They should be clearly shown on the pertinent plan detail sheets. Horizontal dimensions shall normally be in tenths of a foot.

1304.7 Pavement and Shoulder Cross-Slopes

The shape of the finished surface of the pavement and shoulders should be shown on each typical section by indicating the direction (by an arrow pointing downslope) and the rate of slope. Cross-slopes on pavements and shoulders are to be expressed in dimensionless, vertical-to-horizontal ratios, in decimal form, e.g. 0.01, 0.016, 0.08, etc.

1304.8 Subsurface Drainage

The location of pipe underdrains, aggregate drains, etc. should be shown on each typical section. Include slopes for aggregate drains.

1304.9 Pavement Build-up

Pavement and treated shoulder build-ups and course steps shall be clearly indicated on each typical section. This includes such items as: surface, base and subbase courses; curb, curb and gutter; saw cuts; depth of planing; pavement for maintaining traffic to remain, etc.

Step details may be needed to adequately show pavement “steps” as per the **Pavement Design Manual**.

1304.10 Foreslopes and Backslopes

If the limiting stations of a typical section include both cuts and fills, examples of each should be shown. Cut and fill foreslope and backslope rates shall be indicated as 2:1, 3:1, 4:1, (horizontal: vertical) etc. Percentages should not be used. Guardrail offset locations shall also be shown, where applicable.

1304.11 Legend

The legend is required to describe the pay items used in the Typical Sections and also the build-up of the existing pavement. It may be shown on only the first Typical Section sheet with a cross-reference shown on each succeeding sheet.

Numbered or lettered balloons are used to tie the legend to the drawings. Proposed items are to be differentiated from existing by using numbers for proposed and letters for existing. In addition, dashed balloons may be used to show existing items. Balloon references should be consistent throughout the typical section sheets.

The legend for proposed items shall include the specification number and the exact pay item description, as listed in the ODOT Item Master. The legend for existing items should never include a specification number, but should describe the item in more generic terms such as: Asphalt Concrete, Reinforced Concrete, or Subbase. The approximate existing depth (+/-) should be listed.

1304.12 Longitudinal Joints

For rigid pavements, the location and type of all longitudinal joints should be indicated on each typical section **[SP 1304-3]**.

1304.13 Approach Slabs

Although approach slabs are paid for as structure items, base pavement, cross slopes, etc. must be shown on the typical sections.

1304.14 Warranty Pavement

When warranty pavement is included in a project, show the total thickness of the pavement along with an assumed configuration.

1304.15 Subgrade Treatment

Subgrade treatments such as lime stabilization, cement stabilization or undercuts should be shown on the typical sections and the cross sections.

Section 1300
Plan Components

1305 General Notes and Special Provisions

1305.1 General

The General Notes contain those plan notes required to clarify construction items that are not satisfactorily covered by the specifications or plan details. They are also used to modify the Standard Construction Drawings. All pay items that are "As Per Plan" or "Item Special" require a plan note, a special detail, or both.

On small projects, the General Note Sheets will include the majority of all plan notes for the project. For large projects, components such as: Maintenance of Traffic, Sanitary Sewers, Water Work, Traffic Control, Lighting, Landscaping or Structures should be accompanied by their own plan notes.

Plan notes should be consistent with the intent and requirements of the plans. Notes that repeat provisions clearly covered by the Construction and Material Specifications, Supplemental Specifications or Standard Construction Drawings should be avoided. For unusual or potentially controversial plan notes, contact the involved specification committee chair for advice on the content of the note.

Sample Plan Sheet **SP 1305-1** shows an example General Note format. Specific notes must be selected by the project designer. Notes may be right and left justified as shown in **SP 1305-1**; or left justified as shown in **SP 1306-1**.

1305.2 Sample Plan Notes

Sample Plan Notes for environmental, pavements and general project information are found in **Appendix B.** Sample Plan Notes for other project issues such as bridges, guardrail, traffic control and maintenance of traffic are available from the responsible ODOT unit (**Offices of Structural Engineering**, **Roadway Engineering**, **Traffic Engineering**, etc.). Each general note is accompanied by a designer note which provides guidance on when to specify the note, as well as details on how the note may need to be customized to address project specific issues.

The ODOT **Office of CADD and Mapping Services, CADD Section** maintains a plan note application available for download from the CADD web page. The application assists with plan note placement in MicroStation files.

1305.3 Special Provisions

Special Provisions are notes and/or specifications developed for a project that are not related to standard ODOT Construction and Material Specifications. Ordinarily, these notes should be included in the General Notes. However, when these notes would take up a significant number of plan sheets, the designer may opt to include them with the plan as Special Provisions produced on 8-1/2" x 11" sheets.

In the case of Waterway Special Provisions, the Office of Environmental Services (OES) provides Special Provisions in the form of Waterway Permit Conditions, which includes the conditions of the Section 404 permits and the OEPA Section 401 Water Quality Certifications. The actual 404/401 permits are sent by OES to the district office to be displayed on the project site.

The title and date of all Special Provisions are listed on the Title Sheet. A reproducible letter size copy of all Special Provisions is to be included in the Final Plan Package submitted to the **Office of Estimating**.

1306 Maintenance of Traffic

1306.1 General

Maintenance of Traffic sheets normally follow the General Notes. On projects where traffic maintenance is uncomplicated or traffic is detoured, a separate Maintenance of Traffic section of the plan is not required, and the notes may be included with the General Notes. When bridge plans include staged construction details, a cross-reference to these details should be added to the Maintenance of Traffic notes.

Examples of Maintenance of Traffic sheets are included in the Sample Plan Sheets **[SP 1306-1 through 1306-8].**

1306.2 Maintenance of Traffic Plan Contents

Probably the least complicated plans for maintaining traffic result when through traffic is detoured during the entire construction period. In such cases, the detour route is shown on the Title Sheet Location Map **[SP 1302-2]**, Schematic Plan, General Notes or on a separate detour sheet **[SP 1306-3]**. If the detour is shown somewhere other than on the Title Sheet Location Map, it should be referenced in the Index of Sheets.

When traffic is maintained during construction, the plan will normally require a number of notes along with several details. The following is a list of some of the details that may be required:

- Sequence of operations **[SP 1306-1** and SP **1306-2]**.
- Phase drawings showing construction by phase **[SP 1306-4(a) through 1306-8]**, method of maintaining traffic for each phase, barriers, drums, maintenance of traffic signing, existing signing, and pavement marking. Phasing plans may be drawn at 1”=20’, 1”=30’, 1”=40’, 1”=50’, 1”=100’ or 1”=200’.
- Section details for maintaining traffic, showing: existing pavement widths, pavement for maintaining traffic widths (including guardrail offset and grading), lateral construction limits, placement of channeling devices (barriers, drums, etc.) and work zone lane widths.
- Supplemental details for work zone traffic control devices.
- Plan insert sheets Crossover details
- Roads / Pavement for maintaining traffic details
- Miscellaneous MOT details

The **Traffic Engineering Manual** provides guidance on how to maintain traffic during construction and gives specific details on what is required on maintenance of traffic sheets.

For additional information regarding Maintenance of Traffic, contact the **Office of Roadway Engineering**.

Section 1300
Plan Components

1306.3 Roads and Pavements for Maintaining Traffic

A temporary road is a road whose sole purpose is to temporarily maintain traffic during construction, after which it is normally removed. Temporary roads are constructed using Item 615, Roads for Maintaining Traffic and Item 615, Pavement for Maintaining Traffic.

Item 615, Roads for Maintaining Traffic is a lump sum quantity that includes all embankment and excavation necessary to construct and remove the temporary road; including temporary pavement. When undercuts are necessary for permanent mainline pavement or embankment construction, the proposed temporary road should be evaluated for undercuts. A geotechnical evaluation should be considered to determine if the existing soil conditions are adequate to support the temporary road. Additional soil borings along the temporary road are not normally required to make the geotechnical evaluation.

Item 615, Pavement for Maintaining Traffic is paid for by the square yard and includes the necessary pavement for the temporary road as per CMS 615.05. When the pavement build-up differs from that shown in CMS 615.05, Item 615, Pavement for Maintaining Traffic, As Per Plan, shall be used with the pavement build-up as shown in the plans.

Sample Plan Sheets **SP 1306-6 and 1306-7** show details such as alignment, grade, typical sections, cross-sections, and superelevation that are typically required for a temporary road on independent alignment. In order to facilitate the use of GEOPAK software, temporary roads on independent alignment should be drawn at 20'=1" [20:1] or 50'=1" [50:1].

When the earthwork required to maintain traffic is relatively small, a plan note can be used to indicate that the earthwork required to construct the temporary road will be included as part of Item 615, Pavement for Maintaining Traffic, As Per Plan and not paid for separately under Item 615, Roads for Maintaining Traffic. **SP 1306-4(a)** shows an example of when it may be beneficial to combine the two quantities.

Item 615, Pavement for Maintaining Traffic should not be confused with items such as 410, 448, and 616 which may also be included in the plans to be used for maintenance of traffic. Nor should it confused with the pavement quantities listed in the Local Alternate Detour note.

1307 Estimated Quantities

1307.1 General

Quantities shall be calculated and presented in the plan in such a manner that they may be traced from the General Summary sheet to their origin through a system of cross-referencing. **SP 1307-1 through 1307-5** provides examples of Subsummary and General Summary formats.

As of the first letting of February 2014, the General Summary for all new single-funded projects shall be required in an Excel format using the standard spreadsheet, GENSUM_VBA_AASHTOWare.xls, available on the Office of CADD and Mapping Services' CADD external webpage This Excel spreadsheet will be used to transfer quantities directly into ODOT's Office of Estimating's AASHTOWare software. **All** quantities must be carried to the GENSUM_VBA_AASHTOWare.xls spreadsheet (i.e., pavement, retaining walls, structures). Any quantities that are not included in this spreadsheet will **not** be included in the Engineer's Estimate. The GENSUM_VBA_AASHTOWare.xls spreadsheet must be transmitted in the delivery of the Plan Package. It is recommended that all multi-funded projects use this Excel spreadsheet as well.

During the transition to this requirement, any new General Summaries that are created must use the GENSUM_VBA_AASHTOWare.xls Excel spreadsheet. Any existing General Summaries can be completed in the method they were started with. The spreadsheet must then be placed into a CADD file. For more detailed information, see Section 502.1 of the ODOT CADD Engineering Standards manual.

1307.2 General Summary Sheet

1307.2.1 Sheet Number Columns

The sheet number columns are used to show a cross-reference to the sheet from which the quantities are carried. Extra columns should be provided to allow for possible additions. Quantities may originate from many sources, and these sources may often exceed the number of columns available on the General Summary. For this reason, subsummaries are often used. Subsummaries are described in more detail in **Section 1307.3**.

1307.2.2 Participation and Funding Splits

To facilitate project accounting, pay quantities should be separated in the General Summary and throughout the plans according to participation by the involved agencies **[SP 1307-4 and 1307-5]**. This usually applies to situations where portions of the project are financed under different federal project numbers, are split by municipal corporation lines, or contain items that are to be paid for by only one agency. The General Summary should show a separate subtotal for each unique combination of Local, State and Federal fund participation, in addition to the grand total. Funding splits for projects using combined funds (e.g. Bridge and Safety) shall also show separate subtotals for each unique combination of funding, in addition to the grand total in the General Summary. When participation or funding splits are needed for a project, the participation or funding split columns should be included on all sheets of the General Summary.

In lieu of creating separate columns in the General Summary, the use of an asterisk to identify items with participation or funding splits is allowable for projects with one or two affected items. A note associated with the asterisk should provide details regarding the participation or funding split.

Pavement Quantities listed under the “Office Calcs” column on the General Summary should reflect participation or funding splits when needed.

If space permits, extra columns should be provided on the General Summary to permit additional participation or funding splits.

1307.2.3 Item Code, Unit of Measure, and Description

The ODOT Item Master is a listing of construction item codes, their corresponding pay item descriptions and units of measure. This list is continually revised and posted on the Office of Estimating’s website. Questions regarding the ODOT Item Master should be directed to the **Office of Estimating**.

The item code is a nine character identifier used to catalogue pay item descriptions into a computerized database. All item codes and descriptions must be written exactly as listed in the Item Master. The first three digits of the item code generally refer to the specification number of the pay item and are entered in the “Item” column on the General Summary. The last five digits of the item code (referred to as the “Item Extension”) are used to catalogue the pay items within the specification number. The item extension is entered in the “Item Extension” column. The fourth character refers to the type of measurement being used (“E” for English). The fourth character should not be included in the item code on the General

Section 1300
Plan Components

Summary. It will be added at the time the information is entered into the computer during final plan processing. Item Specials are an exception to the above and are discussed in **Section 1307.2.6**. Item extensions are to be shown on the General Summary only (not subsummaries, notes, etc.).

Water work items using city specifications are to be Item “Specials” and their descriptions are to be per ODOT’s Item Master. See **SP 1307-4** for an example. Only a few cities have made arrangements with the **Office of Estimating** to use their own specifications.

Item descriptions are limited to an additional 120 characters beyond those shown in the Item Master.

Lump sum items shall show ”LUMP” in the grand total column with the unit column left blank.

The various items of work are grouped in order in the General Summary under the following headings:

Roadway
Erosion Control
Drainage
Pavement
Water Work
Sanitary Sewer
Lighting
Traffic Surveillance
Traffic Control
Traffic Signals
Landscaping
Retaining Walls
Building Demolition
Noise Barriers
Structures (Under 20')
Structures (20' and Over)
Maintenance of Traffic

Three-sided culverts must be listed as separate structures. Prefabricated structures with spans greater than or equal to 10 feet should be listed as structure items. Prefabricated structures with spans less than 10 feet should be included with the drainage items. Work that may require a sub-contractor may have a separate summary or subsummary unless very few items are involved. Examples are Water Work, Lighting, Traffic Control, Traffic Signals, Landscaping, Retaining Walls and Structures. When a separate summary is used, a cross reference must be shown on the General Summary to the sheet numbers on which the quantities are listed. A separate summary is usually provided for Sanitary Sewer items, although these items may be included under Drainage if the sanitary work involves only minor adjustments. Building Demolished is often considered a Roadway item when only a few buildings are involved. Structures are divided into two categories: “under 20’” and “20' and over” to facilitate collection of data for a report required by FHWA.

When separate general summary sheets are used in the plans, all quantities must also be carried to the standard GENSUM_VBA_AASHTOWare.xls spreadsheet. This excel spreadsheet is used to transfer plan quantities directly into ODOT's Office of Estimating's AASHTOWare software. Therefore, a**ll** quantities must be carried to this spreadsheet (i.e., pavement, retaining walls, structures, etc.). Quantities which are not carried to the GENSUM_VBA_AASHTOWare spreadsheet will **not** be included in the Engineer's Estimate. For more information on the GENSUM_VBA_AASHTOWare.xls spreadsheet, see Section 502.1 of the ODOT CADD Engineering Standards manual.

The pay items within each of the listed headings must be arranged in ascending numerical order by the item code. For items with the same item code but different supplemental descriptions, the items are placed in alpha-numeric order by supplemental description. As a general rule, at least one blank line should be left between every five pay items to provide for possible additions.

Pay items should be included under each heading as per the following list. Unless otherwise noted, all items under the stated specification number are included.

Roadway - 201, 202 (except Structure Removed, Approach Slab Removed, Portions of Structure Removed, and Building Demolished), 203, 204, 205, 206, 208, 209, 606, 607, 608, 622 (Concrete Barrier only), 623 (Monument Items only), 625 (Ground Rod for Fence only), 651, 652, 653, 654, 656, 878.

Erosion Control - 601, 616, 659, 660, 670, 671, 672, 673, 832, 836, 838.

The Department will furnish Item 832, Each, Erosion Control with an amount in the proposal to pay for Temporary Sediment and Erosion Control (TSEC) Best Management Practices (BMP) work. This amount is an estimate by the Department of the total cost of TSEC BMP work. If the TSEC BMP work exceeds this amount, the TSEC BMP work will still be paid at the pre-determined prices. The pre-determined prices are located in Supplemental Specification 832.

A Lump Sum pay item for the Storm Water Pollution Prevention Plan (SWPPP) should be included in the General Summary when a SWPPP is required.

Item 616, Water, must be added to all projects that require a 404/401 waterway permit. This quantity of water is used to comply with permit requirements regarding erosion and dust control near waterways. In addition, projects that include the Dust Control Plan Note from the **Traffic Engineering Manual** should include this Item 616, Water, in the Maintenance of Traffic section of the General Summary.

Item 207 is provided in the Construction and Materials Specifications to describe temporary sediment and erosion control methods to be used in conjunction with Supplemental Specification 832. No 207 items should be included in the General Summary.

Drainage - 602, 605, 611 (Except three-sided flat-top and arch structures or if used for sanitary sewer), 613, 835, 837, 839, 895.

Pipe Alternates - In the following examples, the figure in parentheses at the end of the corrugated metal pipe descriptions indicates the metal thickness of the pipe; if there are two figures, the first figure indicates the thickness of the top plates and the second figure indicates the thickness of the bottom plates. If there is no figure, the thickness shown for that pipe size in the appropriate 707 Table of the Construction and Material Specifications will suffice and need not be shown on the plan. Figures in brackets for 707.04 indicate the height of corrugation. The 1inch corrugation should generally be noted for pipe diameters over 48 inches.

Small Diameter (Less than 36")

611 _____ Ft. 21" Conduit, Type A 706.01, 706.02, 706.08 or 24" 707.01 (0.138), 707.04 (0.109), 707.05 (0.109), 707.21.

611 _____Ft. 24” Conduit, Type A 706.01, 706.02, 706.08, 707.33 with welded bell, SS 938 with welded bell or 30” 707.01 (0.138), 707.04, 707.05, 707.21.

Large Diameter (36" and over)

611 _____ Ft. 60” Conduit, Type A 706.02, 707.33 with welded bell, SS 938 with welded bell or 72” 707.02 (0.138), 707.03, 707.04 (1”), 707.07 (0.109), 707.22.

611 _____ Ft. 66" Conduit, Type A 706.02 or 72" 707.02 (0.138), 707.04 (1") (0.109), 707.07 (0.109), 707.22.

Pavement - 251, 252, 253, 254, 255, 256, 258, 301, 302, 304, 305, 307, 320, 321, 407, 408, 409, 411, 421, 422, 423, 424, 442, 443, 446, 448, 451, 452, 609, 617, 618, 803, 811, 812, 822, 826, 850, 851, 852, 857, 859, 874, 880, 881, 882, 884, 886, 888, 896, Special Pressure Relief Joint.

Water Work - 638 (Item Special when local government specification is used for water work).

Sanitary Sewer - 611 (When used for Sanitary Sewers).

Lighting - 625 (Except Ground Rod for Fence).

Traffic Surveillance - 625, 630, 631, 632, 633 (When used for Traffic Surveillance).

Traffic Control - 620, 621, 626, 630, 631, 642, 643, 644, 645, 646, 647.

Traffic Signals - 611 (Conduit for pull boxes only), 625 (When used for Traffic Signals), 632, 633, 804, 815, 816.

Landscaping - 657, 658, 661, 662, 666.

Retaining Walls - 203, 503, 509, 511, 518, 610.

Building Demolition - 202 (Building Demolished).

Noise Barriers - Special Noise Barrier.

Structures - 202 (Structure Removed and Portions of Structure Removed, Approach Slab Removed), 203 (When used for Mechanically Stabilized Earth walls at bridge abutments. See the **Bridge Design Manual** for additional information.), 503, 504, 505, 506, 507, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 522, 523, 524, 526, 611 (3-sided flat-top and arch structures), 840, 842, 843, 845, 847, 848, 849, 883, 885, 892, 893, 894, 898.

In order to effectively track bridge maintenance costs, separate quantities must be recorded for each bridge structure. The following three options are acceptable:

- Providing a separate general summary for each bridge within the bridge sheets with a reference from the General Summary to the structure General Summary. When separate general summary sheets are used in the plans, all quantities must also be carried to the standard GENSUM_VBA_AASHTOWare.xls spreadsheet. This excel spreadsheet is used to transfer plan quantities directly into ODOT's Office of Estimating's AASHTOWare software. Therefore, a**ll** quantities must be carried to this spreadsheet. Quantities which are not carried to the GENSUM_VBA_AASHTOWare spreadsheet will **not** be included in the Engineer's Estimate. For more information on the GENSUM_VBA_AASHTOWare.xls spreadsheet, see Section 502.1 of the ODOT CADD Engineering Standards manual.

- Using a combined structure general summary that splits out quantities for each bridge; also with a reference from the General Summary. All quantities must also be carried to the standard GENSUM_VBA_AASHTOWare.xls spreadsheet. See Section 1307.1 for more information.

- Including structure quantities broken out by bridge number on the General Summary. See Section 1307.1 for more information.

Maintenance of Traffic - 410, 502, 614, 615, 616, 622 (Portable Concrete Barrier only), 873, any additional items used specifically for maintenance of traffic.
The following items are listed in order at the bottom of the last General Summary sheet without a group heading:

614 Lump, Maintaining Traffic

619 Month, Field Office, Type (A, B or C)

623 Lump, Construction Layout Stakes

624 Lump, Mobilization

Item 614, Maintaining Traffic, is required on most projects. A building demolition plan would be an example of a project that would not require Item 614, Maintaining Traffic.

Two-lane resurfacing, mowing, pavement marking, guardrail replacement, bridge painting, and other similar types of projects may not require pay items for Field Office, Construction Layout Stakes or Mobilization. The District Highway Management Administrator should be consulted when there is a question regarding the need for these items. The following guidelines should be used for determining the type of Field Office to specify:

Estimated Project Construction Cost	Office Type
Less than $500,000	A
$500,000 to $5,000,000	B
Over $5,000,000	C

The basis of payment for a Field Office should be Month, unless otherwise instructed.

1307.2.4 Contingency Quantities

In some cases, it may not be feasible to obtain precise quantities due to uncertainties regarding existing conditions. In these cases, a reasonable estimate (not contingency) of the items necessary along with the location to where they apply should be completed and appropriate quantities should be shown in the plans. Contingency quantities should not be used.

Pavement cores, soil borings and other condition surveys commensurate with the nature of the proposed work should be used to assist with the determination of these quantities.

1307.2.5 Linear Grading

Linear grading pay items are intended for shallow grading and/or filling operations performed from the edge of pavement outward to prepare, dress and/or reshape the roadside.

Item 209, Reshaping Under Guardrail and Item 209, Preparing Subgrade for Shoulder Paving are described in the Construction and Material Specifications. Item 209, Linear Grading may be used at other locations with minor grading. All three pay items are based on a linear measurement along each side of the pavement.

Sufficient detail must be included in the plans to estimate and construct the work. When two or more different types of Item 209, Linear Grading are required in the same plan, they should be differentiated by designating them as “Method A”, “Method B”, etc. If off-project material is needed for the work, a quantity of Item 209, Borrow must be specified in the plans. Consideration should be given as to how this item is paid. If Item 209, Borrow can be measured and calculated, then payment should be by the Cu. Yd. If the borrow cannot be measured due to settlement or because the area is under water, then payment should be by the Ton.

1307.2.6 “Standard”, “As Per Plan” and “Special” Pay Items

There are three types of pay items in a construction plan, “Standard”, “As Per Plan” and “Special”. A “Standard” pay item is one whose requirements are defined by the Standard Construction Drawings and the Construction and Material Specifications or Supplemental Specifications. The description of a “Standard” pay item is consistent from plan to plan and is listed under the heading “Basis of Payment” in the Construction and Material Specifications or Supplemental Specifications.

An “As Per Plan” item is a standard pay item whose requirements need to be modified from that which is defined by the Standard Construction Drawings and the Construction and Material Specifications or Supplemental Specifications. Every “As Per Plan” item must have a corresponding plan note, or proposal note, or plan detail, or combination thereof which clearly and completely explains the deviation(s) from the standard item. The location of “As Per Plan” notes and details shall be cross-referenced in the “See Sheet No.” column on the General Summary.

A “Special” item is an item that does not exist in the Standard Construction Drawings, the Construction and Material Specifications or Supplemental Specifications. It must be created by means of plan notes, plan details, proposal notes, special provisions or a combination thereof, which clearly and completely defines all aspects of the item. The location of “Special” item notes and details shall be cross-referenced in the “See Sheet No.” column on the General Summary. “Special” pay items are coded according to the closest related Specification number. If the item is a “Special”, the word “Special” must be entered in the “Item” column and all eight digits of the item code are entered in the “Item Extension” column.

1307.2.7 Alternate and Optional Items

Alternate and Optional bid items are included in a plan when so dictated by the sponsoring agency. Alternate items shall be listed as "Alternate" at the end of the section where they would normally occur in the General Summary **[SP 1307-4]**. The description for "Alternate" items should vary to give distinction between items. One group of bid items can be alternated to another group of bid items without there being a one-to-one item match. Plan notes, plan details, proposal notes, special provisions, or a combination thereof shall be provided to clearly and completely define and identify the alternates. The bidder is required to bid all alternate items. The sponsoring agency will determine the alternate item or group of alternate items selected for the contract to be awarded. When the higher priced alternate item is selected, the additional cost of the alternate will be the responsibility of the sponsoring agency.

Optional bid items are listed under their appropriate heading in the General Summary. Each set of Optional bid items are grouped together and designated with alphabetical labels (e.g. Option A, Option B, etc.) **[SP 1307-3(c)]**. When a group of bid items is optional to another group of bid items, each group of items will be given a single label. The bidder is to bid on one option only, with the choice of options left to the bidder.

Questions regarding the use of alternate and optional bid items should be addressed to the **Office of Estimating**.

1307.2.8 Sheet Cross References

The "See Sheet No." column is used to show a cross reference to a general note sheet, plan detail sheet or description group general summary. References to a general note or plan detail for items that are not "As Per Plan" or "Special" should be made when the note or detail describes a specific method of performing work. Description groups that have their general summaries cross referenced should be listed in the order shown in **Section 1307.2.3**.

Reference to a proposal note may be made at the end of a pay item description only if the pay item is new, or if the item is rarely used.

1307.2.9 Buildings Demolished

Buildings to be demolished should be paid for under Item 202, Building Demolished. A single lump sum item is used for each parcel. The item description should include the parcel number and a list of the buildings to be removed. For example:

Item 202, Building Demolished, Parcel 10 WD, 2-Story Framed House, Basement, Shed

Item 202, Building Demolished, Parcel 20 T, 1-Story Brick House, 2-Car Detached Garage

Item 202, Building Demolished, Parcel 102 WL, Remove 20 Trailers, 6 Sheds

For additional information contact the **Office of Real Estate**.

1307.2.10 Salvage of Utility Items

Existing utility facilities (fire hydrants, valve boxes, etc.) to be removed by the highway contractor shall be disposed of and replaced, adjusted or removed and reset. These items shall not be removed and stored for retrieval by the utility owner. The rules governing utility relocation and reimbursement differ from other

functions of the highway construction process. The removal of existing facilities for storage would require that a salvage credit be given to the project for the value of the removed items and any contractor charges for handling and/or transportation of the items would be ineligible for project cost.

1307.3 Subsummaries

A limited number of sheet number columns are available on the General Summary. This limits the number of sheets from which quantities can be brought forward. It is therefore necessary on larger plans to summarize quantities in stages. Subsummaries are plan sheets where quantities from several sheets are gathered. The items may or may not have some relationship to each other.

Some of the pavement marking quantities are subdivided and subtotaled by color and/or type. Examples of subsummary sheets are included in the Sample Plan Sheets**.**

Subsummaries are generally located in a set of plans near (normally in front of) the source of the quantities they summarize. However, when they summarize a number of unrelated items, they may be located either after the General Summary or after the calculation sheets.

1307.4 Quantity Calculations

1307.4.1 General

In order to prepare a valid engineering cost estimate for a project, it is essential that quantities be accurately calculated, accurately carried to the General Summary, and that substantiating data for all calculated items be included in the plan.

1307.4.2 Pavement Calculations

Pavement, subgrade compaction and treated shoulder quantity computations should be completed on 8 1/2" x 11" sheets. These sheets may be handwritten or computer generated (e.g., spreadsheets). Computations should clearly show how the quantities were derived. Irregular areas should be noted as CADD generated or planimetered areas. All sheets must include the project title and be numbered (e.g., 2 of 10). Quantities should be carried to the General Summary and listed under a column entitled "Office Calcs." **[SP 1307-3(a) and 1307-3(b)]**.

1307.4.3 Rounding of Quantities

Rounding of quantities should be made at the subsummary level. All quantities are whole numbers except as follows:

- Carried to tenths:

  Cubic Yards - Masonry

  Square Feet - Signs

  Feet - Ground Mounted Sign Supports

- Carried to the nearest foot

  Feet - Conduit and Underdrains, Subdrainage piping (Structural)

- Carried to hundredths:

  Miles - Pavement Marking

  Feet - Bridge Deck Joints, DripStrip, Prestressed Concrete Bridge Members

  Tons - Commercial Fertilizer

  Acres - Lime

- Nearest 100 Pounds

  Pounds - Structural Steel

- Guardrail quantities are normally determined in standard 12.5' panel lengths. The following, however, are instances when this is not the case.

  Where there is a continuous run of guardrail between two structures, it may be necessary to use a partial panel to properly close the opening. In this case, the length may be carried to hundredths of a foot.

  The old Type 5 guardrail Bridge Terminal Assemblies, Type 1, Type 3, and TST have a length of 18.75' which does not utilize W-beam guardrail panels. Since the length of Type 5 W-beam guardrail used in conjunction with these Bridge Terminal Assemblies must be in multiples of 12.5', the total length-of-run (including the 18.75' length discussed above) should be an odd multiple of 6.25']. The Bridge Terminal Assembly lengths are ***NOT*** included in the quantities for the overall MGS.

  When utilizing W-beam guardrail across structures, the entire length of rail (including approaches) from Anchor Assembly to Anchor Assembly should be a multiple of 12.5'. However, since the length of the portion on the structure may be an odd multiple of 6.25', it is possible that the length of either the approach or trailing end may have to be adjusted to an odd multiple of 6.25'.

1307.4.4 Validation of Quantities

Prior to submission of the completed plans, all plan quantities shall be independently checked by competent personnel other than the person(s) who originally computed the quantities. Each plan sheet that lists quantities or calculations shall be validated by the signed initials or names of persons who computed the quantities and those who performed the checking operations. These initials should be shown in the title block. SPEDuP plans shall show these initials in the page footing. While it is contemplated that spot checks of quantities will be made during review of the plan, the correctness of the quantities is the responsibility of the design unit preparing the plans.

1308 Project Site Plan

1308.1 General

A Project Site Plan is required for all projects that require the submittal of a Notice of Intent (NOI) as explained in the **Location and Design Manual, Volume 2, Section 1112**. The Project Site Plan is prepared by the designer and provided as part of the contract documents. A sample Project Site Plan is shown in the Sample Plan Sheets **[SP 1308-1]**.

Section 1300
Plan Components

For non-contiguous portions of projects sold under one contract as described in **Location and Design Manual, Volume 2, Section 1112**, provide a Project Site Plan for each individual site that exceeds one acre of earth disturbing activity.

A Storm Water Pollution Prevention Plan (SWPPP) is required for all projects with a Project Earth Disturbed area greater than or equal to one (total) acre. The construction contractor is responsible for modifying the Project Site Plan to prepare a SWPPP that meets the Ohio EPA NPDES (National Pollutant Discharge Elimination System) Permit requirements. The contractor shall develop the SWPPP in accordance with Supplemental Specification 832 after the contract is awarded and prior to any construction activity. The contractor's engineer must sign, seal, and submit the proposed plan to ODOT for review. Additional guidance can be found in the **Location and Design Manual, Volume 2**.

1308.2 Requirements

The Project Site Plan shall consist of a schematic plan similar to that required in **Section 1303**. It will generally have a scale of 1"=200'. This plan shall show all Project Disturbed Areas.

The following items shall be included on the plan and may be listed in tabular form:

- A site description indicating the nature and type of construction activity.
- The total area of project (right-of-way, including permanent easements).
- The total area of "Project Earth Disturbing Activities" that is expected to undergo earth disturbing activities as estimated from **Location and Design Manual, Volume 2, Figure 1112-1**.
- The area of "Contractor Earth Disturbing Activities" as estimated from **Location and Design Manual, Volume 2, Figure 1112-1**.
- The area of "NOI Earth Disturbing Activities" as estimated from **Location and Design Manual, Volume 2, Figure 1112-1**.
- An approximate determination of the Rational Method runoff coefficient for both the pre-construction and post-construction site conditions.
- An estimate of the impervious (paved) area for both the pre-construction and post construction site conditions.
- The name and location of the immediate receiving stream or surface water(s) and the subsequent named receiving water(s) (e.g. Black Run/Sandy Creek).
- Surface water locations including streams, lakes, ponds, wetlands, jurisdictional and regulated ditches, springs, etc. within 200' of the right-of-way.
- The approximate latitude and longitude ($\pm$ 5 seconds) of the center of the project.
- The name and number of the USGS 7.5 minute quadrangle map(s) on which the project is located.
- Existing contours with enough accuracy to define the existing drainage patterns.
- Flow arrows indicating proposed drainage patterns.

- Existing buildings and current land uses (e.g. residential, commercial, or agricultural).
- Permanent drainage items such as culverts, storm sewers, catch basins, etc.
- The location of permanent erosion control measures and permanent storm water Best Management Practices (BMP) through a description, graphically, and in tabular form listing station and offsets, or station ranges.

1309 Plan & Profile Sheets

1309.1 General

Plan & Profile Sheets **[SP 1309-1(a) through SP 1309-8]** show what an area looks like before (existing) and after (proposed) construction of the project. In addition, they show quantities, dimensions, and other items required to construct the project. Plan and Profile Sheets are normally drawn to the following scales:

- Rural Projects:

  - Horizontal: 1"=50', or 1"=20'
  - Vertical: 1"= 5', or 1"=10'

- Urban (or Short Rural) Projects:

  - Horizontal: 1"=20'
  - Vertical: 1”=5' (preferred) or 1”=10'

The above scales will result in coverage on a typical sheet of 1500' at 1"=50' and 600' at 1"=20'. For convenience, the scale used for the roadway plan and profile sheets should match the scale used on the right-of-way detail sheets.

The profile should be plotted on a square grid system subdivided in accordance with the examples shown in **Figure 1202-1**.

The plan and profile sheets at the beginning and end of the project should include additional length of existing topographic features beyond the ends of the permanent pavement construction. The minimum additional length is 300 feet for design speeds of 40 mph or less and 500 feet for design speeds over 40 mph. Horizontal and vertical alignments and all topography should be shown in these “extension” areas.

To avoid misinterpretations, the use of abbreviations in the plans, except those defined in the **Construction and Materials Specifications** or generally understood by engineers and contractors, should be minimized. If abbreviations are used, a legend explaining the abbreviations should be included.

1309.2 Format

Plan & Profile Sheets are composed of three distinct parts - plan, profile and quantities. All of these parts may be shown on a single sheet **[SP 1309-5, 1309-6, and 1309-8]**. However, because of the complexity of some plans, it may be necessary to vary the format to more clearly show the proposed work. In such cases, the plan, profile and quantities may be shown on separate sheets **[SP 1309-2]** or combined in any

manner **[SP 1309-1(a) and 1309-1(b)]**. When varying from the single-sheet format, the designer should locate the plan, profile and quantity sheets as near to each other as possible and provide cross-references on each sheet.

1309.3 Existing Information

All existing features should be shown and the disposition of all such items within the existing and/or proposed right-of-way should be indicated. Existing features, except buildings, should be shown using dashed lines. The following sections list many of the existing items that should be shown on a Plan & Profile Sheet. This list should not be considered all-inclusive.

1309.3.1 Topography

- Trees and stumps – For projects involving earth disturbing activities or any other construction activity that may require tree removal, the diameter of all trees and stumps 12 inches and over must be shown. Symbols should be used to differentiate between deciduous and coniferous trees. Species names (e.g., Oak, Maple, Pine) do not need to be labeled. In general, labels designating tree size (as defined in the Construction and Material Specifications) should be provided for trees located within the construction limits and 25 feet outside the project construction limits. Trees and stumps to be removed should be noted by an "X".

- Shrubs

- Moving water such as creeks, streams, rivers and ditches - The direction of flow should be denoted by flow arrows.

- Ponds and lakes

- Wetland areas

1309.3.2 Buildings and Appurtenances

- Buildings – Identify usage (i.e., residential commercial, etc.), type of construction and number of stories

- Wells, cisterns, sanitary systems (leach fields, septic tanks)

- Underground storage tanks, oil and gas wells with associated piping

- Walks, drives, paved areas

- Walls, fences

- Non-highway signs – Highway signs are not typically shown on the Plan and Profile Sheets but rather in the Traffic Control Plans.

- Railroad facilities shall be shown when they are located within the normal limits of the Plan & Profile Sheet. The location of the tracks with respect to the centerline of construction should be shown together with the rail elevations at intervals not to exceed 500 feet]. This information may be shown on the cross-sections if more convenient.

1309.3.3 Roadway Items

- Pavement, curbs, treated shoulder, drives.
- Guardrails, concrete barrier, fences.
- Profile of the ground line at the centerline of construction, with elevations every 50' and at abrupt changes **[SP 1309-1(a) through SP 1309-8]**.
- Storm sewers, inlets, manholes, catch basins, culverts (type, size and elevations) **[SP 1309-6 and 1309-8]**.
- Bridges.
- Light poles.

1309.3.4 Boundary Lines

- Property lines, easements.
- Right-of-way lines.
- Governmental boundaries (State, County, City, Village, Township, etc.).
- Railroad right-of-way lines.

1309.3.5 Utilities

- Location and depth of underground utilities (gas, telephone, water, sanitary, etc.)
- Location of overhead utilities (electric, telephone, cable television, etc.). Only poles should be shown unless actual lines are located such that they may impact the contractor's operations. Indicate the rating of major overhead electric transmission lines and the existing clearance.

1309.3.6 Underground Mines

- Location of any field observed or mapped mine features (openings, subsidence features, etc.).
- Limits of mapped mine workings labeled with the Ohio Department of Natural Resources Division of Geological Survey Mine Code. A note referencing the appropriate Mine Map Overlay Sheets should be shown on the Plan & Profile sheets when the extent of the mine workings exceeds the normal limits of the sheet.

1309.4 Proposed Facility Information

Listed below are many of the proposed facility items that should be shown on a Plan & Profile sheet. This list should not be considered all-inclusive.

Section 1300
Plan Components

1309.4.1 Alignment and Grade

- Centerline of construction and any other construction baselines should be shown along with their relationship to each other. Stations, station equations, and bearings (at each tangent and at least one per sheet) must be shown.

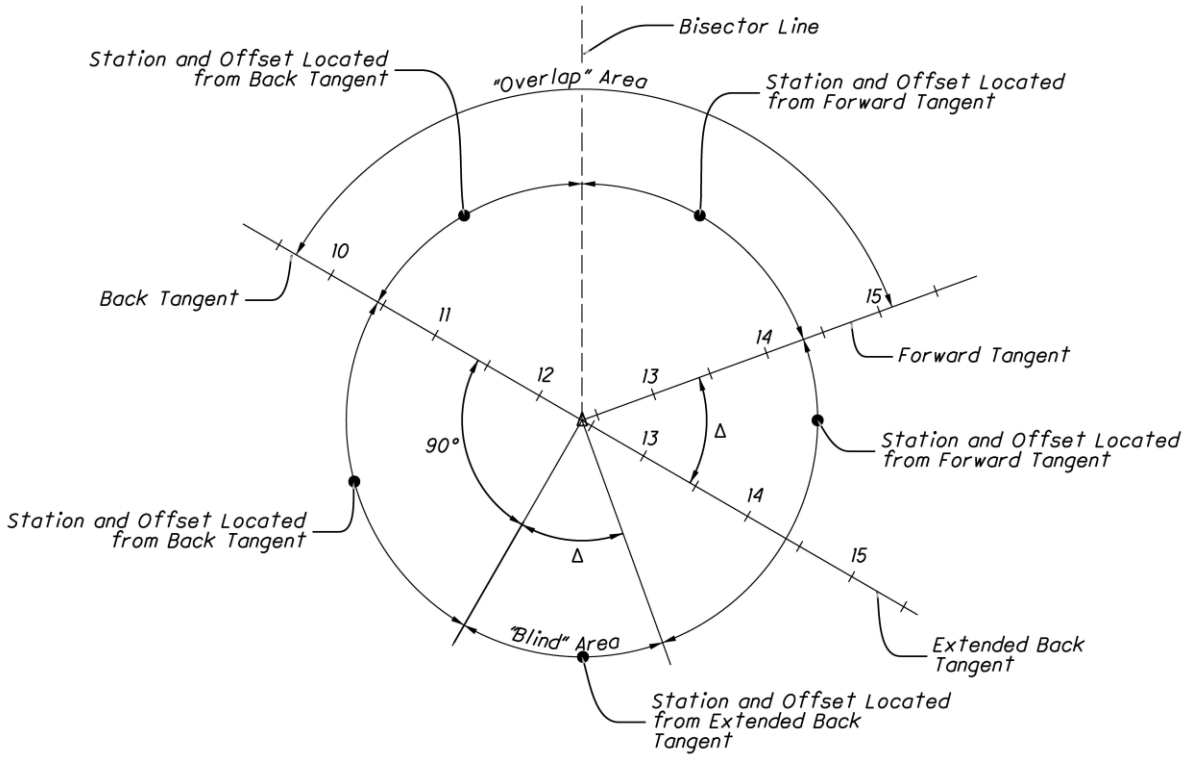
  The centerline of construction should match the centerline of right-of-way. In those instances where it is not possible to match the two centerlines, a constant offset between the two centerlines is preferred. When the two centerlines differ, their relationship must be shown in the right-of-way plans. It is not necessary to show this relationship within the construction plans.

  Stationing shall be designated in feet per the following examples:

  104+59.35, meaning 10,459.35 feet from Sta. 0+00.

  When giving locations of points intermediate of full stations and leaving off the full station designation, all leading zeros should be included. For example: +03.17 would be the abbreviated form of Sta. 2+03.17.

  When a centerline includes a deflection angle (i.e., a P.I. without a horizontal curve), there can be confusion on how to measure stations and offsets from the back and forward tangents. The following figure clarifies which tangent to use depending on a point's location in the "overlap" area.



In addition to the “overlap” area, there is a “blind” area in which a station and offset cannot be measured from either the back or forward tangent. Stations and offsets in the “blind” area should be measured off an extended back tangent as shown in the figure.

Indicate when station and offset are being reported along the extended back tangent in the “blind” area as follows:

Sta. 12+75.00, 30.00’ Rt., on Extended Back Tangent

- Grades are to be shown using percentages to the hundredths.
- Profile grade elevations are to be shown every 25'. The location of the profile grade elevation is shown on the Typical Sections.
- Elevations shall be expressed in feet above the specified datum.
- Horizontal alignment data – Show all data for simple curves and spiral curves (See **Figures 1303-1, 1303-2 and 1303-3**). All proposed horizontal alignment data (i.e. curve information, station equations, reference points, etc.) shall be specified to the nearest hundredth of a foot.
- Vertical alignment data – The data includes the station and elevation of the PVI and the limits and length of vertical curve. When there is a grade break without a vertical curve, the words “NO CURVE” should be added adjacent to the PVI station and elevation **[SP 1309-1(a)]**.
- Vertical clearance under overhead structures - The existing, proposed and required clearance shall be shown.
- Vertical clearance under major overhead electric transmission lines.

1309.4.2 Roadway Items

- Lane widths – Where lane widths are not obvious, they should be shown on the plan view or on a separate sketch. The location and dimensions of all pavement transitions should be shown, including “tie-ins” to existing pavement.
- Pavement width, treated shoulder width – Label width dimensions left and right of the centerline of construction at transition end points **[SP 1309-5]**.
- Curbs – Show and label transitions **[SP 1309-1(a)]**.
- Drives – Label the location, type, existing surface type, width, and alignment with mainline (i.e., angle relative to centerline) on plan and profile sheets, drive detail sheets or tables.
- Guardrail – Label anchor assemblies, bridge terminal assemblies, terminal stations, flare and radii **[SP 1309-2 and 1309-8]**.
- Concrete barrier – Label terminal stations, end anchorages, transitions, and end treatments like impact attenuators.
- Signs – Identify sign structures (i.e. cantilever and trusses), controllers and signal poles. Smaller traffic control signs (i.e. mounted on yielding posts) are normally shown on a separate traffic control plan sheet.

- Bridge limits, structure number, approach slab limits, and pier locations **[SP 1309-8]**.

1309.4.3 Boundary Lines

- Right-of-Way, easement, temporary right-of-way and limited access lines

- Construction limits – These limits must encompass all work. This includes removals, room for construction equipment to complete work, site access, etc. Construction limits are not intended to encompass storage areas for materials or equipment. However, it may be necessary to address storage areas when determining a project's environmental impacts.
- Property Lines – Show property lines when right-of-way is being acquired or when the project includes access management changes for properties along the roadway.

1309.4.4 Drainage Items

- Storm sewers, inlets, manholes, catch basins, culverts - These items should be shown in both plan and profile **[SP 1309-1(a), 1309-3, 1309-4, 1309-5, 1309-6]**. Drainage items are often shown on the cross-sections and drainage details, in addition to the Plan & Profile sheets. Detailed information should be indicated on only one of these sheets. The remaining sheets need only show the type of structure and a reference to the sheet showing additional details. Proposed and existing elevations should be shown on the Plan & Profile sheets for manholes and catch basins which are to be either reconstructed or adjusted to grade.

- Underdrains - Include all bends, branches, outlet offsets and elevations **[SP 1309-5]**. In addition, include the profile grade for unclassified underdrains

- Flow arrows showing direction of flow in ditches, streams, underdrains and culverts.

- Erosion protection - includes dimensions of rock channel protection, sodding, ditch erosion protection, etc.

- Slope lines, where necessary, to better define drainage.

- Design and 100-year water elevations, if not shown elsewhere in the plans (e.g., culvert details, etc.).

1309.5 Quantities

Plan & Profile sheets are used to show many of the plan quantities as described in the following sections.

1309.5.1 Reference Balloons

Reference balloons are used to tie the items on the plan to the pay quantities in the estimated quantities table. The designations within the balloon correspond with the reference designation in the estimated quantities table. Dashed balloons are used to indicate that quantities are picked up on a different sheet.

A separate reference balloon is used for each drainage structure and its outlet run of conduit regardless of whether or not the run of conduit extends onto an adjacent plan and profile sheet. For example, reference balloon D-5 on **SP 1309-1(a) and SP 1309-1(b)** includes a catch basin and proposed storm sewer conduit that extends to the next sheet.

Reference balloon numbering may be restarted on each plan view or may be carried through the entire plan. A consistent system of reference balloon numbering should be used for each project. **SP 1309-1(a)** and **SP 1309-1(b)** provide an example of sequential balloon numbering that is carried through all plan and profile sheets. **SP 1309-6** provides an example of balloon numbering that is restarted for each plan and profile sheet.

1309.5.2 Estimated Quantities

Quantities should be shown in tabular form in such a manner as to clearly show the following:

- Reference Designation - This is usually a combination of letters and numbers. The letters indicate the general description of the item (Example - UD or U for underdrain, GR or G for guardrail, D for drainage, S for sanitary sewer, C for curb, DR for driveways, R for removal, WQ for manufactured water quality structure), and numbers differentiate between similar items (D-1, D-2 and D-3 might be used when there were three drainage items on one Plan & Profile Sheet).
- Location - This includes the limiting stations and side (Rt. or Lt.)
- Item Number or Special and item description
- Unit of Measure (ft^2, yd^3, mi., etc.)
- Item quantity and total quantity.

Indicate whether the total quantities are carried to the General Summary or to a Subsummary Sheet.

1309.6 Miscellaneous Information

In addition to existing and proposed information and quantities, Plan & Profile sheets include other information pertinent to the project, such as the following:

1309.6.1 Project Control and Reference Points

Points used to establish project control along with the associated reference points are more commonly shown on the Schematic Plan or General Notes. When a Schematic Plan is not provided or for other unique situations where the project control points and reference points cannot be shown in the Schematic Plan or General Notes, these points should be shown on the Plan sheets as described in Section 1303.22.

1309.6.2 Cross References to Other Sheets

Where quantities, details, etc. are shown on other sheets, cross-references are required.

1309.6.3 Typical Sections of Adjoining Pavement

When not shown with the Typical Section Sheets, the first and last Plan & Profile Sheet should show a detail of the Typical Section of the Adjoining Pavement, including type, thickness and cross slopes of all pavement courses.

1309.6.4 Project and Work Limits

If the Project and Work Limits are not provided in the Schematic Plan, the limits should be shown on the appropriate Plan & Profile Sheets.

1309.6.5 Match Lines

A match line should be shown, and the station given, wherever the plan view, work or quantities are continued on another sheet. It is recommended that the match lines be made at a location where the stationing is a multiple of 100 feet.

1310 Cross-Sections

1310.1 General

Although the main purpose for cross-sections is to show end areas and surface dimensions for the calculation of earthwork and seeding quantities, they conveniently show a wealth of additional information, which will be discussed in part in the following sections **[SP 1310-1 through SP 1310-4]**.

In complicated areas such as interchanges, a cross-section layout sheet may be required. A cross-section layout sheet is a plan sheet showing where each section is located **[SP 1310-6]**.

1310.2 Format

Cross-Sections are plotted on a 1" x 1" grid system subdivided in accordance with the examples shown in **Figure 1202-1**. Horizontal and vertical scales are equal - usually 1"=5' or 1"=10'. Elevations are labeled along each side at the major grid lines. When a 1"=10' scale is used, the even elevations are located at the 1" grid lines. The distance, measured from the centerline of construction, is labeled at the top and bottom of the sheet at the vertical major grid lines. Cross-section sheets shall be laid out such that stationing increases from the bottom to the top of the sheet.

Intervals between regular sections should normally be 50'. Intervals of 25' should be used where greater detail is required. In addition, sections (or partial sections) are plotted at abrupt ground line changes or to show special features such as drives, bridges, or drainage items. Sections must be shown as often as necessary to accurately determine the character and extent of the proposed work. The station is shown in bold print under each section at the centerline of construction. The existing ground elevation at the centerline of construction is shown directly below the station number and the elevation of the proposed grade at the profile grade point is shown directly above the station number. A project may require two profile grade points to be shown on the cross-sections.

Exaggerated cross-sections may be included in the plan or provided on separate sheets with the Stage Three submission for review and reference during construction of the project. They are used to calculate variable depth pavement leveling course quantities or to show variable depth pavement planing.

Existing features are shown with dashed lines and proposed features are shown with solid lines. Existing features located between two cross-sections should be shown on the nearest cross section. For example, for a project using 50’ cross section intervals with a catch basin located at Sta. 20+27, the catch basin should be depicted on the cross section at Sta. 20+50. Surface, base and subbase courses of proposed pavement are not shown. Likewise, interpretations of the subsurface investigation, such as top of rock, are not shown. The limits of the existing pavement should be shown.

The ratio for each side-slope and back-slope (2:1, 3:1, etc.) should be labeled at the top and bottom sections on each sheet and at any intermediate sections where there is a change in the slope.

1310.3 Earthwork and Seeding Quantities

1310.3.1 Earthwork Calculations

End areas (calculated to the nearest square foot and earthwork volumes (cubic yards are shown for cuts and fills in the columns on the right side of the cross-section sheet. Separate calculations must be shown when different types of earthwork (e.g., Item 203 and Item 204) are included **[SP 1310-2 and 1310-4]**.

Concrete pavement removal must be itemized separately and paid for under Item 202, Pavement Removed. On large projects, asphalt concrete pavement removal should be itemized separately under Item 202, Pavement Removed, Asphalt **[SP 1310-7]**. Adjustments must be made for drives, intersections, etc. When pavement is removed and is to be replaced with embankment material, the quantity of embankment must be included in the plans using the applicable 203 or 204 pay item.

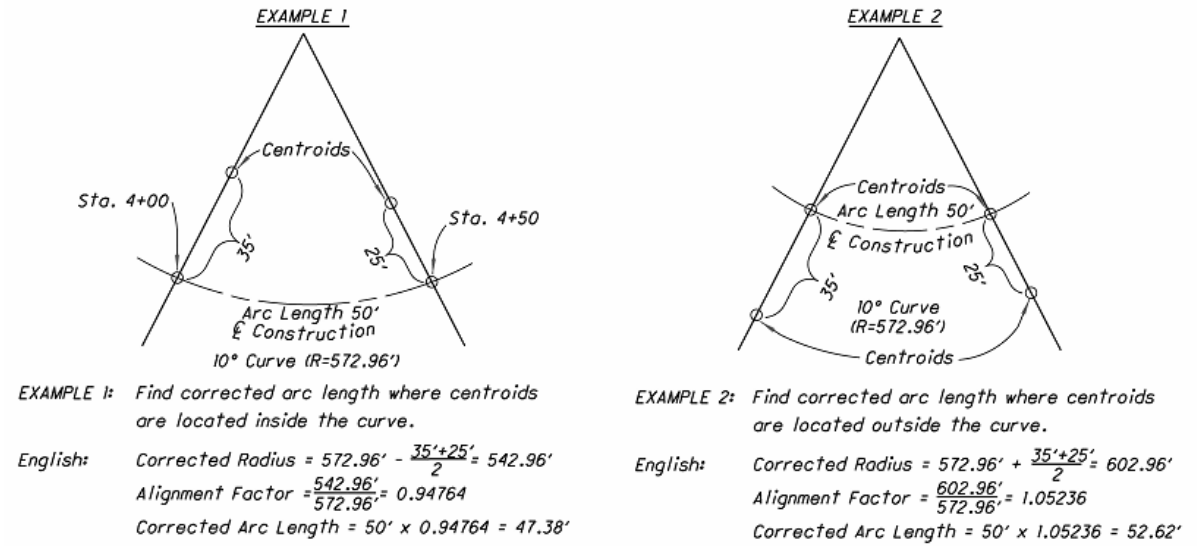
End areas may be determined using computer programs, planimetering, or summation of geometric shapes. Subtotals for earthwork quantities should be shown on each sheet and carried to a subsummary in advance of the cross-sections or directly to the General Summary.

1310.3.2 Earthwork Corrections for Curvature

When computing earthwork for a project, it is important that the designer consider the effect of curvature on the volumes of cut and fill and adjust the quantities where warranted. Curvature may have a significant effect where there are side-hill cuts and/or fills where the centroid of either area is significantly displaced from the centerline. The magnitude is a function of the curve radius, with shorter radii curves (such as may be used on ramps) having the greater effect. Whenever the true volume of cut or fill, or both combined, based on the centroidal arc length, differs by one cubic yard per yard of distance between adjacent cross-sections from the estimated volumes based on the survey length, a correction shall be shown in the plans.

It is assumed that the actual true volume of a curved prismoid is the product of the average area of end sections times the arch length passing midway between the centroids (centers-of-gravity) of the end sections. If the centroidal arc lies on the inside of a curve, its length is shorter than the centerline distance; if it lies on the outside, its length is longer.

To adjust earthwork volumes for curvature, the corrected-arc-length method should be used. This method is simple and easy to understand and is easily adapted to computer programs for earthwork. An example of this method is shown in the following figure.



EXAMPLE 1: Find corrected arc length where centroids are located inside the curve.

English: Corrected Radius = $572.96' - \frac{35'+25'}{2} = 542.96'$

Alignment Factor = $\frac{542.96'}{572.96'} = 0.94764$

Corrected Arc Length = $50' \times 0.94764 = 47.38'$

EXAMPLE 2: Find corrected arc length where centroids are located outside the curve.

English: Corrected Radius = $572.96' + \frac{35'+25'}{2} = 602.96'$

Alignment Factor = $\frac{602.96'}{572.96'} = 1.05236$

Corrected Arc Length = $50' \times 1.05236 = 52.62'$

The diagram of the example showing the method of correction should be shown on the General Note Sheet. The corrected arc lengths should be shown in the earthwork tabulations on the cross-section sheets.

1310.3.3 Roads for Maintaining Traffic

Roads for Maintaining Traffic, along with their baseline (if any) should be shown on the cross-sections **[SP 1310-2 and SP 1310-3]**. Earthwork for Roads for Maintaining Traffic shall be shown by heavy dashed lines. This includes both the portion to be removed under 615, Roads for Maintaining Traffic, as well as the overlapping areas of earthwork that will remain as part of the permanent facility.

Earthwork cut and fill end areas for roads for maintaining traffic may be shown on the cross-sections with quantities located in separate cut and fill columns or marked with an asterisk. Alternatively, they may be calculated on separate letter size sheets and included with the LD-4 form (submitted with the final tracings) for estimating purposes. The totals of the earthwork cut and fill for roads for maintaining traffic shall be provided in the General Notes.

1310.3.4 Seeding Calculations

Except on projects where the seeding quantities can otherwise be determined with reasonable accuracy, seeding end widths and areas should be shown on the cross-sections. The limits of seeding shall be all areas of exposed soil between the right-of-way lines and within the construction limits for areas outside the right-of-way lines.

End widths measured to the closest foot and seeding areas (sq. yards) are shown in the columns on the left side of the Cross-Section sheet. Adjustments must be made for drives, intersections, etc. **[SP 1310-3]** Subtotals for seeding quantities should be shown on each sheet and carried to a subsummary in advance of the Cross-Sections or directly to the General Summary.

1310.4 Drainage Items

Existing and proposed drainage facilities should be shown on the Cross-Sections. This includes, but is not limited to: ditches, permanent erosion control items, flow arrows, culverts, headwalls (type and elevations), inlets, manholes, drive pipes, underdrains, and other longitudinal drainage items. Ditch flowline elevations should be shown. Existing facilities to be removed or abandoned should be so noted. Existing normal water level elevations should also be noted for lakes, ponds, rivers and streams. The elevation of the Ordinary High Water Mark (OHWM) should be identified for any waterway feature being addressed through the Waterway Permit.

Drainage items are normally shown on the Plan & Profile Sheets and on the Drainage Detail sheets in addition to the Cross-Sections. Full design information should be indicated on only one of these sheets. The remaining sheets need only show the type of structure and a reference to the sheet showing additional details.

1310.5 Drives

Drive profiles should be shown on the cross-sections. Profiles which do not fall at a full cross-section should be shown on a partial section. The drive station, length and grade should be labeled. Separate drive profile sheets are not typically required. Separate sheets may be needed for long drives **[SP 1310-5]**.

1310.6 Miscellaneous Items

Some of the other items that should be shown on the Cross-Sections include: retaining walls, limits of subgrade stabilization and all underground utilities.

1311 Miscellaneous Details

Miscellaneous Details is a section of the plan that serves as a “catch-all” for items that do not fit under other headings. Some of the items that may fall into this category include:

1311.1 Drive Details

Drive details **[SP 1311-4 and 1311-5]** show the geometry and build-up of drives. Typically, this information can be adequately presented in tabular format and separate drive details are not needed.

1311.2 Grading Details

Grading Details **[SP 1311-12]** are sheets showing the graded shoulder, slope breaks, drainage structures, ditches, and flow arrows. A grading detail should be provided for intersections and interchanges on complicated plans where cross-sections and profiles cannot adequately describe the grading.

1311.3 Intersection Details

Intersection Details **[SP 1311-2 and SP 1311-3]** show the intersection angle, pavement widths, radius return curve data (location of origin point, radius, interior angle and length of curve), centerline and edge of pavement elevations at 25 ft. intervals, elevations around the radius returns at 10 to 15 ft. intervals,

drainage structures including elevations, ditch and conduit flow arrows, and top of curb elevation. An intersection detail should be provided for all intersections.

1311.4 Interchange and Ramp Terminal Details

Addition of new or modification of existing interchanges should be accompanied by Interchange Details showing baseline layout information, profiles, horizontal alignment, ramp intersections, class terminals, tapers in terminal areas, superelevation rates and superelevation transition lengths.

Ramp Terminal Details **[SP 1311-13]** show pavement elevations and stations for proposed edge of pavement, crown and edge of shoulder. Width dimensions associated with ramp terminals are provided.

1311.5 Pavement Joint Details

A Pavement Joint Detail **[SP 1311-7(a) and 1311-7(b)]** should be provided for all intersections, ramp terminals and other varying width sections when constructed with concrete pavement. The Pavement Joint Detail shows the locations of all expansion, longitudinal and contraction joints.

1311.6 Pavement/Transition Details

Pavement/Transition Details **[SP 1311-6 and 1311-9 through 1311-11]** show the pavement build-up within a transition. A Pavement/Transition Detail should be provided for areas at the ends of a project that are not easily depicted by a typical section.

1311.7 Superelevation Tables

Superelevation Tables **[SP 1311-1]** show edge of pavement elevations, profile grade elevation, pavement cross slopes at 25 ft. intervals and at all P.C., P.T., T.S., S.C., S.T., and C.S. as well as the transition rates.

1311.8 Other Details

Additional details that may be needed include:

- Noise Barriers - Additional information may be obtained by contacting the **Office of Environmental Services**.
- Linear Grading Details
- Median Crossover Details **[SP 1311-8]**
- Roundabout Details **[SP 1311-14(a) and 1311-14(b)]** show roundabout geometry in addition to what is shown on the Schematic Plan. Additional information may be obtained by contacting the **Office of Roadway Engineering**.

1312 Drainage Details

1312.1 General

Drainage Details include details for prefabricated structures and other drainage related items that cannot be adequately shown on other plan sheets. Several of these are discussed in the following sections.

1312.2 Culvert Details

If larger than minimum pipe sizes are used, a separate culvert detail is required **[SP 1312-1, 1312-2, 1312-3 and 1312-7]**. If space permits, two or more details may be placed on one sheet. The horizontal and vertical scales are the same, preferably 1"=10'. Culvert details should include the following:

A. Hydraulic Design Data to be shown on the profile or as an information block for each culvert:

- Drainage area to the nearest acre.
- Design-year and 100-year discharge in cfs.
- Design-year and 100-year velocity in ft/s.
- Design-year and 100-year headwater elevation to the nearest 0.1 ft.
- Elevation of the Ordinary High Water Mark (OHWM) or depth of flow associated with ordinary high water to the nearest 0.1 ft. for crossings that require a Waterway Permit.
- Amount of fill material below the OHWM for crossings that require a Waterway Permit. See the Office of Environmental Services' Waterway Permits Manual for more information.
- All existing structure data - size, type, length, date built.
- Design Service Life: 50 yr. or 75 yr.
- Stream pH
- Abrasive or non-Abrasive
- Culvert File Number (CFN). Required for Type A conduits (culverts under pavement) with a diameter of 12 inches and greater, having an opening measured along the centerline of the roadway of less than 10 feet.

B. Plan View Information:

- Station to nearest 0.01 ft. where structure centerline intersects centerline of construction.
- Skew angle to the nearest degree as measured from the centerline of the culvert to the centerline of the roadway.
- Stations and offsets (nearest 0.01 foot at structure ends).
- Channel protection with dimensions.
- Slope treatment.
- Conduit channels and ditches with flow arrows.
- Pavement dimensions.
- Guardrail dimensions and offsets.

- Headwall angle to structure and location with dimensions.
- Right-of-Way limits, easements.
- Construction limits.

C. Profile Information:

- Culvert type, length and grade.
- Culvert grade to nearest hundredth of a percent.
- Inlet and outlet flowline elevations to the nearest 0.1 foot
- Profile grade elevation.
- Edge of pavement elevations.
- Minimum cover elevation to the nearest foot.
- Maximum cover elevation to the nearest foot.
- Type of headwall with elevations.
- Ditch grades to the nearest tenth of a foot.
- Type of channel and/or ditch protection with thickness.
- Guardrail treatment.
- Centerline of construction.
- All offsets (measured along centerline of culvert).

D. Estimated Quantities:

- End treatment (riprap, etc.).
- Item 602, Concrete Masonry for headwalls or Item 511, Concrete if non-standard.
- Conduit. The pay quantity for pipe on slopes 3:1 or steeper is measured along the invert. All other pipe is measured horizontal from station to station.
- Pavement restoration. All items that are required to restore the pavement after the installation of 611 items.

If the quantities are carried to any sheet other than the General Summary, a cross-reference note should be added.

All items that are located such that they would prevent a 611, or 605 item from being constructed require a 202 removal item (headwall removed, pipe removed, catch basin removed, etc.).

1312.3 Storm Sewer Profiles

Storm sewers are usually shown in detail on the Plan & Profile sheets. However, it is sometimes necessary to show storm sewer profiles on separate sheets if the profile on the Plan & Profile sheets is too congested. Storm sewer profiles should include: pipe type, size, length, direction of flow, existing and proposed cover; grade, flowline elevations, stations and offsets, and all catch basins, manholes and inlets **[SP 1312-4 and 1312-5]**. A Culvert File Number (CFN) is required for all 36 inch diameter, and greater, Type B conduits (storm sewer under pavement).

Hydraulic information at the storm sewer outlet should include: the total drainage area, the design year discharge, and the hydraulic grade line for the check discharge.

1312.4 Three-Sided Precast Culverts

In addition to the culvert details specified in **Section 1312.2**, three-sided precast culvert details will consist of the following as a minimum **[SP 1312-6(a) through 6(h)]**:

A. Plan Details

- Wall and slab thicknesses.
- Footing, wingwall, and headwall details.
- Reinforcing steel list (cast-in-place concrete only).
- Structure number with station.
- Foundation notes.
- Estimated quantities - 503, 511 or 898, and 509 should be used for headwalls, footings and wingwalls. The plans should define the limits of work under 503 and 611.

B. Optional Designs

For three-sided culvert plans involving optional designs (flat top/arch top), the structure details may be combined or separated, depending on the degree of similarity. Footing and wingwall designs should generally be the same for each option. Quantities for optional designs should use one of the following formats:

- Separate list of estimated quantities for each option.
- A combined list with all common quantities listed together and all quantities not common listed separately under each option (i.e., Option A, Option B, etc.)

1312.5 Underdrain Details

Underdrain Details show the size of underdrain, type of underdrain, tees, bends, crosses, and outlets for underdrains.

Section 1300
Plan Components

1313 Sanitary Sewer and Water Work Plans

Normally, sanitary sewer and water work can adequately be shown on the regular Plan & Profile sheets. Occasionally, however, where the project is complex, or the magnitude of this type of work is extensive, special plan sheets may be required **[SP 1313-1 and SP 1313-2]**.

1314 Traffic Control, Lighting, Landscaping, Rest Areas, Structures, Right-of-Way, and Soils Information

1314.1 Traffic Control Plans

Plans and details involving permanent traffic control items, such as pavement markings, signing, and signalization **[SP 1314-1 through 1314-8]**, shall be prepared in accordance with the **Ohio Manual of Uniform Traffic Control Devices** and the **Traffic Engineering Manual**. Additional information may be obtained by contacting the **Office of Roadway Engineering**.

1314.2 Lighting Plans

Lighting plans should be prepared in accordance with the **Traffic Engineering Manual [SP 1314-9 through 1314-11]**. The **Office of Roadway Engineering** should be contacted for assistance in the preparation of plans involving highway lighting.

1314.3 Landscaping Plans

The **Office of Roadway Engineering** and the **Office of Environmental Services** should be contacted for assistance in the preparation of plans involving highway landscaping **[SP 1314-12]**.

1314.4 Rest Area Plans

The **Office of Facilities Management** should be contacted for assistance in the preparation of plans involving rest areas.

1314.5 Structures

Structure plan preparation should be in accordance with the **Bridge Design Manual**. Additional information may be obtained by contacting the **Office of Structural Engineering**.

1314.6 Right-of-Way Plans

The **Real Estate Administration Policies and Procedures Manual** should be used as a guide for preparation of Right-of-Way plans. Right-of-way sample plan sheets are contained within the **Real Estate Manual**. Additional information may be obtained by contacting the **Office of Real Estate**.

1314.7 Soils Information Sheets

Soil profiles, foundation investigations, etc. should be prepared using the **Specifications for Geotechnical Explorations**. Additional soils information, if any, may be obtained by contacting the **Office of Geotechnical Engineering** and the **Office of Structural Engineering**.

All available soils information should be included in the contract documents. This is usually accomplished by the use of soils plan sheets. Special Provisions or plan notes referencing the location of the soils information may also be used.

1314.8 Mine Map Overlay Sheets

Mine Map Overlay sheets should be used when a mine exists within 500' of the proposed work. These sheets should show mine maps overlain on the proposed roadway. The mine maps are usually electronically scanned and attached to the CADD file. Additional features located within 500 feet on both sides of the centerline, including but not limited to the following, should be shown on the overlay sheets:

- Location of any field observed or mapped mine features (openings, subsidence features, etc.).
- Limits of mapped mine workings labeled with the Ohio Department of Natural Resources Division of Geological Survey Mine Code. A note should be shown on the Plan & Profile sheets when the extent of the mine workings exceeds the normal limits of the sheet.
- Existing and proposed roadways and centerlines
- Property and section lines
- Contours
- Construction limits
- Existing and proposed structures (houses, bridges, culverts, etc.)
- Driveways
- Railroads
- Streams, seeps, and springs
- All-terrain vehicle trails, hiking and horse trails, and bike paths

Additional information regarding Mine Map Overlay Sheets may be obtained by contacting the **Office of Geotechnical Engineering**.

1315 Simplified Plans

1315.1 General

Simplified plans **[SP 1315-1 through SP 1315-4]** are not required to follow the format requirements described in the previous sections. However, they shall contain enough information to adequately describe the work so that the contractor can properly bid and construct the project.

1315.2 Plan Sheets

As a minimum, all plan sheets shall have a project identifier and sheet number.

1315.2.1 Title Sheet

The following is the minimum information that shall be provided on the title sheet:

- Plan Title - **Section 1302.2**
- Design Designation – **Section 1302.3**
- Design Exceptions – **Section 1302.4**
- Index of Sheets – **Section 1302.5**
- Plan Preparer Identification - **Section 1302.6**
- Underground Utilities Note - **Section 1302.7**

Section 1300
Plan Components

- Location Map - **Section 1302.8**
- Supplemental Specifications - **Section 1302.9**
- Standard Construction Drawings - **Section 1302.10**
- Project Information – **Section 1302.11**
- Notes - **Section 1302.12**
- Plan Signatures - **Section 1302.13**

Quarter size sheets should follow the format shown on **Figure 1302-1**.

1315.2.2 General Summary

All Simplified Plans must include a General Summary. The format of the General Summary shall be as per **Section 1307.2**.

1316 SPEDuP (Simplified Plan – Expedited Delivery Project) Plans

1316.1 General

SPEDuP plans are not required to follow the format requirements described in the previous sections. However, they shall contain sufficient information to adequately describe the work so that the contractor can properly bid and construct the project.

The plans shall be primarily developed using Microsoft Word and Microsoft Excel. The entire plan shall be submitted in a single PDF file.

1316.2 Plan Sheets

As a minimum, all plan sheets shall have a project identifier and sheet number. Provide the project identifier as a header. The sheet number shall be in the footer, on the right (PAGE X of XX). All font shall be capitalized and in Arial Bold, font size 10. The border around all pages shall be ½ inch.

If necessary, drawings and maps may be embedded into the Word document as a graphics. If proper scaling is required, additional details can be included in to the PDF version of the plan package in an 8 ½" X 11" plan sheet. The plan developer may create the graphics in MicroStation and include the plotted PDF into the final plan package. Embedding these details into the seed Word and/or Excel document is preferred to ensure proper page numbering.

1316.2.1 Title Sheet

The following is the minimum information that shall be provided on the Title Sheet:

- Plan Title – **Section 1302.2**
- Design Designation – **Section 1302.3**
- Plan Preparer Identification – **Section 1302.6**
- Underground Utilities Note - **Section 1302.7**
- Location Map – **Section 1302.8**
- Supplemental Specifications – **Section 1302.9**
- Standard Construction Drawings – **Section 1302.10**
- Project Information – **Section 1302.11**
- Notes – **Section 1302.12**

- Plan Signatures – **Section 1302.13**

The SPEDuP logo shall be included on the top left corner of the Title Sheet **[SP 1302-8]**. A copy of the SPEDuP logo can be found on the **Office of CADD and Mapping Services'** website.

Letter size sheets should follow the format shown on **Figure 1302-2**. A SPEDuP plan letter size sample Title Sheet is shown in the sample plans **[SP 1302-8]**.

The Title Sheet must be created using the standard Excel template found on the **Office of CADD and Mapping Services'** website, and it must be transmitted in the delivery of the Plan Package

1316.2.2 General Summary

All SPEDuP plans must include a General Summary **[SP 1307-6]**. The format of the General Summary shall be as per **Section 1307.2**.

The General Summary must be created using the standard Excel template found on the **Office of CADD and Mapping Services'** website. The General Summary spreadsheet (in Excel format) must also be transmitted in the delivery of the Plan Package.

List of Figures

List of Figures

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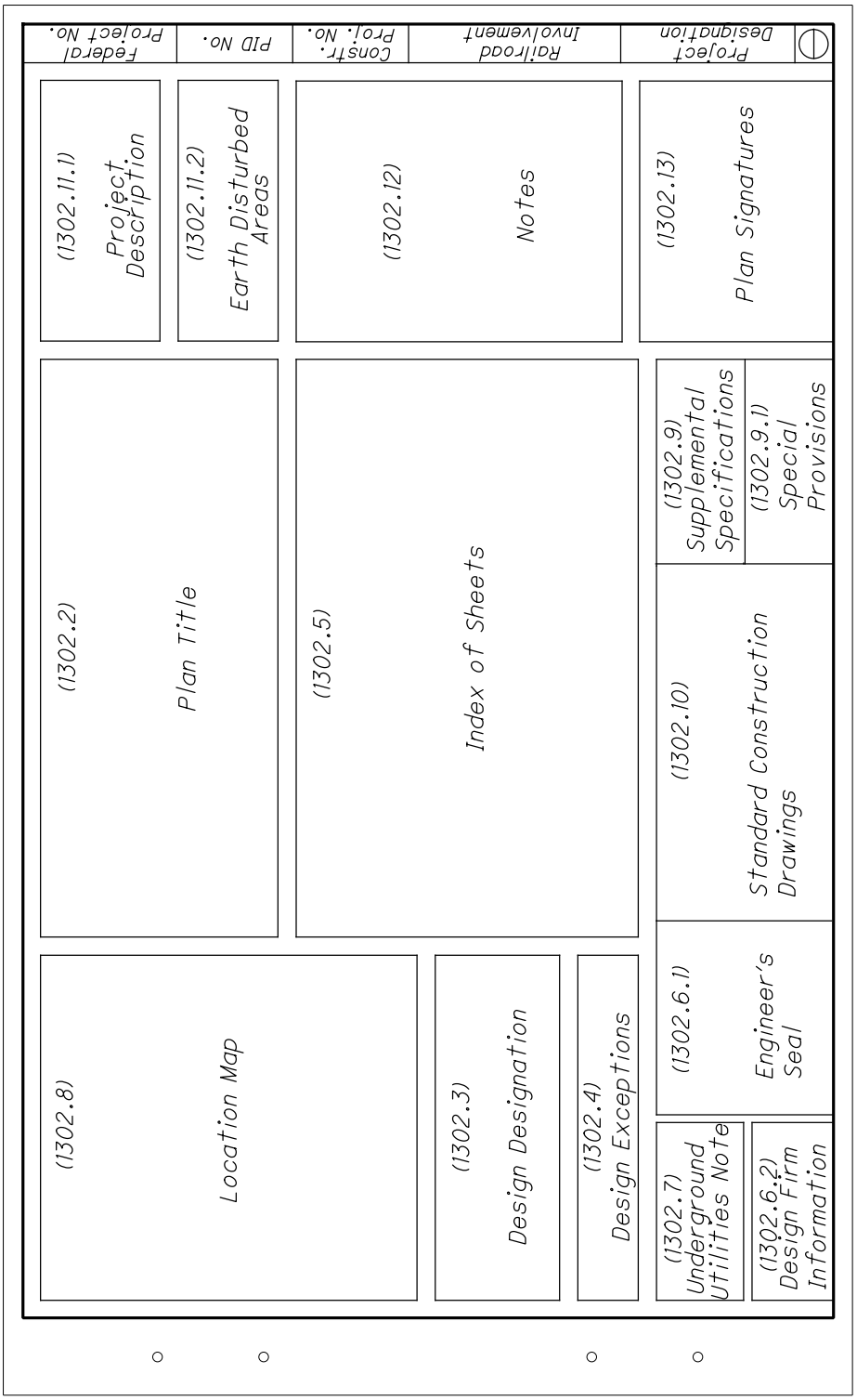
April 2008

STANDARD TITLE SHEET LAYOUT

1302-1

REFERENCE SECTION 1302

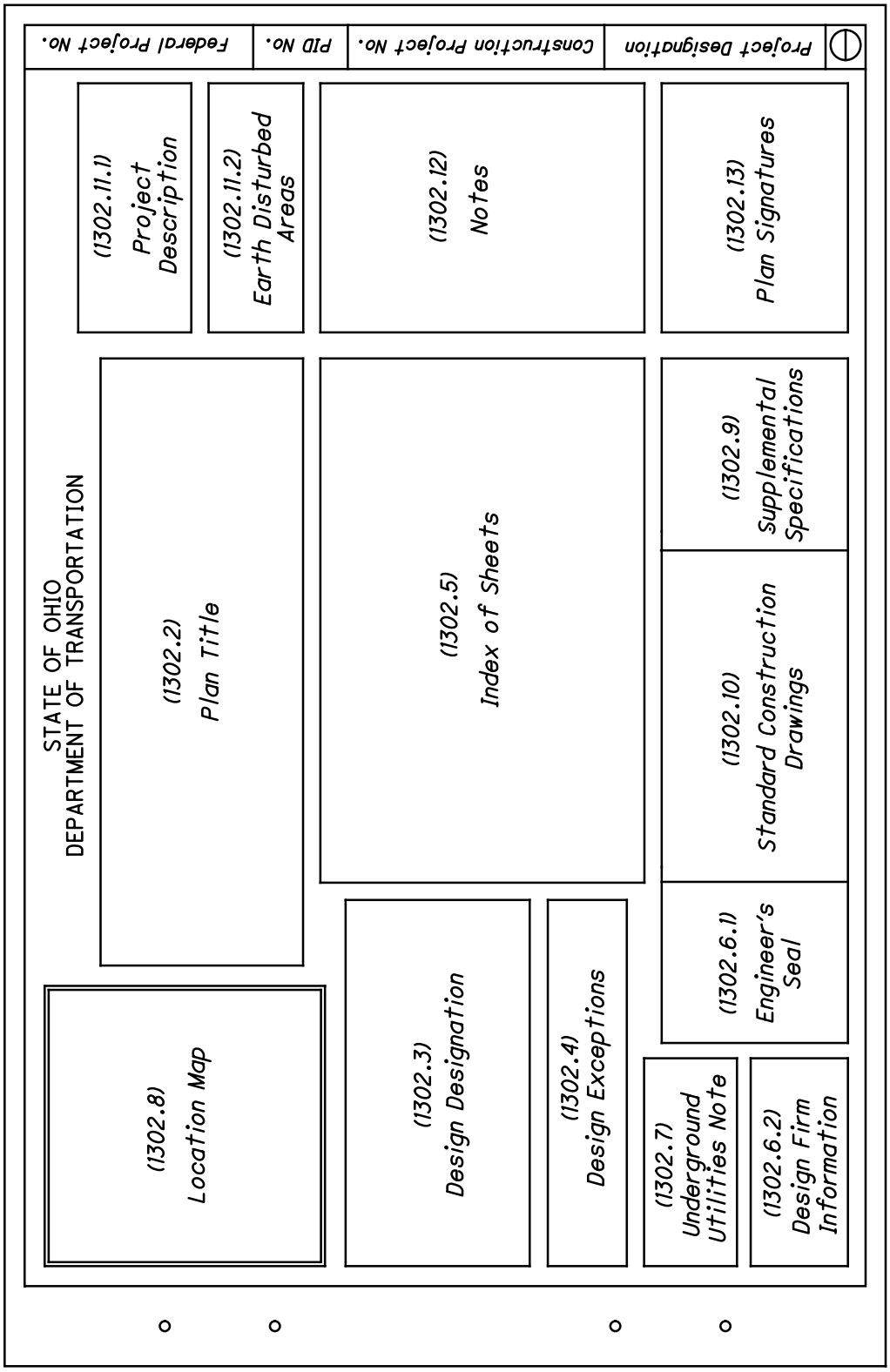


July 2012

SIMPLIFIED PLAN
TITLE SHEET LAYOUT:
11" X 17" SIZE

1302-2

REFERENCE SECTION
1315.2.1



July 2012

SPEDuP PLAN TITLE SHEET LAYOUT: LETTER SIZE

1302-2A

REFERENCE SECTION
1316.2.1

(1316.2.1)
SPEDuP Logo

STATE OF OHIO, DEPARTMENT OF TRANSPORTATION
(1302.2.1)

(1302.8)
Location Map

(1302.2.2)
Project Designation

Title Block
(1302.2.5)

(1302.11.1)
Project Description

(1302.11.2)
Earth Disturbed Areas

(1302.3)
Design Designation

(1302.4)
Design Exceptions

(1302.12)
Notes

(1302.7)
Underground Utilities Note

(1302.13)
Plan Signatures

(1302.6.2)
Design Firm Information

(1302.6.1)
Engineer's Seal

(1302.10)
Standard Construction Drawings

(1302.9)
Supplemental Specifications

PAGE 1 OF __

GUIDE FOR SHOWING DESIGN EXCEPTIONS IN PLAN

1302-3

REFERENCE SECTION
1302.4

NDC = Normal Design Criteria

PLAN SHEET	DESIGN EXCEPTION	DESIGN FEATURE	EXAMPLE
Schematic (A)	Horizontal Alignment	Degree of Curve	Dc = 7°00' (NDC Dc = 6°00'MAX)
	Horizontal Alignment	Deflection	Deflection = 2°00' (NDC 1°00'MAX)
	Horizontal Alignment	Lack of Spiral (B)	No Spiral (NDC 200' Spiral)
	Superelevation	Superelevation Rate	e_{max}= 0.077 (NDC 0.08)
Typical Section	Lane Width	Lane Width	11' (NDC 12')
	Shoulder Width	Graded/Curbed Shoulder Width	8' (NDC 10')
	Cross Slope	Pavement Cross Slope	0.0208 (NDC 0.0156)
Plan Sheet	Stopping Sight Distance	Horizontal SSD (B)(C)	SSD=381'(450' Min) Actual Design Speed 48 MPH
	Bridge Width	Bridge Width	30' (NDC 34')
	Horizontal Clearance	Horizontal Clearance	8' (NDC 10')
Profile Sheet	Vertical Alignment	Grade Break	0.20% (NDC 0.40% MAX)
	Stopping Sight Distance	Vertical SSD (C)	SSD=381'(450' Min) Actual Design Speed 48 MPH
	Grades	Grades	4.36% (NDC 4.00% MAX)
	Vertical Clearance	Vertical Clearance	15.5' (NDC 16.5' MIN)
	Superelevation	Superelevation Rate of Transition (D)	Rate of Transition=1:165 (NDC 1:213)
	Horizontal Alignment	Intersection Angle	Angle = 55° (NDC 70°
	Horizontal Alignment	Transition (Taper) Rates	Taper Rate = 50:1 (NDC 60:1)
Bridge Plan Sheets	Structural Capacity	Structural Capacity	(E)
	Bridge Parapets/ Curb Configuration	Bridge Parapets/ Curb Configuration	(E)
Superelevation Sheets	Superelevation	Superelevation Position	Position 35% (NDC 50%)

(A) If no Schematic Plan, show on Plan and Profile Sheets.

(B) Show with Curve Data.

(C) Stopping Sight Distance (SSD) and Actual Design Speed are shown only when the SSD is less than the normal design criteria.

(D) Superelevation rate of transition is shown only when it is faster than the normal design criteria. It is shown on the Superelevation Tables when such tables are included in the plan.

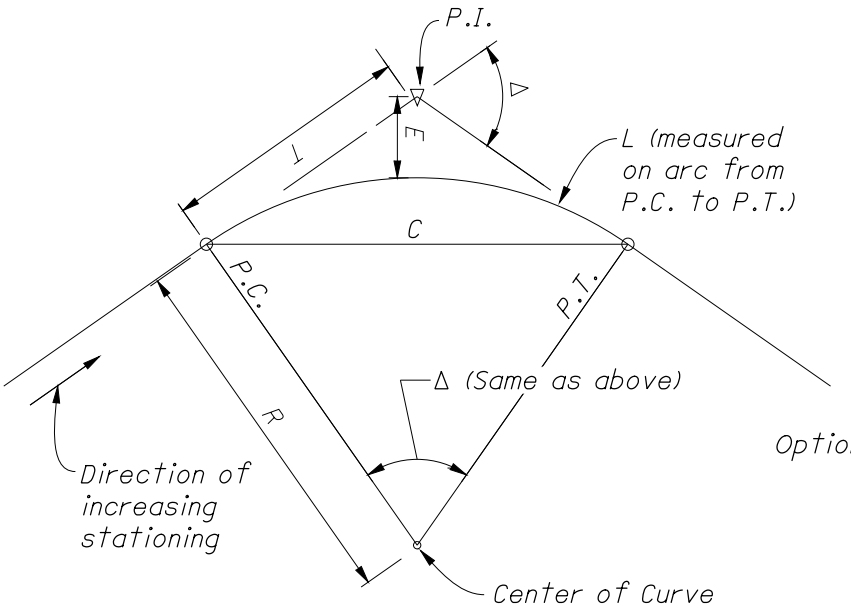
(E) See Bridge Design Manual or contact the Office of Structural Engineering.

April 2008

SIMPLE CURVE ELEMENTS AND DATA

1303-1

REFERENCE SECTION
1303.5, 1309.4.1



CURVE DATA

P.I.= Sta.
Δ = ___° ___′ ___″ Lt. or Rt.
* D_C = ___° ___′ ___″
R =
T =
L =
E =
e_{max} =
Optional { C =
C.B. = ___ ___° ___′ ___″___
P.C. = Sta. } ⟨1⟩
P.T. = Sta. }

⟨1⟩ Normally shown on Plan View.

ELEMENTS

P.I.- Point of Intersection
Δ - Angle of Intersection
* D_C - Degree of Curve
R - Radius
T - Tangent Length
L - Length of Curve
E - External Distance
e_{max} - Maximum Superelevation
C - Chord Length
C.B.- Chord Bearing
P.C.- Point of Curve
P.T.- Point of Tangent

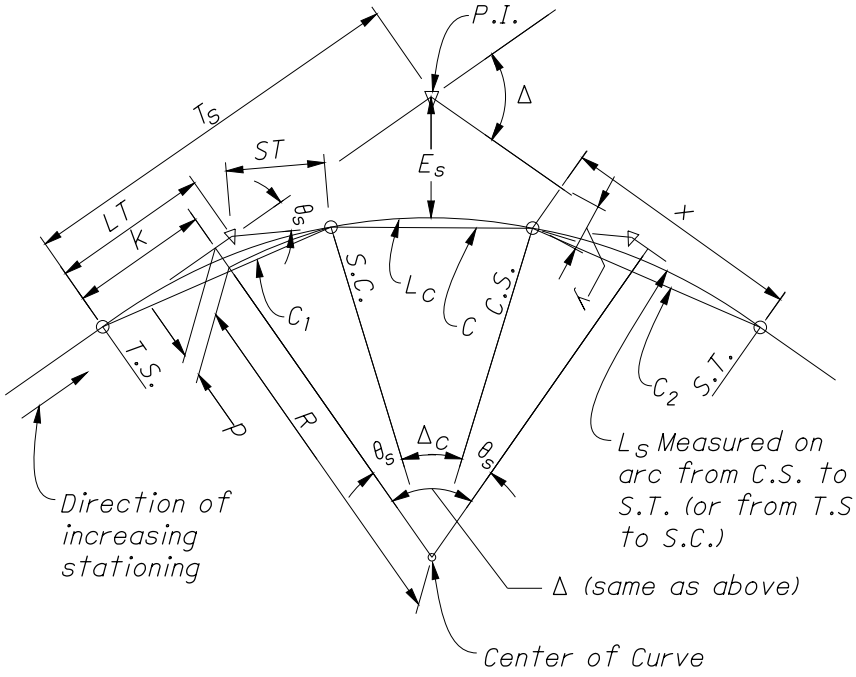
* English Units only

April 2008

SPIRAL CURVE ELEMENTS AND DATA

1303-2

REFERENCE SECTION
1303.5, 1309.4.1



CURVE DATA

P.I.= Sta.
Δ = ___ ° ___ ′ ___ ″ *Lt. or Rt.*
*D_C = ___ ° ___ ′ ___ ″
R =
L_S =
θ_S =
LT =
ST =
Optional { x = ; y = ; k = ; p = ; Δ_C = } ⟨1⟩
L_C =
T_s =
E_S =
e_{max} =
Optional { C_1 = ; C = ; C_2 = }
T.S. = Sta.
S.C. = Sta.
C.S. = Sta.
S.T. = Sta. ⟨2⟩
Optional { $C.B._1$ = ___ ° ___ ′ ___ ″ ; C.B. = ___ ° ___ ′ ___ ″ ; $C.B._2$ = ___ ° ___ ′ ___ ″ }

Note:
If the spiral is only on one end of a curve, substitute T_1 and T_2 for T_s and either P.C. for T.S. and S.C. or P.T. for C.S. and S.T. . The E_s distance becomes optional.

⟨1⟩ *For unequal spirals, show two sets of data for these items and substitute T_1 and T_2 for T_s.*

⟨2⟩ *Normally shown on Plan view.*

ELEMENTS

P.I. - *Point of Intersection*
Δ - *Angle of Intersection*
D_c - *Degree of Curve*
R - *Radius of Curve*
L_S - *Length of Spiral*
θ_S - *Angle of Intersection of the LT and ST.*
LT - *Long Tangent*
ST - *Short Tangent*
x - *Tangent distance of the C.S. with reference to the S.T. and the T_s.*
y - *Tangent offset of the C.S. with reference to the S.T. and the T_s.*
k - *Distance from the T.S. to the perpendicular projection of the center of curve.*
p - *Offset of Curve to Tangent*
Δ_c - *Central Angle of Curve*
L_C - *Length of Curve*
T_s - *Distance from T.S. or S.T. to P.I.*
E_S - *Distance from curve to P.I.*
e_{max} - *Maximum Superelevation*
C_1 = *Chord Length from T.S. to S.C.*
C = *Chord Length from S.C. to C.S.*
C_2 = *Chord Length from C.S. to S.T.*
T.S. - *Tangent to Spiral*
S.C. - *Spiral to Curve*
C.S. - *Curve to Spiral*
S.T. - *Spiral to Tangent*
$C.B._1$ = C_1 *Bearing*
C.B. = *C Bearing*
$C.B._2$ = C_2 *Bearing*

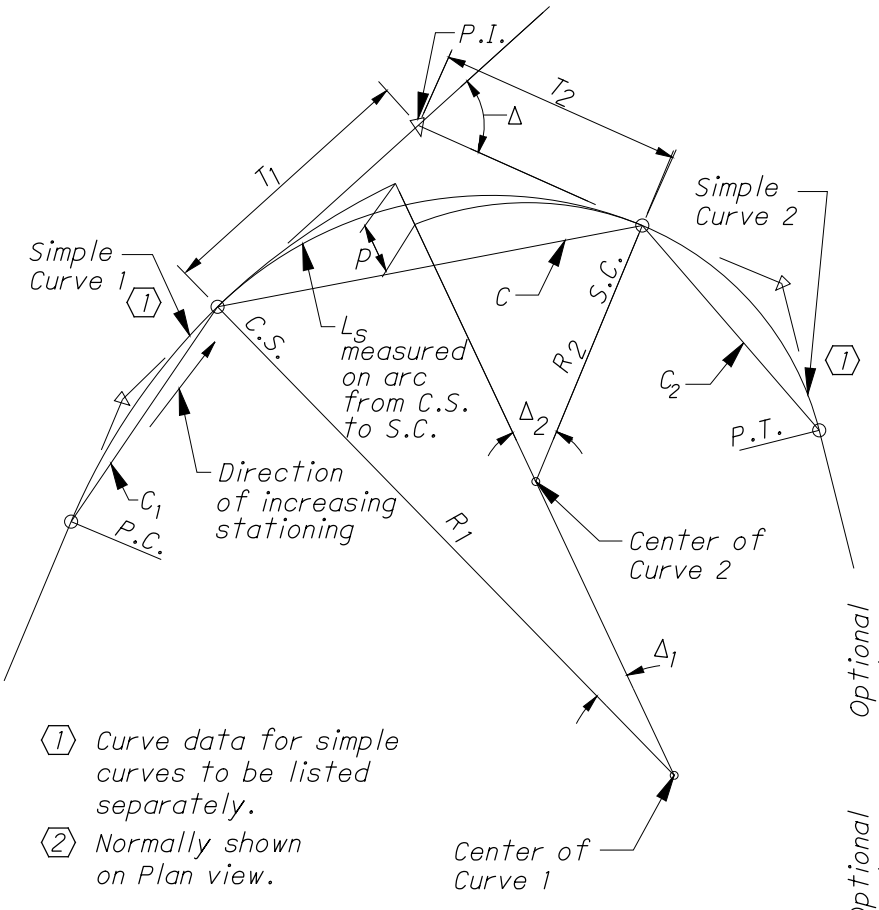
* *English Units only*

April 2008

COMBINING SPIRAL CURVE ELEMENTS AND DATA

1303-3

REFERENCE SECTION
1303.5, 1309.4.1



CURVE DATA

P.I. = Sta.
Δ = ___ °___ ′___ ″ Lt. or Rt.
* D_1 =___ °___ ′___ ″
R_1 =
* D_2 =___ °___ ′___ ″
R_2 =
L_s =
P =
Δ_1 = ___ °___ ′___ ″
Δ_2 = ___ °___ ′___ ″
T_1 =
T_2 =
e_1 =
e_2 =

Optional
C_1 =
C =
C_2 =

C.S. = Sta.
S.C. = Sta.
} (2)

Optional
$C.B._1$ = ___ °___ ′___ ″
C.B. = ___ °___ ′___ ″
$C.B._2$ = ___ °___ ′___ ″

(1) Curve data for simple curves to be listed separately.
(2) Normally shown on Plan view.

ELEMENTS

P.I. - Point of Intersection
Δ - Angle of Intersection
* D_1 - Degree of Curve 1
R_1 - Radius of Curve 1
* D_2 - Degree of Curve 2
R_2 - Radius of Curve 2
L_s - Length of Spiral
θ_s - Nominal Spiral Angle (Not Shown on Diagram)
p - Radial Shift (Distance that Curve 1 is offset from Curve 2)
Δ_1 - Central Angle of the extension of Curve 1 into Spiral
Δ_2 - Central Angle of the extension of Curve 2 into Spiral

C_1 = Chord Length from P.C. to C.S.
C = Chord Length from S.C. to C.S.
C_2 = Chord Length from S.C. to P.T.
T_1 - Distance from C.S. to P.I.
T_2 - Distance from P.I. to S.C.
e_1 - Superelevation at C.S.
e_2 - Superelevation at S.C.
C.S. - Curve to Spiral
S.C. - Spiral to Curve
$C.B._1$ = C_1 Bearing
C.B. = C Bearing
$C.B._2$ = C_2 Bearing

* English Units only

1401 Design Review Process

1401.1 Introduction

ODOT's Project Development Process (PDP) is a team-oriented approach to developing a transportation project from concept to completion. This section of the **Location and Design Manual** focuses on design involvement in the PDP with emphasis on design review submittals. It provides a general overview of plan development and identifies the information which is to be included in each design review submission. It does not detail design standards nor provide guidance on how to evaluate any particular design component or environmental issue. Design and environmental requirements are provided in various technical manuals and policies as listed in **Figure 1402-1**. An overview of the entire PDP is contained in the **Project Development Process Manual**.

1401.2 Project Classification

The PDP classifies transportation projects into three groups: Major, Minor and Minimal. The PDP steps involved for each type of project are outlined in **Figures 1401-1, 1401-2 and 1401-3**, respectively. These figures show the design review submissions in each step.

Major Projects are defined as transportation improvements where the anticipated end product of the improvement is expected to have a significant impact to the highway's public access, level of service, traffic flow, mobility patterns, mode shares, require substantial Right-of-Way acquisition, or is expected to have a high degree of public controversy. Additionally, this classification applies to those highway transportation improvements that will require a substantial financial investment to complete all aspects of project development. These projects will typically involve one or more of the following conditions: making significant alterations to the existing highway (e.g., lane addition), relocating a major portion of a highway (e.g., significant change to horizontal and/or vertical alignment), developing a completely new highway alignment (e.g., bypass), and the construction of a new or significant modification to an existing interchange.

From a design perspective Major Projects are those in which new highway alignments or significant alterations to existing highway alignments will result in the examination of multiple alternatives as a necessary and systematic progression to selecting the preferred alternative. In some instances where it appears the project is Minor in nature based on environmental impacts and there are only a few viable alternative solutions to be studied, but, the project is expected to be controversial, it may be advantageous to follow Steps 5-7 of the PDP for Major Projects (**Figure 1401-1**) relative to the preliminary engineering components to allow for a graduated progression of plan developing activities through several steps of the PDP rather than covering all the preliminary engineering work in a single step under Step 3 of the PDP for Minor Projects (**Figure 1401-2)** to avoid unnecessary plan rework

Minor Projects are defined as transportation improvements that generally are located on the existing alignment. Small adjustments to the existing alignment to improve geometric conditions may be involved. Substantial relocations of non-interstate roadways that do not result in significant environmental impacts can also qualify as a Minor Project. Minor Projects may have environmental impacts but can be approved following the Categorical Exclusion (CE) Process. Examples and thresholds for environmental impacts are included in the **Office of Environmental Services Categorical Exclusion Confirmation Handbook**. Minor Projects can involve Right-of-Way acquisition, utility relocations, altering the highway's cross section and raising/lowering the roadway profile. Some examples of Minor Projects include bridge replacement and rehabilitation, culvert replacement, pavement widening and rehabilitation, geometric realignment, and intersection upgrades, including the addition of turn lanes.

Minimal Projects are defined as transportation improvements that are generated by the traditional maintenance and preventive maintenance program as they relate to the development of the District Work Plan. These projects do not alter the basic highway cross section or geometry, require no additional Right-of-Way, have minimal impacts on existing utilities, have no impacts to environmental resources, require no environmental agency coordination, are considered "exempt" from NEPA studies as defined in ODOT's-**Office of Environmental Services Categorical Exclusion Confirmation** and are likely to require only very minor public involvement, if any.

Examples of Minimal Projects include:

- Guardrail replacement where roadway ditches and backslopes will not be relocated.
- The replacement of traffic signals provided no work takes place within any historic district and there is no likelihood of encountering contaminated materials.
- Traffic signal maintenance.
- Pavement Drop Off repair.
- Pavement Markings.
- Mowing or brush removal/trimming.
- Herbicidal spraying.
- Installation or maintenance of signs, pavement markings/raised pavement markers/sensors and/or replacement of fencing.
- Bridge deck overlays, bridge deck replacements, super structure replacement and other maintenance activities, including bridge painting projects provided the project doesn't involve any work within streams, rivers, scenic river corridors or historic properties.
- General highway maintenance including filling pot holes, crack sealing, mill and resurfacing, joint repair, shoulder reconstruction, minimal bank stabilization.
- **SPEDuP per 1301.3.**

1401.3 Staged Review Process

The Staged Review Process consists of a series of review submissions at various stages of the design process. Required review submissions are detailed in the following sections. The activities and products for each of these review submissions are detailed in **Section 1403**.

1401.3.1 Major Project Staged Review Process

Major Projects will normally require the following design review submittals:

1. Red Flag Summary (**Section 1403.2**)
2. Conceptual Alternatives Study (**Section 1403.3**)
3. Assessment of Feasible Alternatives (**Section 1403.4**)
4. Preferred Alternative Verification (**Section 1403.5**)
5. Stage 1 Detailed Design (**Section 1403.7**)
6. Preliminary Right-of-Way (**Section 1403.8**)
7. Stage 2 Detailed Design (**Section 1403.9**)
8. Final Right-of-Way (**Section 1403.10**)
9. Final Right-of-Way Tracings (**Section 1403.11**)

10. Stage 3 Detailed Design (**Section 1403.12**)

11. Final Tracings (**Section 1403.13**)

Preliminary Right-of-Way, Final Right-of-Way and Final Right-of-Way Tracing Submissions are omitted if no temporary or permanent right-of-way is to be acquired.

1401.3.2 Minor Project Staged Review Process

Minor Projects will normally require the following design review submittals:

1. Red Flag Summary (**Section 1403.2**)

2. Minor Project Preliminary Engineering Study (**Section 1403.6**)

3. Stage 1 Detailed Design (**Section 1403.7**)

4. Preliminary Right-of-Way (**Section 1403.8**)

5. Stage 2 Detailed Design (**Section 1403.9**)

6. Final Right-of-Way (**Section 1403.10**)

7. Final Right-of-Way Tracings (**Section 1403.11**)

8. Stage 3 Detailed Design (**Section 1403.12**)

9. Final Tracings (**Section 1403.13)**

Preliminary Right-of-Way, Final Right-of-Way and Final Right-of-Way Tracing Submissions are omitted if no additional temporary or permanent right-of-way is to be acquired.

1401.3.3 Minimal Project Staged Review Process

Minimal Projects will normally require the following design review submittals:

1. Red Flag Summary (**Section 1403.2**) Red flags should be identified as part of the scoping process. A written Red Flag Summary is optional.

2. Stage 3 Detailed Design (**Section 1403.12**)

3. Final Tracings (**Section 1403.13**)

1401.4 Limited Review Process

For Minor Projects with a well-defined scope of services for the proposed design work and limited utility involvement and environmental impacts, a limited review process may be applied. Except for the Minor Project Preliminary Engineering Study and Final Right-of-Way Plans, ODOT **will not** review the plans for accuracy and adherence to design and plan preparation requirements.

The Limited Review Process cannot be applied to projects that require Federal oversight as per **Section 1402.2**.

Limited Review Projects normally require the following design review submittals:

1. Red Flag Summary (**Section 1403.2**)

2. Minor Project Preliminary Engineering Study (**Section 1403.6**)

3. Final Right-of-Way (**Section 1403.10**)

4. Final Right-of-Way Tracings (**Section 1403.11**)

5. Final Tracings (**Section 1403.13**)

Review submittals for Stage 1 Detailed Design, Preliminary Right-of-Way, Stage 2 Detailed Design and Stage 3 Detailed Design are omitted. The design activities associated with these submittals must be performed. Final Right-of-Way and Right-of-Way Tracing Submissions are omitted if no temporary or permanent right-of-way is to be acquired.

External agency approvals (e.g., FAA Notification/Clearance, Waterway Permits, LD-33 County Engineer Approval and Railroad Agreements) and Central Office approvals (e.g., Design Exceptions, Maintenance of Traffic Exceptions Committee, and Waterway Permit determination) must be obtained.

The District must approve any major design decisions that occur after the Minor Project Preliminary Engineering Study. The designer must notify the District with a description of each alternative and an assessment of the impacts of each alternative on project cost, traffic operation, right-of-way cost, utility relocations, environmental impacts and any other associated impacts.

1401.5 Design-Build Review Process

Design-Build Projects combine the detailed design and construction of a project into a single contract. The design firm and construction contractor form a team, working concurrently on the design and construction phases of a project; expediting project delivery. Design-Build Projects should be selected based on the following criteria:

1. Projects which due to physical conditions demand an expedited schedule and can be completed earlier using design-build.

2. Projects that require no Right-of-Way acquisition and minimal utility relocation.

3. Projects which are environmentally exempt or qualify for a Level 1 Categorical Exclusion.

4. Projects that do not have complicated geotechnical problems (e.g., slide repairs, rock cuts, mine remediation).

5. Projects that can have a clearly defined Scope of Services and design basis.

6. Ideally, projects should be scheduled for sale between August and September so the Design-Build Team can work on the design during the winter.

7. Projects that have room for innovation in the design and/or construction effort.

8. Projects that require expertise that is not available in-house.

9. Projects that have limited or no railway involvement.

10. Projects that are classified as Minor or Minimal under the Project Development Process (PDP).

11. Projects with limited impacts to "Waters of the United States" that can be authorized by 404 Nationwide Permits and do not require an Individual 404 Permit, 401 Water Quality Certification or Individual Isolated Wetland Permit. Some Nationwide Permits require preconstruction notification to the U.S. Army Corps of Engineers. When preconstruction notification is required, certain aspects of design work may need to be moved forward from Stage 1 which is completed after construction contract award. These tasks are moved into Minor Project Preliminary Engineering which is used as a basis for the bid documents. This will allow for permit requirements and processing times.

ODOT will normally prepare the Design Red Flag Summary and Minor Project Preliminary Engineering Study. The information from these studies will be used to determine if the project is a candidate for further development as a Design-Build Project.

For Minor Projects, the project is bid during Step 4 of the PDP; after environmental clearance is granted but before Stage 1 design development has begun. The Design-Build team will submit Stage 1 Detailed Design and Stage 2 Detailed Design for review and approval. The Design-Build team may design and submit Stage 1 and Stage 2 information in phases consisting of buildable units (i.e. earthwork, pavement replacement, etc.) for review. The scope and design shall be coordinated with the District and authorization must be granted prior to submitting various plan components for review.

Preliminary Right-of-Way, Final Right-of-Way, Right-of-Way Tracings and Stage 3 Detailed Design are not required. As-built Final Tracings are submitted after construction is completed.

For Minimal Projects, the project is bid during Step 1 of the PDP. The Design-Build team will submit Stage 3 Detailed Design Plans (without quantities) for review and approval. Other reviews are not normally required.

All external agency approvals (e.g., FAA Notification/Clearance, Waterway Permits, LD-33 County Engineer Approval and Railroad Agreements) and Central Office approvals (e.g., Waterway Permit Determinations, Design Exceptions, Maintenance of Traffic Exceptions Committee) must be obtained. Additional information on Design-Build Projects is contained in the **Design-Build Scope of Services Manual**.

1401.6 Local-Let Local Public Agency (LPA) Projects

LPA Projects are transportation improvement projects or enhancement projects that are funded primarily with Federal or state monies and, if required, matched with local resources. Traditional LPA projects are those that are administered by ODOT whereas local-let LPA projects are those in which the LPA assumes project administration duties.

To the extent practical and feasible, ODOT will minimize its direct involvement in the design and delivery of projects that are funded with local and Federal monies, or local and state monies, which do not directly involve routes on the National Highway System. As set forth in ODOT's **Development Process Policy for Locally-Administered Transportation Projects (#25-001(P))**, Local Public Agencies may voluntarily assume project management tasks as determined and in coordination with the ODOT District Office. For these Local-Let LPA projects, review submittals shall be as detailed in the **Locally Administered Transportation Projects Manual of Procedures**. ODOT-Let LPA Projects will follow the Major, Minor or Minimal Staged Review Process as selected by the Department.

1401.7 Review Process Determination

The District Office will classify a project as Major, Minor or Minimal and determine whether the project will follow the Staged Review, Limited Review, Design-Build, or Local-Let Development Process and tailor the required review submittals to be compatible with the project.

Irrespective of the number or detail of submittals required, the designer is responsible for plan accuracy and adherence to all design and plan preparation requirements.

1401.8 Customization of Review Requirements

While many ODOT projects will use the review processes and review submissions exactly as described in this manual, a number of projects may benefit from the use of a customized review process. The Staged Review Process may be customized by combining review submissions and/or modifying the content of individual review submissions.

Customizations of the Staged Review Process must be listed in the scope of services document. These customizations should be evaluated on a case by case basis by ODOT personnel prior to scoping. Consultants are encouraged to submit suggestions for modifications during scoping that would allow for more effective use of resources while still providing adequate evaluation of design and environmental issues. Significant deviations must be justified in the project file.

Section 1401.8.1 Combined Reviews

The use of combined submissions should be evaluated for relatively straightforward projects. Elements from each involved submission must be included in the combined submission. It is not acceptable to disregard early review (e.g., Minor Project Preliminary Engineering) elements and focus only on elements from the later review (e.g., Stage 1 Detailed Design).

An example of a project with a combined review submission would be a simple bridge replacement project. This type of project can be adequately reviewed using a combined Minor Project Preliminary Engineering and Stage 1 Detailed Design Review Submission and possibly a combined Stage 2 and Stage 3 Review Submission.

Section 1401.8.2 Modifications to Design Review Content

Individual review submission design activities may be modified to occur earlier or later in the Staged Review Process. Some design activities may be moved to a later phase in the development process. This is justified when these activities add significant cost to the design as a result of performing the task on multiple alternatives, and when their postponement to a later phase (when the number of alternatives has been reduced) does not diminish the designers ability to evaluate alternatives or to adequately determine the project's scope, schedule and budget for the project. Conversely, review elements should be moved forward in the process when these elements can be obtained at relatively low costs and would add greatly to the designer's ability to evaluate alternatives or to adequately determine scope, schedule and budget.

An example of moving elements to a later phase in the Staged Review Process would involve a realignment project with multiple culverts; none of which is likely to affect the profile or other significant factors. For this type of project, culvert sizing could be deferred from the Assessment of Alternatives roadway until the Preferred Alternative Verification.

An example of moving elements forward in the process would be a widening project which has a significant number of drives for which access management is an issue. On this type of project it may be prudent to move deed and title research and property line location determinations from Stage 1 forward into Minor Project Preliminary Engineering. This will allow better evaluation of drives and service roads prior to establishing construction limits for environmental clearances.

When Federal funds are used for design work, any proposed increase in the level of design performed prior to the approval of the environmental document beyond Major Step 8 or Minor Step 4 shall be coordinated with the FHWA prior to approval of scope of services. Any increase needs to be justified on a project-by-project basis to ensure the integrity of the NEPA decision.

1401.9 Scheduling

Gantt chart schedules as described in the **Project Development Process Manual** are used to coordinate the various tasks associated with project development. Consultants are required to submit updated gantt chart schedules each month. These schedules must include baseline, actual and current finish dates. When developing schedules, particular attention must be paid to items that fall on the critical path (e.g., right-of-way acquisition, utility relocation, individual 404/401 permits, etc.) and items that must be completed at a particular time of year (e.g., aerial mapping, ecological studies, etc.).

Projects which are behind schedule must include a recovery plan. The Project Manager must approve any modification to the schedule which alters commitment dates.

1402 Review Agencies

1402.1 Ohio Department of Transportation

Unless otherwise indicated in the design scope of services, all review submittals are made directly to the District Office. The District Project Manager is the first point of contact for all review questions. Most submissions, especially those prior to Stage 1, should be reviewed by the District Production, District Planning, and District Real Estate offices.

Specialty areas within each District office may need to be involved. For example, when Right-of-Way is to be acquired for a project, the District Real Estate Section should (at a minimum) review the Preferred Alternative Verification Study, the Minor Project Preliminary Engineering, Preliminary Right-of-Way, Final Right-of-Way and Final Right-of-Way Tracings. It is the responsibility of the District project manager to coordinate the appropriate and timely execution of reviews not only within the District but Central Office as well. **Figure 1402-1** lists ODOT Central Office Technical Specialty Areas. At the District's request, these offices/specialty sections will assist in the design and review of unique or complex items. For some projects, or portions of projects, a Central Office Review is mandatory. See the **Project Development Process Manual (PDP), Appendix B – Review Matrices** for a list of these reviews. In addition, Central Office may review any project in accordance with the **Quality Assurance Review Policy (#220-001(P))**. Projects designed by ODOT staff should follow the review requirements outlined in Section 1400. Reviews must be conducted by someone other than the project designer.

1402.2 Federal Highway Administration

The **Federal Highway Administration (FHWA)** is accountable for ensuring that all Federal-aid Highway Programs are delivered consistent with established requirements. The **Federal-Aid Highway Program Stewardship and Oversight Agreement** outlines the respective roles and responsibilities of ODOT and

FHWA in administering the Federal-aid Program. **Figure 1402-8** outlines the Federal Oversight determination process.

At the time of programming, the District will determine the level of oversight required on a project and enter into Ellis. On Projects subject to Federal Oversight, FHWA and ODOT should discuss which submissions should be sent to FHWA. For Federal oversight projects, a copy of all required review submittals must be furnished directly to FHWA by the preparing agency or local government. Due to fluctuations in workloads, the FHWA may request Federal Oversight on a project that would normally be state administered.

1402.3 Local Governments

When the design agency is working for a local government, the local government may either have review materials processed through its office or have the preparing agency make submittals directly to the District Office. In either case, ODOT will assume the submittal reflects the intent and desires of the local government, unless otherwise notified.

1402.4 Other Governmental Agencies

Approval from the **Federal Aviation Administration (FAA)**, **U.S. Army Corps of Engineers (USACE), Federal Emergency Management Agency (FEMA), U.S. Coast Guard, U.S. Fish and Wildlife Service, Ohio Department of Natural Resources (ODNR), State Historic Preservation Office (SHPO)** and **Ohio Environmental Protection Agency (OEPA)** may be required. Approvals that require design details are shown in the **Project Development Process Manual (PDP), Appendix B – Review Matrices**. Other required environmental approvals and agency coordination are detailed in various manuals and handbooks published by the **Office of Environmental Services**.

1402.5 External Review Agencies

An external agency may be contracted to perform some of ODOT's review responsibilities. If this is the case, the designer shall be so notified at the design scope of services meeting or as soon as the external assignment becomes effective.

1402.6 Railroad Involvement

Railroad/Railway companies must be informed at an early stage of plan development whenever their facilities may be affected in any manner. When railroad property falls within the work limits of a proposed project, the possibility of railroad involvement exists. Some examples include: work on structures that pass over a rail line, new grade separations, reconstruction or rehabilitation of existing grade separations, proposed at grade crossings, drainage work, removal of right-of-way encroachments, utility work, traffic signal preemption, etc. In addition, major and minor projects with an intersection in the project limits located within 400 feet of an at-grade rail crossing require coordination with the Ohio Rail Development Commission to determine the need for preemption.

All projects with rail involvement must be coordinated with the **Central Office Railroad Coordinator**. The **Central Office Railroad Coordinator** prepares and processes all Railroad/Railway construction agreements. The construction agreement process is initiated at Stage 1 and is finalized at Stage 3. The District is to send a copy of the final plans to the Railroad/Railway Company.

For projects involving acquisition of rail right-of-way, the involved railroad/railway company will be allowed an opportunity to comment on the right-of-way plans and legal descriptions associated with acquisition of their

property. The **Railroad Acquisition Unit** in the **Office of Real Estate** will handle acquisition of right-of-way from railroads.

1403 Design Review Submittals

1403.1 General Requirements

Figures 1401-1, 1401-2 and 1401-3 outline the design review submissions required for Major, Minor and Minimal Projects, respectively. The following sections define the requirements for each design review submission. No attempt has been made to either detail design standards or to provide guidance on how to evaluate any particular design component or issue. Design standards are provided in the technical manuals and design policies listed in **Figure 1402-1**.

Each review submission includes a numbered list of design activities. The numbering system is provided for reference purposes only and is not intended to suggest a sequence in which these activities should be performed.

Since right-of-way acquisition is frequently on the critical path for overall project development, Preliminary Right-of-Way plan preparation and Stage 2 Detailed Design should be developed concurrently. Final Right-of-Way plan development will normally occur immediately after Preliminary Right-of-Way approval.

Each project should be scheduled based on its required design activities and anticipated design development timeframes. Some activities are iterative. For example, on a bridge overpass project, the designer may need to assume a deck and/or beam thickness in order to set a vertical profile. Once the profile is set, the actual thickness can be calculated and the profile revised, if necessary. Other activities can proceed concurrently. For example, development of signal plans and structure details can usually proceed at the same time.

Unless otherwise noted in the design scope of services, all review submissions should be sent to the District Office. Multiple copies and direct submittals to Central Office and external agency reviewers may be required. Not every item listed will apply to every project. Care should be taken to ensure that each submission includes all information required to process the review. Review submissions that lack required information or contain inaccuracies that preclude meaningful review will be rejected.

There may be instances where one engineer provides specific design recommendations to the engineer responsible for overall project design. For example, a sub consultant might prepare the Geotechnical Exploration Report. The recommendations contained in this report are then incorporated into the project plans by the prime consultant. When this type of situation occurs, the sub consultant should be given an opportunity to review the plans prior to their submission to ODOT to ensure that the sub consultant's recommendations have been correctly interpreted and incorporated into the project's design.

1403.1.1 General

All submissions must include the following in the letter of transmittal:

1. Project identification: County, Route, Section (Street Name), PID number, Federal number or program (if known).

2. Identification of the type of review submission.

3. Indication of any local government involvement along with any comments the local government may have regarding the submission.

4. Explanation of any special items, situations or potential problem areas.

5. Disposition of previous review comments.

6. A current cost estimate factored up to the year the project will be awarded and indicating reasons for any significant increase or decrease in project cost. (Cost estimates are not required for Red Flag Summaries.)

7. Identification of all plan sheets, reports and other materials.

When both environmental and design documentation are required to complete a review, all documentation should be submitted at the same time. A sufficient number of copies of all submissions must be provided to allow for adequate review by all involved parties.

1403.1.2 Format

The format and number of copies required for all submissions is determined during the design scope of services meeting(s). For plan sets, quarter size 11" x 17" sheets are usually preferred. Plan sets must be bound. Calculations, reports and other documentation should normally be submitted on 8 1/2" x 11" paper. Large size exhibits or preliminary design work may be needed for public involvement meetings. Multiple sets of documents may be required to facilitate the review.

1403.1.3 Engineers Seal

All final submissions must be sealed by a Registered Professional Engineer in accordance with the **Ohio Revised Code Sections 4733.14, 4733.17, and 4733.23**. This includes not just final plan sets, but also completed preliminary engineering studies. If an Engineer has been hired to prepare plans through the Final Tracing Submittal, then only the final tracings and supporting documentation must be sealed. However, if an Engineer is hired to develop the project through Step 7 of the PDP for Major Projects, then the Preferred Alternative Verification plans and supporting documentation must be sealed.

Although it is preferred that a single design firm develop the preliminary and detailed design phases of a project, it is recognized that there will be times when this is not feasible. For example, in order to maintain continuity in development of the environmental document, a single consultant may develop the preliminary engineering for a large project through completion of the Preferred Alternative Verification.

The Preferred Alternative may then be broken into multiple phases for concurrent detailed design development by the preliminary engineering consultant as well as several other consultants. In these situations, the detailed design Engineers may rely on the preliminary development completed and sealed by the preliminary engineering consultant as the basis for their design. They should note this on the Title Sheet of the plans with a statement similar to: “Alignment, profile, derived from work performed by …XYZ Engineer… shown in the Preferred Alternative Verification dated…”

1403.2 Red Flag Summary

Red flags are points of concern that could cause revisions to: the anticipated design and construction scope of work, the proposed project development schedule, the estimated project budget (including construction, utility reimbursement, right-of-way acquisition and design costs) or the potential impacts of the project on the surrounding area. Red Flags may include, but are not limited to:

1. Existing substandard geometric features that cannot be readily corrected.

2. Known or suspected geologic and geotechnical issues (e.g., organic soils, karst, rockfalls, landslides, underground mines, poor subgrade conditions).

3. Type of pavement rehabilitation that may be required. For example, the work required to construct full depth pavement reconstruction can be significantly more involved than that required for a thick overlay. Pavement cores or dynaflect testing are usually required to determine the nature of the required pavement repairs. For pavement preservation projects, the proposed pavement design should be specified in the design scope.

4. Difficulty in correcting existing drainage problems.

5. Impacts to **FEMA** flood zones.

6. Physical difficulties in maintaining traffic during construction (e.g., cannot cut bridge to provide part width construction).

7. Unusual impacts to properties for the type of project involved or unusually costly parcel takes. For example, a total take would be unusual on a culvert replacement project. A total take would not be unusual for a realignment project.

8. Possible impacts to major utility facilities (e.g., relocation of fiber optic cables, gas transmission lines, or electric transmission facilities).

9. Railroad issues that could change the magnitude of the project (e.g., a railroad company requests that a bridge span be increased to allow for future track development, railroad needs preemption for traffic signals due to proximity of intersection and at-grade rail crossing, etc.).

10. Cultural resources (i.e., historic properties eligible for or listed in the National Register or Historic Places, prehistoric or historic period cemeteries).

11. Ecologically sensitive areas (i.e., wetlands, streams, parks, endangered species habitat, Lake Erie Coastal Management Area, hazardous materials waste areas, landfills).

12. Environmental justice areas.

Identification of red flag areas must be performed by qualified individuals with successful experience on similar projects. Red flags are based on reasonable knowledge available at the time of project development. Existing data (e.g., old plans, USGS maps, Soil Conservation Maps, etc.) should be researched. A minimum of one site visit by qualified personnel to review the existing field conditions is mandatory.

Reference to ODOT's design and environmental manuals will be necessary to completely identify and evaluate the impacts of potential alternatives to avoid these areas. If red flag areas cannot be avoided, their impacts on the project must be minimized to the point practicable and evaluated in the subsequent steps of the Project Development Process; especially during the preliminary engineering phases.

For Major Projects, the Red Flag Summary is part of Step 2 of the PDP, for Minor and Minimal Projects it is part of Step 1.

Red Flag Summary activities are required for all projects. A written Red Flag Summary is required for Major and Minor Projects and is optional for minimal projects. Design and environmental red flag analyses must be combined and submitted as a single document. A suggested form for the Red Flag Summary is available on the ODOT website. In addition to the form, red flag areas should be shown on USGS or aerial mapping.

The Red Flag Summary must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.3 Conceptual Alternatives Study

1403.3.1 General

The purpose of the Conceptual Alternatives Study is to develop horizontal alignments and associated corridors that avoid and/or minimize impacts to design and environmental red flag areas within the larger planning study area established during Steps 3 and 4 of the PDP for Major Projects. The corridor width is normally in the 1000' to 2000' range; depending on the proposed cross section and existing topography. For some projects (e.g., urban reconstruction projects), Step 3 activities may indicate that study of a wide corridor is unnecessary and that investigation of alternatives within a smaller study area can adequately address all issues. In these instances, the study area may be constrained to the existing right-of-way and a limited area adjacent to this right-of-way. See **Section 1403.3.4** for additional details regarding projects with constrained areas.

The Conceptual Alternatives Study is a combined design and environmental submission. Design activities are detailed in this manual. Refer to the manuals and guidelines published by the **Office of Environmental Services** for information regarding environmental activities.

Conceptual Alternatives Studies are submitted during Step 5 of the PDP for Major Projects. Conceptual Alternatives Studies are not required for Minor or Minimal Projects.

1403.3.2 Conceptual Alternatives Study Activities

The following activities are usually part of a Conceptual Alternatives Study:

1. Collect existing plan information.

2. Obtain mapping in accordance with the ODOT Mapping and Survey Specifications to show proposed alignments/corridors at a detail level (i.e. DTM and Planimetric Accuracy Class) as requested by the District. In some cases, mapping may be needed as early as Step 3.

3. Use projected traffic volumes to develop typical sections which meet geometric criteria.

4. Develop several proposed horizontal alignments that meet the purpose and need of the project. Ensure that these alignments conform to geometric criteria. Avoid or minimize impacts to environmental and design red flag areas. For existing alignments, verify if the centerline of Right-of-Way does or does not equal the Centerline of Construction. Unless otherwise approved by the District Production Administrator, use the centerline of existing Right-of-Way as the centerline of construction for projects following existing alignment.

5. Identify specific interchange locations for projects in rural areas or new alignments. For interchanges in urban areas, preliminary configurations may be required.

6. Review existing soils information (e.g., geologic reports, hydrogeologic information, old soil borings, ODNR mapping, maintenance history, etc.) Determine if a preliminary geotechnical exploration is necessary to evaluate the proposed corridors/alignments. Make preliminary design recommendations.

7. Determine the location of **FEMA** flood zones. Develop alignments to avoid or minimize impacts to **FEMA** flood zones.

8. Determine corridor width based on proposed cross section and the general topography of the area (e.g., rolling, hilly).

9. Analyze alignments to determine best placement of bridge structures.

10. Contact utility companies to locate major existing facilities (e.g., high-power transmission lines, fiber optic cable, and gas transmission lines) and provide information regarding the proposed location of future lines. Obtain Sub-Surface Utility Engineering (SUE) Quality Level D and C for rural projects and Quality Level B for urban projects.

11. Identify major utility relocations. Contact District Utility Coordinator to determine estimated utility reimbursement costs.

12. Identify access management issues.

13. Perform environmental field studies. (For requirements, see **Office of Environmental Services'** publications.)

14. Analyze the positives and negatives of each alternative from a design and environmental perspective.

15. Prepare cost estimates (construction, utility reimbursement and right-of-way acquisition) for each alternative. Utility estimates should include costs to the state or other sponsoring agency as well as costs borne by individual utility companies.

1403.3.3 Conceptual Alternatives Study Review Submission

The Conceptual Alternatives Study Review Submission should include:

1. Design and legal speeds.

2. Functional classification.

3. Projected traffic volumes for opening year and design year.

4. Conceptual typical sections identifying the number of lanes, lane width, type of curb, sidewalk, buffer, graded shoulder width and type of grading.

5. Mapping with design and environmental red flag areas overlain with proposed corridors; including:

    A. Proposed alignments.
    B. Proposed corridor widths.
    C. Proposed bridge structure locations.
    D. Proposed interchange locations.
    E. Streams (i.e., streams that appear as blue lines on USGS 1:24000 scale mapping or located on National Resource Conservation Service Soil Maps.)
    F. **FEMA** flood zones.
    G. Geologic and geotechnical concerns.
    H. Soil and bedrock mapping and topography.
    I. Railroads.
    J. Side roads.
    K. Major utility facilities.
    L. Existing residential and commercial structures.
    M. Environmental red flags areas such as cemeteries, wetlands, historic properties, hazardous

waste sites, and parks. (See the **Office of Environmental Services** publications for additional information.)

6. Curve data (degree of curvature [radius], PI) for all proposed roadways, except interchanges. This information can be shown on the corridor mapping or it may be listed separately.

7. Documentation of preliminary geotechnical analysis of existing data to determine extent of geologic and geotechnical concerns.

8. Documentation of preliminary contact with involved utilities (i.e., list of utility owners, requests for information on major facilities).

9. Results of environmental field studies.

10. Matrix or other summary of the advantages and disadvantages from a design and environmental perspective of each alternative; including cost estimates for construction, utility reimbursement and right-of-way acquisition.

11. Discussion of selection of alternatives for further development.

Design and environmental portions of the Conceptual Alternatives Study must be submitted as a single combined report.

The Conceptual Alternatives Study must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required. By the end of Step 5 of the PDP for Major Projects, two or three alternatives should be selected for further analysis during the Assessment of Feasible Alternatives.

1403.3.4 Conceptual Alternatives Studies for Projects with Constrained Study Areas

The Staged Review Process develops an increasing level of design detail as the number of alternatives is reduced. For projects that involve a constrained study area or limited number of alternatives, it is sometimes advantageous to complete detailed design work on the entire study area rather than phasing in these tasks over various review submissions. For this reason, the Project Manager should consider moving selected tasks forward from the Assessment of Feasible Alternatives and the Preferred Alternative Verification into the Conceptual Alternatives Study. It is always necessary to balance the costs of additional design work versus the benefits gained by decreasing the risk associated with design uncertainties.

Consider moving the following tasks forward:

1. Collection of any supplemental mapping required through ground survey or other appropriate method.

2. Completion of pavement design.

3. Development of preliminary vertical alignments.

4. Evaluation of interchange justification issues (Preliminary Access Request Point Documents).

5. Collection of Subsurface Utility Engineering (SUE) Quality Level A or B information.

6. Initiation or completion of geotechnical exploration.

7. Detailed evaluation of structure locations.

8. Development of more narrowly defined construction limits.

9. Development of superelevation tables.

10. Conceptual development for Post Construction Storm Water Best Management Practices (BMP) including the following information:

    A. Recommended types of BMPs suitable to the project settings and drainage features.
    B. Determination of the need for water quantity treatment BMPs.
    C. List of constraints regarding implementation of BMPs resulting from conflicts with major project features. This includes impacts to environmental resources, total parcel takes, major utility relocations, etc.
    D. Classification as Redevelopment or New Development according to the **Location and Design Manual, Volume 2**.

Selected alternatives should minimize impacts to design and environmental red flag areas within the project limits.

1403.4 Assessment of Feasible Alternatives

1403.4.1 General

The purpose of the Assessment of Feasible Alternatives is to analyze two or three of the alternatives developed in the Conceptual Alternatives Study at a higher level of detail than performed in the Conceptual Alternatives Study. Construction limits are developed based on typical cross section criteria. Ditch flowline elevations are not normally established.

The Assessment of Feasible Alternatives is a combined design and environmental submission. Design activities are detailed in this manual. Refer to the manuals and guidelines published by the **Office of Environmental Services** for information regarding environmental activities.

Assessment of Feasible Alternatives is part of Step 6 of the PDP for Major Projects. Assessment of Feasible Alternatives, as discussed in this section, is not required for Minor or Minimal projects. See **Section 1403.6** for Minor Project Preliminary Engineering requirements.

1403.4.2 Assessment of Feasible Alternatives Activities

The following activities are usually part of the Assessment of Feasible Alternatives:

1. For projects or portions of projects within existing roadway right-of-way, obtain the locations of existing centerline monuments, existing right-of-way monuments, and existing centerline reference monuments.

2. If not previously obtained, collect mapping suitable for detailed design and construction. In some cases, ground survey may be appropriate.

3. Request certified traffic from the **Office of Statewide Planning**. Procedures for obtaining certified traffic are defined in written customer agreements held by the District Planning & Programs Administrator and the **Office of Statewide Planning**.

   Each request for Certified Traffic will include the following information:

A. County-Route-Log or other project identifier;
B. PID number;
C. opening and design years;
D. list of needed design values (K, D, T24, TD, 8th highest hour factor);
E. map(s) clearly showing project limits;
F. list of intersections requiring turning movements, if any, or indicate them on the map(s) and indicate the time periods required (P.M. peak, both peaks, etc.) if needed in addition to the ADT;
G. for Interstate Route resurfacing projects, identify those bridges requiring separate design designations (e.g., bridges under roadways which cross over interstate routes, etc.) by route number or name;
H. any known details on planned developments or other known factors which may impact the project;
I. an accurate "need by" date. Normal turnaround is 60 days from day of receipt in the **Office of Statewide Planning** for all projects.

Turning movement counts (preferably 8 hour (7am -11am and 2pm -6pm)) are needed for all intersections where turning movement forecasts are requested.

4. For projects or portions of projects within existing roadway right-of-way, establish the centerline of existing right-of-way. Unless otherwise approved by the District Production Administrator, use the centerline of existing right-of-way as the centerline of construction.

5. Develop preliminary vertical profiles.

6. Check preliminary vertical and horizontal clearances.

7. Evaluate location of superelevation at bridge structures and other critical locations.

8. Perform capacity analyses.

9. Investigate interchange justification issues. Consider a Preliminary Access Point Request Document if it is suspected that a project could result in degradation to the freeway capacity. See **Location and Design Manual, Volume One, Section 500** for further details.

10. Design preliminary interchange layouts.

11. Evaluate relocated drives in areas that may produce landlocked parcels. Evaluate commercial and industrial drives associated with high traffic generators. Develop drive geometry and profiles, as needed. Ensure that the right-of-way acquisition cost estimate(s) account for significant modifications to access.

12. Identify potential design exceptions. Check accident data to determine if there is a correlation between crashes and substandard features.

13. Make a preliminary evaluation of service road justification issues.

14. Perform geotechnical exploration in critical locations for site characterization or to determine preliminary costs.

15. Determine limits of geologic hazards and areas with slope stability, settlement, or poor subgrade concerns. Determine preliminary costs.

16. Complete Drainage Design Criteria Forms. (LD-35)

17. Investigate profile cuts for stream diversions that would require long storm sewers. Stream diversions would require waterway permits.

18. Analyze conceptual storm sewer location:

    A. Approximate outlet locations
    B. Rough catch basin locations
    C. Location of trunk lines

19. Make a preliminary evaluation as to the size of culverts for streams shown on USGS maps. Size all culverts that could change the vertical profile due to depth of cover issues, and bankfull design.

20. Identify potential mitigation areas for stream and wetland impacts.

21. Prepare conceptual cross sections. This is most easily accomplished using a design software program that includes an automated cross section generator. A large cross section interval of up to 500 feet may be used. More closely spaced cross sections may be needed in critical areas. The cross sections should be checked for gross discrepancies. Ditch flowline design is not necessary.

22. Make a preliminary evaluation of proposed structure locations (e.g., check skew angle of crossing, waterway opening, roadway curvature, roadway cross slope, approximate clearances).

23. Determine potential locations for retaining walls.

24. Prepare Maintenance of Traffic Alternatives Analysis.

25. Determine if lighting is needed in any areas. Investigate warrants for freeway and interchange lighting.

26. Determine conceptual construction limits using large interval cross sections. Adjust construction limits for storm sewer outlets, service roads, temporary roads, interchange areas, channel work, culvert outlets, drive relocations, building removals, utility relocations, environmental red flag areas, Post Construction Storm Water Best Management Practice (BMP) locations, etc.

27. Obtain tax maps and overlay property lines, ownerships, and tax identification numbers on mapping data.

28. Determine limits and type of existing right-of-way.

29. For each alternative, identify possible total take parcels and relocations. Identify possible commercial or residential relocations.

30. Identify major utility relocations. Contact the District Utility Coordinator to determine estimated utility costs; including costs to ODOT and those borne by the utility companies.

31. Contact involved railroad/railway companies to determine their design requirements. Incorporate the railroad/railway companies' requirements into the design.

32. Evaluate aesthetic options. Define the corridor's desired landscaping, lighting, signing, signals and bridge components in terms of texture, shape, color, proportion, scale, order and balance.

33. Investigate noise wall justification issues.

34. Investigate retaining wall justification issues.

35. Prepare exhibits for Preliminary Engineering Phase Value Engineering Study. Submit exhibits to the District who will coordinate the Value Engineering Study with the **Office of Roadway Engineering**. The Preliminary Engineering Phase Value Engineering Study must be completed prior to submission of the Preferred Alternative Verification.

36. Prepare plans for Constructability Review. The Constructability Review will normally be conducted in conjunction with the Preliminary Engineering Phase Value Engineering Study.

37. Estimate cut/fill quantities.

38. Perform environmental field refinement studies. See **Office of Environmental Services** publications for details.

39. Prepare cost estimates (construction, utility reimbursement and right-of-way acquisition) for each alternative alignment.

40. Prepare a matrix presenting the advantages and disadvantages of each alternative.

41. Conceptually evaluate Post-Construction Storm Water Best Management Practices (BMPs). Consider the following items in the evaluation:

    A. BMP selection based on project setting and drainage features
    B. Requirements, if any, for water quantity treatment
    C. Identification of constraints regarding implementation of BMPs. Constraints include total parcel takes, impacts to environmental resources, major utility relocations, etc.
    D. Project classification as Redevelopment or New Construction according to **Location and Design Manual, Volume 2**.

1403.4.3 Assessment of Feasible Alternatives Review Submission

The Assessment of Feasible Alternatives Review Submission should include:

1. Certified traffic data.

2. Design and legal speeds.

3. Functional classification.

4. Conceptual typical sections identifying the number of lanes, lane width, type of curb, sidewalk, buffer, graded shoulder width and type of grading.

5. Mapping with design and environmental red flag areas overlaid with proposed alternative alignments and construction limits. Show the following information:

A. Proposed alignments.
B. Proposed bridge structure locations.
C. Proposed interchange locations.
D. Conceptual construction limits.
E. All streams.
F. **FEMA** flood zones.
G. Geologic and geotechnical concerns.
H. Soil and bedrock mapping and topography.
I. Railroads.
J. Side roads.
K. Potential service road locations.
L. Potential noise wall locations.
M. Major utility facilities.
N. Existing residential and commercial structures.
O. Existing right-of-way lines.
P. Property lines from tax maps.
Q. Tax identification numbers and ownerships.
R. Total take parcels.
S. Commercial and residential relocations.
T. Location and configuration of critical drives.
U. Potential retaining wall locations.
V. Conceptual locations of storm sewer trunk lines and outfalls.
W. Preliminary culvert location, size, and requirements (e.g., bankfull design).
X. Environmental red flags and specific study results such as cemeteries, wetlands, historic properties, hazardous waste sites, parks. (See **Office of Environmental Services** publications for additional information.)

6. In order to see all detail involved, the scale of this mapping may need to be smaller than that used for the Conceptual Alternatives Study. Depending on the size of the project and the detail shown, it may be necessary to provide one map at a large scale showing all alternative alignments and several other maps at a smaller scale showing the details of each alternative.

7. Curve data for all proposed roadways, except interchanges. Curve data can be shown on the alignment mapping or it may be listed separately. Locate points of superelevation transition and full superelevation.

8. Preliminary profiles showing:

   A. Estimated vertical clearances at critical locations (e.g., at bridges)
   B. Estimated cover at critical locations (e.g., at culverts)
   C. Approximate grades and location of vertical curves.
   D. Bridge locations.
   E. Major culvert locations.

9. Conceptual cross sections showing limits of grading.

10. List of all potential design exceptions and a brief reason as to why they should be considered for acceptance.

11. Capacity analyses.

12. Summary of interchange justification issues (Preliminary Access Point Request Document).

13. Preliminary geotechnical exploration shown on plan and profile view.

14. Summary of the Preliminary Geotechnical Exploration.

15. Completed drainage criteria forms.

16. Maintenance of Traffic Alternatives Analysis.

17. Documentation of highway lighting considerations and warrants.

18. Copies of correspondence with railroad/railway companies.

19. List of aesthetic options considered.

20. Documentation of Noise Wall Justification issues.

21. Documentation of Retaining Wall Justification issues.

22. Exhibits for a Preliminary Engineering Phase Value Engineering Study. The Preliminary Engineering Phase Value Engineering Study must be completed prior to submission of the Preferred Alternative Verification.

23. Plans for a Constructability Review. The Constructability Review will normally be performed concurrently with the Preliminary Engineering Phase Value Engineering Study and must be completed prior to submission of the Preferred Alternative Verification.

24. Submit cut/fill quantity report for each alternative.

25. Results of environmental field studies.

26. Matrix or other summary of the advantages and disadvantages of each alternative; including cost estimates for construction, utility reimbursements and right-of-way acquisition.

27. Disposition of comments from Conceptual Alternatives Study Review.

28. Discussion of selection of apparent preferred alternative.

29. Discussion of Post-Construction Best Management Practices (BMPs) Conceptual Layout and potential implementation issues.

Design and environmental portions of the Assessment of Feasible Alternatives must be submitted as a single combined report.

The Assessment of Feasible Alternatives must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required. By the end of Step 6 of the PDP for Major Projects, a single feasible alternative (i.e., the apparent preferred alternative) should be selected for further investigation.

1403.4.4 Assessment of Feasible Alternatives for Projects with Constrained Study Areas

The Staged Review Process develops an increasing level of design detail as the number of alternatives is reduced. For projects that involve a constrained study area or limited number of alternatives, it is sometimes advantageous to complete detailed design work on the entire study area rather than phasing in these tasks over various review submissions. For this reason, the Project Manager should consider moving selected tasks forward from the Preferred Alternative Verification into the Assessment of Feasible Alternatives. It is always necessary to balance the costs of additional design work versus the benefits gained by decreasing the risk associated with design uncertainties.

Consider moving the following tasks forward:

1. Initiation or completion of geotechnical exploration.

2. Completion of pavement design.

3. Completion of the Interchange Justification Studies (Access Point Request Documents).

4. Detailed evaluation of structure locations.

5. Development of more narrowly defined construction limits.

6. Development of superelevation tables.

7. Completion of Bridge Preliminary Design.

1403.5 Preferred Alternative Verification

1403.5.1 General

The purpose of the Preferred Alternative Verification is to refine the preliminary construction limits for the apparent preferred alternative. Assumptions made during the Assessment of Feasible Alternatives are further investigated. Preliminary ditch flowline elevations are established.

Any additional design decisions that could potentially increase the construction limits or otherwise require that the environmental document be revised should be investigated.

Preferred Alternative Verifications are part of Step 7 of the PDP for Major Projects. They are not required for Minor or Minimal Projects.

1403.5.2 Preferred Alternative Verification Activities

The following activities are usually part of the Preferred Alternative Alignment Verification:

1. Collect any supplemental mapping required through ground survey or other appropriate methods. The extent of ground survey will depend on the quality of aerial mapping, the general topography of the site and the type of project. Ground survey data is frequently collected to:

    A. Supplement areas obscured by trees or other topography.
    B. Determine elevations of existing drainage features.
    C. Obtain channel sections at bridge structures.

D. Determine pavement elevations where the proposed pavement ties into existing pavement.
E. Verify vertical clearances for overpass structures.
F. Locate underground utilities based on utility company field markings.
G. Existing centerline monuments.

2. Finalize horizontal alignments.

3. Finalize vertical profiles.

4. Estimate cut/fill quantities.

5. Refine interchange layout.

6. Identify potential design exceptions. Check accident data to determine if there is a correlation between crashes and substandard features.

7. Prepare an Access Point Request Document for new or revised access - interstate or other freeway. These documents are also known as Interchange Justification Studies. Contact the **Office of Roadway Engineering** for information regarding these documents. Submit to the District, who will submit through the **Office of Roadway Engineering** or approval. Approval must be obtained prior to submission for Stage 1 Detailed Design Review.

8. Use access management techniques to determine if driveway access points/configurations need to be altered. Ensure that the right-of-way acquisition cost estimate(s) account for significant modifications to access.

9. Design turn lane lengths.

10. Perform the geotechnical exploration in accordance with the **Specifications for Geotechnical Explorations**.

11. Modify the typical sections to show chemical stabilization requirements.

12. Evaluate geologic and geotechnical issues based on the geotechnical exploration and revised cross sections and prepare Draft geotechnical reports and plans.

13. Design proposed pavement. Request pavement design as per the **Pavement Type Selection Policy, (#20-006(P))**. Determine if local standards regarding pavement type apply. Pavement design approval, if applicable, must be obtained prior to the Preferred Alternative Verification Review submission.

14. Determine subsurface drainage requirements. Ensure that positive drainage outlets are available.

15. Submit rainfall intensity curves if other than those published in the **Location and Design Manual, Volume 2**, to the **Office of Hydraulic Engineering** for approval.

16. Contact County Engineer to determine if proposed culvert flowline elevations are acceptable using the LD-33 form criteria.

17. Size all culverts expected to be greater than 36 inches.

18. Identify all culverts that are to be bankfull designed.

19. Evaluate the use of prefabricated culverts.

20. Refine conceptual design of Post Construction Storm Water Best Management Practices (BMPs) by determining preliminary sizing and approximate location for non-linear BMPs (i.e. detention ponds, infiltration basins, bioretention cell, etc.)

21. Submit projects that involve replacement of existing bridges with span lengths greater than 10 feet to the **Office of Hydraulic Engineering** for approval of structure type (i.e., prefabricated or cast-in-place).

22. Determine if channel relocations are necessary. Detail proposed channel design. Investigate use of natural stream design.

23. Hydraulically size all major storm sewer trunk lines.

24. Prepare cross sections at normal spacing interval with preliminary flowline information.

25. Prepare Structure Type Studies for all proposed bridge structures as follows:

    A. Complete a bridge hydraulic study and scour analysis.
    B. Compare alternative structure types.
    C. Check vertical and horizontal clearances.
    D. Develop cost estimates for each alternative.

26. Submit non-standard railing types, non-redundant designs and fracture critical members to the **Office of Structural Engineering** for approval. Obtain approval prior to submitting for Stage 1 Detailed Design Review.

27. Analyze impacts on **FEMA** flood zones.

28. Estimate the location and amount of fill material in wetlands, streams and other regulated waters of the United States.

29. Prepare waterway permit determination package or draft waterway permit application per Section 703.0 of the **Office of Environmental Services Waterway Permits Manual**. Submit to the District, prior to Preferred Alternative Verification review, who will review and submit to the **Office of Environmental Services** for preliminary permit determination. Comments from the **Office of Environmental Services** should be incorporated into the draft waterway permit. Complete draft waterway permit and submit to **Office of Environmental Services**.

30. Determine potential locations for on and off site stream and wetland mitigation.

31. Contact the **Office of Environmental Services** to determine if a project requires U.S. Coast Guard coordination or is a Section 9 Bridge Project. The **Office of Environmental Services** will, if necessary, contact the **U.S. Coast Guard** to determine if design requirements impact proposed design.

32. Verify that the maintenance of traffic scheme will work based on the additional design completed during Preferred Alternative Verification development.

33. As per the **Traffic Management in Work Zones Interstate and other Freeways Policy (#516-003(P))**, perform quantitative analysis to determine queues generated by proposed lane closures that violate the Permitted Lane Closure Map.

34. Submit lane closure exception requests to the District Deputy Director. If approved, these requests must then be submitted to the Multi-Lane Coordinator for approval by the Maintenance of Traffic Exceptions Committee (MOTEC). Approval must be obtained prior to submission for Stage 1 Detailed Design Review. An alternate must be submitted to MOTEC.

35. Prepare preliminary pavement marking plans to show lane alignment, lane assignments and turn lane storage lengths, unless information can be adequately shown on the plan views.

36. Perform signal warrant analysis for all proposed signals and existing signals to remain.

37. Contact maintaining agency to determine if alternate bid items for signal or lighting equipment should be used in addition to ODOT's generic bid items.

38. Prepare Proprietary Bid Justification.

39. Determine if additional Right-of-Way is needed for overhead sign poles, signal controllers, light poles or other equipment.

40. Determine permissible locations for on-site waste and borrow areas and portable asphalt and concrete plants, if any.

41. Identify existing Right-of-Way lines (No bearings or distances required).

42. Determine proposed Right-of-Way lines based on available construction limits. Determine if permanent right-of-way is to be acquired by warranty deed or easement. Identify channel easements, temporary right-of-way, etc.

43. Identify construction limits.

44. Contact property owners to determine presence of underground items (e.g., septic systems, sprinklers, etc.)

45. Reevaluate possible total take parcels and relocations. Evaluate the possibility of wetland mitigation with parcel takes.

46. Contact utility companies to verify existing utility locations; including depths.

47. For projects with significant utility involvement, determine utility depths using subsurface utility engineering through Quality Level "B". Quality Level "A" may be needed in critical areas.

48. Request that the utility companies identify any utility relocations outside the proposed construction limits. These areas should be included in the environmental document.

49. Send copies of the Preferred Alternative Verification plans to all involved utilities for input on the proposed design. Responses from the utility companies should be considered during Stage 1 design development.

50. Identify possible right-of-way acquisitions from railroad/railway companies.

51. Prepare Noise Wall Justification.

52. Prepare Retaining Wall Justification **(Section 1404.2)**.

53. Prepare Pedestrian Overpass Justification (**Section 1404.4**)

54. Perform Airway/Highway Clearance Analysis **(Section 1404.1)**.

55. Evaluate and incorporate recommendations from the Preliminary Engineering Phase Value Engineering Study.

56. Evaluate the need for landscape plans.

57. Obtain a list of environmental commitments and ensure that all commitments are maintained.

58. Prepare cost estimates for construction, utility reimbursements and right-of-way acquisition. Evaluate any significant increases or decreases in cost.

59. Prepare a revised schedule for further design development through submission of Final Tracings. See the **Project Development Process Manual** for example GANTT charts. The District should be contacted before proposing changes to established commitment dates.

1403.5.3 Preferred Alternative Verification Review Submission

The Preferred Alternative Verification Review Submission should include:

1. Title Sheet including:

    A. Project designation.
    B. Design designation.
    C. Index of sheets for this submission to facilitate review comments.
    D. Location map.
    E. Project description.

2. Schematic Plan sheet including:

    A. Reference lines and stationing.
    B. Horizontal curve data and bearings.
    C. Political boundaries.
    D. Waterways.
    E. Delineated wetlands.
    F. Bridges.
    G. Railroads.
    H. Utility lines as per **Section 1303.14**.
    I. Public roads.
    J. Existing culverts.
    K. Delineated wetlands and major environmental features.
    L. Location of permissible on site waste and borrow areas.
    M. Location of permissible on site locations for portable plants.

3. Typical Section sheets including:

   A. Roadway, treated and paved shoulder widths and cross slopes.
   B. Location of reference lines and profile grade point.
   C. Typical foreslopes and backslopes.
   D. Pavement buildup.
   E. Subsurface drainage (e.g., underdrains, aggregate drains). Ensure that positive outlets are available.
   F. Chemical stabilization.

4. Plan and Profile sheets including:

   A. Existing topographic items.
   B. Existing buildings.
   C. Existing septic systems, sprinklers, etc.
   D. Delineated wetlands and major environmental features.
   E. Relocated channels.
   F. Critical drive locations.
   G. Total take parcels.
   H. Tax identification numbers and ownerships.
   I. Commercial and residential relocations.
   J. Property lines based on tax map information.
   K. Existing right-of-way lines.
   L. Overhead and underground utilities.
   M. Proposed and existing alignment information
      i. Centerlines.
      ii. Curve data.
   N. Lane widths.
   O. Interchanges
   P. Proposed pavement.
   Q. Proposed and existing roadway profile.
   R. Vertical clearance for bridge overpass structures.
   S. Conceptual location of storm sewer trunk lines and outfalls.
   T. Conceptual location of non-linear Post Construction Storm Water Best Management Practices (BMP) (i.e. ponds, infiltration basins, bioretention cells, etc.).
   U. Intersection turning radii, labeling is not necessary.
   V. Construction limits.
   W. Show proposed culvert locations in plan view only.
   X. Name and location of waterways, side roads and railroads.
   Y. Existing Right-of-Way lines (No bearings or distances required).
   Z. Preliminary proposed Right-of-Way lines.
   AA. Rail lines.
   BB. Retaining walls.
   CC. Geologic and geotechnical concerns.
   DD. Temporary fill locations.

5. Cross Section information including:

   A. Existing ground.

B. Foreslopes, backslopes and approximate ditch flowlines. Sheets are not required to be in standard format as per **Section 1310** until Stage 1. Labeling of foreslopes, backslopes and flowlines not required until Stage 1. Underground utilities and drainage features not required until Stage 1.

6. Submit cut/fill quantity report.

7. Channel sections with preliminary flowline information.

8. Preliminary pavement marking plan.

9. Draft Soil Profile, Draft Structure Foundation Exploration sheets, and Draft Geotechnical Reports.

10. List of all potential design exceptions not previously identified along with a brief reason why the design exception should be considered for approval.

11. Access Point Request Documents (also known as Interchange Justification Studies). Approval for these documents must be obtained through the **Office of Roadway Engineering** prior to submission for Stage 1 Detailed Design Review.

12. Documentation of approved pavement design in accordance with the **Pavement Type Selection Policy, (#20-006(P))**, if applicable.

13. Documentation of approval of rainfall intensity curves other than those published in the **Location and Design Manual, Volume 2**.

14. Initial drainage calculations for proposed culverts

    A. Delineated contributing drainage areas shown on topographic mapping:
        i. For drainage areas less than 50 acres [20 ha] or where the Rational Method is used to estimate discharges use 1:2400 preferred, 1:6000 minimum topographic mapping scale.
        ii. For drainage areas greater than 50 acres [20 ha], use 1:24000 minimum topographic mapping scale.
    B. Drainage areas
    C. Magnitude of the 2-year, design-year and 100-year discharges.
    D. Allowable headwater elevations.
    E. Water surface elevation of the ordinary high water (may be assumed to be the 2-year storm), design-year flood, 100-year flood and the flood of record for existing and proposed conditions.

15. Documentation of contact with County Engineer for preliminary flowline information (Form LD-33).

16. Documentation of approval of structure type (i.e., prefabricated or cast-in-place) from the **Office of Hydraulic Engineering.**

17. Initial drainage calculations for proposed storm sewer trunk lines.

18. Documentation of Post-Construction Best Management Practices (BMPs) implementation issues and calculations for preliminary sizing of non-linear BMPs (i.e. ponds, infiltration basins, bioretention cells, etc.)

19. Structure Type Study, including:

    A. Preliminary Site Plan for preferred bridge alternative.
    B. Sketches showing:
        i. Profile for each bridge alternative considered.
    C. Hydraulic study and scour analysis.
    D. Narrative discussing the bridge alternatives.
    E. Cost estimate for each alternative.
    F. Foundation recommendation.
    G. Sketches of preliminary maintenance of traffic plan on the bridge.

20. Documentation of approval of non-standard railing type, non-redundant designs or fracture critical members. Approval must be obtained prior to submitting for Stage 1 Detailed Design Review.

21. Waterway permit determination package, or draft waterway permit. Comments from the **Office of Environmental Services** must be obtained prior to submission for Stage 1 Detailed Design Review.

22. Documentation of **U.S. Coast Guard** coordination or determination that the project is a Section 9 Bridge Project.

23. Identification of all proposed encroachments into **FEMA** flood zones.

24. Queue analysis for lane closures on interstates and other freeways.

25. Documentation of application for approval from the Maintenance of Traffic Exceptions Committee. Approval must be obtained prior to submission for Stage 1 Detailed Design Review.

26. Signal warrants.

27. Documentation of Proprietary Bid Justification. Approval from the **Office of Traffic Engineering** should be obtained for traffic related items prior to the Stage 1 submittal.

28. Documentation of alternate bid considerations for signal and lighting equipment.

29. Copies of utility company correspondence regarding verification of utility locations. Utility companies should identify any relocations outside the proposed construction limits. The Preferred Alternative Verification plans should be sent to the involved utilities either before or concurrent with the District review submittal. Utility responses should be considered during Stage 1 design development.

30. Copies of correspondence with railroad/railway companies.

31. Noise Wall Justification.

32. Retaining Wall Justification

33. Pedestrian Overpass Justification.

34. Documentation of Airway/Highway Clearance Analysis.

35. Disposition of Preliminary Engineering Phase Value Engineering Study recommendations.

36. Disposition of Constructability Review comments.

37. Disposition of all environmental commitments.

38. Cost estimates for construction and right-of-way acquisition. Explain any significant increase or decrease in estimated cost from previous estimates.

39. Identify utility relocations. Contact the District Utility Coordinator to determine estimated utility reimbursement costs.

40. Detailed schedule for further design development.

41. Disposition of comments from Alternative Analysis Study Review.

42. Determine potential locations for on and off site stream and wetland mitigation.

The Preferred Alternative Verification must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.6 Minor Project Preliminary Engineering Study

1403.6.1 General

The purpose of a Minor Project Preliminary Engineering Study is to perform sufficient design work to determine an accurate design scope, project development schedule and budget for construction, utility reimbursement and right-of-way acquisition; as well as to provide construction limits from which to base environmental clearances. Right-of-Way and utility impacts should be identified. Design work should minimize impacts to design and environmental red flag areas within the project limits. Any additional design decision that could potentially increase the construction limits or otherwise require revisions to the environmental document should be investigated during the Minor Project Preliminary Engineering Study.

A Minor Project Preliminary Engineering Study may be performed on a single feasible alternative or on multiple feasible alternatives. When multiple feasible alternatives are studied, the extent of design work may be limited to critical items at the discretion of the District Production Administrator. The preferred alternative must be fully developed.

A Minor Project Preliminary Engineering Study is part of Step 3 of the PDP for Minor Projects. A Minor Project Preliminary Engineering Study is not required for Major or Minimal Projects.

1403.6.2 Minor Project Preliminary Engineering Study Activities

The following activities are typically part of a Minor Project Preliminary Engineering Study:

1. Request certified traffic from the **Office of Statewide Planning**. Traffic validation requests should include a clear description of project type, location and limits as well as the specific information required (e.g., ADT, directional distribution, percent trucks, turning movements, eighth highest hour factor, peak hour factor, growth factor, etc.) as well as the years for which this information is required (e.g., current traffic, opening-year traffic, design-year traffic). Traffic data for non-Interstate bridge replacement/rehabilitation projects should be developed or validated by the District Office. All other traffic data should be developed or validated by the **Office of Statewide Planning**.

2. Obtain original plans.

3. Obtain mapping in accordance with the ODOT Mapping and Survey Specifications at a detail level (i.e. DTM and Planimetric Accuracy Class) as requested by the District. The mapping should include, but not be limited to the following:

   A. Topographic survey of the project site.
   B. Channel survey information.
   C. Bridge survey information.
   D. Underground utilities based on utility company field markings.
   E. Existing centerline monuments, existing right-of-way monuments, and existing centerline reference monuments.

4. Use traffic counts to develop typical sections that meet geometric criteria. Identify number of lanes, lane width, type of curb, sidewalk, buffer area, graded shoulder width, type of grading and chemical stabilization.

5. Determine the proposed horizontal alignment. For existing alignments, verify if the centerline of Right-of-Way does or does not equal the centerline of construction. Unless otherwise approved by the District Production Administrator, use the centerline of existing right-of-way as the centerline of construction.

6. Determine proposed vertical profile.

7. Determine approximate vertical and horizontal clearances.

8. Evaluate the location of superelevation at bridge structures and other critical locations.

9. Perform capacity analyses.

10. Design turn lane lengths.

11. Evaluate intersection turning radii.

12. Use access management techniques to determine if driveway access points/configurations need to be altered. Analyze drive locations and evaluate for potential areas of concern, such as:

    A. Impacts of profile work.
    B. Landlocking.
    C. Conflicts with proposed guardrail.
    D. Evaluate commercial or industrial drives associated with high traffic generators.
    E. Develop drive geometry and profiles for critical areas.

    Ensure that the right-of-way acquisition cost estimate(s) account for significant modifications to access.

13. Prepare an Access Point Request Document for revised access - interstate or other freeway. These documents are also known as Interchange Justification Studies. Contact the **Office of Roadway Engineering** for information regarding these documents. Submit to the District, who will submit through the **Office of Roadway Engineering** for approval. Approval must be obtained prior to submission for Stage 1 Detailed Design Review.

14. Identify potential design exceptions. Check accident data to determine if there is a correlation between crashes and substandard features.

15. Make a preliminary evaluation of Service Road Justification issues.

16. Review existing soils information (e.g., geologic reports, hydrogeologic information, old soil borings, maintenance history, etc.) and make preliminary design recommendations and determine if additional exploration is necessary. Perform the geotechnical exploration in accordance with the **Specifications for Geotechnical Explorations**.

17. Determine limits of geologic hazards and areas with slope stability, settlement, or poor subgrade concerns. Determine preliminary costs.

18. Determine pavement buildup. Request pavement design as per the **Pavement Type Selection Policy (#20-006(P))**. Determine if local standards regarding pavement type apply. Approval of pavement design, where applicable, must be obtained prior to submission of the Minor Project Preliminary Engineering Study.

19. Determine subsurface drainage requirements. Ensure that positive outlets are available.

20. Submit rainfall intensity curves if other than those published in the **Location and Design Manual, Volume 2**, to the **Office of Hydraulic Engineering** for approval.

21. Complete Drainage Design Criteria Forms. (Form LD-35)

22. Contact County Engineer to determine if proposed culvert flowline elevations are acceptable using the LD-33 form criteria.

23. Analyze conceptual storm sewer locations:

    A. Approximate outlet locations.
    B. Rough catch basin locations.
    C. Location of trunk lines.

24. Determine if channel relocations are necessary. Detail proposed design including channel sections at appropriate intervals. Investigate use of natural channel design.

25. Perform preliminary hydraulic analysis to size culverts for streams shown on USGS maps. Size all culverts that could change the roadway vertical profile due to depth of cover issues. Identify bankfull designed culverts.

26. Prepare roadway cross sections at normal spacing interval with preliminary flowline information.

27. Prepare Structure Type Studies for all proposed bridge structures as follows:

    A. Complete bridge hydraulic study and scour analysis.
    B. Compare alternative structure types.
    C. Check vertical and horizontal clearances.
    D. Develop a cost estimate for each alternative.

28. Submit non-standard railing types, non-redundant designs and fracture critical members to the **Office of Structural Engineering** for approval. Obtain approval prior to submitting for Stage 1 Detailed Design Review.

29. Estimate the location and amount of fill material in wetlands, streams and other regulated waters of the United States.

30. Prepare waterway permit determination package per Section 703.0 of the **Office of Environmental Services Waterway Permits Manual**. Submit to the District; who will review and submit to the **Office of Environmental Services** for preliminary permit determination. Comments from the **Office of Environmental Services** must be obtained prior to submission of Stage 1 Detailed Design, and should be incorporated into draft waterway permit to be submitted to the **Office of Environmental Services**.

31. Determine potential locations for on and off site stream and wetland mitigation.

32. Contact the **Office of Environmental Services** to determine if a project requires **U.S. Coast Guard** coordination or is a Section 9 Bridge Project. The **Office of Environmental Services** will, if necessary, contact the **U.S. Coast Guard** to determine if design requirements impacts proposed design.

33. Analyze impacts on **FEMA** flood zones.

34. Determine potential locations for retaining walls.

35. Prepare Retaining Wall Justification (Section 1404.2).

36. Prepare Maintenance of Traffic Alternatives analysis for Interstates and Interstate look-alikes only. For other projects, investigate:

    A. Number of lanes to be maintained.
    B. Lane widths
    C. Type of maintenance of traffic (e.g., signalized, detoured, part width, runaround, median crossover).
    D. Establish preliminary phasing/sequence of operations.
    E. Local access.
    F. Staged construction phasing on bridge structures.
    G. Detour routes.
    H. Use of pavement for maintaining traffic.
    I. Maintenance of pedestrian traffic.
    J. Innovative contracting methods (e.g., Work Day, Incentive/Disincentive, Lump Sum Incentive, Liquidated Savings, and A+B Contracts).

37. As per the **Traffic Management in Work Zones Interstate and other Freeways Policy (#516-003(P))**, perform quantitative analysis to determine queues generated by proposed lane closures.

38. Submit lane closure exception requests to the District Deputy Director. If approved, these requests must then be submitted to the Multi-Lane Coordinator for approval by the Maintenance of Traffic Exceptions Committee. Approval must be obtained prior to submission for Stage 1 Detailed Design Review.

39. Plot preliminary pavement markings on the plan views to define lane assignments and traffic patterns.

40. Determine if additional Right-of-Way is needed for overhead sign poles, signal poles, signal controllers, light poles or other equipment.

41. Determine if lighting is needed in any areas, investigate warrants for freeway and interchange lighting.

42. Perform signal warrant analysis for all proposed signals and all existing signals to remain.

43. Contact maintaining agency to determine if alternate bid items for signal or lighting equipment should be used in addition to ODOT's generic bid items.

44. Prepare Proprietary Bid Justification.

45. Obtain tax map and overlay property lines, tax identification numbers, and ownerships on base map survey data.

46. Contact property owners to determine presence of underground items (e.g., septic systems, sprinklers, etc.)

47. Determine limits and type of existing right-of-way.

48. Identify possible total take parcels. Identify possible commercial or residential relocations.

49. Determine permissible locations for on-site waste and borrow areas and portable asphalt and concrete plants, if any.

50. Determine preliminary limits of proposed Right-of-Way lines based on available construction limits. Determine if permanent right-of-way is to be purchased by warranty deed or easement. Identify channel easements, temporary right--of-way, etc. (No bearings or distances required).

51. Determine if additional right--of-way will be needed for sediment basins for temporary erosion control.

52. Identify construction limits.

53. Contact utility companies to locate and verify their underground facilities; including depths.

54. Request that the utility companies identify any utility relocations outside the proposed construction limits. These areas should be included in the environmental document.

55. Send copies of the Minor Project Preliminary Engineering Study to all involved utilities to allow for input on the proposed design(s). Request that the utility company identify any relocations that might fall outside the proposed construction limits. Responses from the utility companies should be considered during completion of the environmental document and Stage 1 design development.

56. Identify utility relocations. Contact the District Utility Coordinator to determine estimated utility costs: including costs to ODOT and those borne by the utility companies.

57. For projects with significant utility involvement (e.g., electric lines 69 kilovolt and above, gas lines above 8 inch and a pressure of 125 pounds per square inch (psi) or more, electrical substations, sanitary pump stations, gas pumping facilities, etc.) determine utility depths using subsurface utility engineering through Quality Level B and, at critical locations, Quality Level A.

58. Contact involved railroad/railway companies to determine their design requirements. Incorporate the railroad/railway companies' requirements into the design.

59. Identify possible right--of-way acquisition from railroad/railway companies.

60. Evaluate how the proposed project fits into the existing corridor aesthetically. Consider features such as landscaping, lighting, signing, signals, retaining walls and bridge structures in terms of texture, shape, color, proportion, scale, order and balance. Identify modifications to proposed design.

61. Prepare a Noise Wall Justification.

62. Prepare Pedestrian Overpass Justification.

63. Perform Airway/Highway Clearance Analysis.

64. Evaluate the need for landscaping plans.

65. Obtain a list of environmental commitments and ensure that all commitments are maintained.

66. Prepare exhibits for Preliminary Engineering Phase Value Engineering Study. Submit exhibits to the District who will coordinate the Value Engineering Study with the **Office of Roadway Engineering**.

67. Prepare plans for Constructability Review. The Constructability Review will normally be completed concurrently with the Preliminary Engineering Phase Value Engineering Study.

68. Prepare cost estimates (construction, utility reimbursement and right-of-way acquisition) for each alternative.

69. Analyze the positives and negatives of each alternative from a design and environmental perspective.

70. Prepare a revised schedule for further design development through submission of Final Tracings. See the **Project Development Process Manual** for example GANTT charts. The District should be contacted before proposing changes to established commitment dates.

71. Conceptually evaluate Post-Construction Storm Water Best Management Practices (BMP). Consider the following items in the evaluation:

    A. BMP selection based on project setting and drainage features
    B. Requirements, if any, for water quantity treatment
    C. Identification of constraints regarding implementation of BMPs. Constraints include total parcel takes, impacts to environmental resources, major utility relocations, etc.
    D. Project classification as Redevelopment or New Construction according to **Location and Design Manual, Volume 2**

1403.6.3 Minor Project Preliminary Engineering Study Review Submission

The Minor Project Preliminary Engineering Study Review Submission should include:

1. Title Sheet including:

    A. Certified traffic data.
    B. Project Description.
    C. Design Designation Information.
    D. Design and legal speeds.

2. Typical sections identifying:

    A. Number of lanes.
    B. Lane width.
    C. Graded shoulder width.
    D. Type of grading.
    E. Type of curb.
    F. Sidewalk.
    G. Buffer.
    H. Pavement buildup.
    I. Subsurface drainage (e.g., underdrains, aggregate drains).

3. Plan views showing:

    A. Existing topography.
    B. Existing buildings.
    C. Delineated wetlands and major environmental features.
    D. Existing right--of-way lines.
    E. Existing septic systems, sprinklers, etc.
    F. Overhead and underground utilities.
    G. Geologic and geotechnical concerns.
    H. Relocation channels.
    I. Proposed and existing alignment information.
        i. Centerlines
        ii. Curve data for all existing and proposed roadways. This information can be shown on the plan view or it may be listed separately. Locate points of superelevation transition and full superelevation.
    J. Lane widths.
    K. Interchanges.
    L. Proposed pavement.
    M. Proposed culvert locations.
    N. Property lines based on tax map information.
    O. Tax identification numbers and ownerships.
    P. Critical drive locations.
    Q. Preliminary pavement markings.
    R. Conceptual locations of storm sewer trunk lines and outfalls.
    S. Existing Right-of-Way lines.
    T. Preliminary proposed Right-of-Way lines.
    U. Preliminary intersection turning radii; labeling is not necessary.
    V. Construction limits.
    W. Total take parcels.
    X. Commercial or residential relocations.

Y. Name and location of waterways, side roads and railroads.
Z. Potential service road locations.
AA. Rail lines.
BB. Retaining walls.
CC. Temporary fill locations.

These may be plan sheets or larger exhibit type sheets.

4. Profile views showing:
5.

A. Existing and proposed roadway profile.
B. Existing drainage system.
C. Underground utilities.
D. Proposed culvert locations.
E. Approximate vertical clearances for bridge overpass structures.

Profiles may be shown on plan and profile sheets or on larger exhibit type sheets.

5. Cross Section information including:

A. Existing ground.
B. Foreslopes, backslopes and approximate ditch flowlines. Sheets are not required to be in standard format as per **Section 1310** until Stage 1. Labeling of foreslopes, backslopes, flowlines and utilities is not required until Stage 1. Drainage features are not required until Stage 1.

6. Channel sections with preliminary flowline information.

7. Draft Soil Profile, Draft Structure Foundation Exploration sheets, and Draft Geotechnical Reports.

8. Access Point Request Documents (also known as Interchange Justification Studies). Approval for these documents must be obtained through the **Office of Roadway Engineering** prior to submission for Stage 1 Detailed Design Review.

9. List of potential design exceptions and a brief reason as to why they should be considered for acceptance.

10. Capacity Analyses.

11. Approval of pavement design.

12. Completed Drainage Design Criteria Forms. (LD-35)

13. Drainage calculations for proposed culverts

A. Delineated contributing drainage areas shown on topographic mapping:
   i. For drainage areas less than 50 acres or where the Rational Method is used to estimate discharges use 1:2400 preferred, 1:6000 minimum topographic mapping scale.
   ii. For drainage areas greater than 50 acres, use 1:24000 minimum topographic mapping scale.

B. Drainage areas.
C. Magnitude of the 2-year, design-year and 100-year discharges.
D. Allowable headwater elevations
E. Water surface elevation of the ordinary high water (may be assumed to be the 2-year storm), design-year flood, 100-year flood and flood of record for existing and proposed conditions.

14. Documentation of approval of rainfall intensity curves other than those published in the **Location and Design Manual, Volume 2**.

15. Documentation of contact with County Engineer for flowline information.

16. Documentation of conceptual storm sewer locations

A. Approximate outlet locations.
B. Location of trunk lines.

Show on plan view or discuss in narrative.

17. Structure Type Study including:

A. Preliminary Site Plan for preferred bridge alternative.
B. Sketches showing:
   i. Profile for each bridge alternative considered.
C. Hydraulic study and scour analysis.
D. Narrative discussing the proposed bridge alternatives.
E. Cost estimate for each alternative.
F. Foundation recommendations.
G. Sketches of preliminary maintenance of traffic plan on bridge.

18. Documentation of approval of non-standard railing type, non-redundant designs or fracture critical members. Approval must be obtained prior to submitting for Stage 1 Detailed Design Review.

19. Waterway permit determination package or draft waterway permit application. Comments from the **Office of Environmental Services** must be obtained prior to submission for Stage 1 Detailed Design Review.

20. Determine potential locations for on and off site stream and wetland mitigation.

21. Documentation of **U.S. Coast Guard** coordination or determination that the project is a Section 9 Bridge Project.

22. Documentation identifying all proposed encroachments into **FEMA** flood zones.

23. Retaining Wall Justification.

24. Pedestrian Overpass Justification.

25. Maintenance of Traffic Alternatives Analysis for Interstates and Interstate lookalikes only. For other projects, provide a summary of conceptual maintenance of traffic schemes with a discussion of each alternatives, including:

A. Number of lanes to be maintained.
B. Lane widths.
C. Access management.
D. Preliminary sketches, if necessary to show phasing.
E. Critical areas and large traffic generators.
F. Detour routes.
G. Maintenance of pedestrian traffic.

26. Queue analysis for lane closures on interstates and other freeways.

27. Documentation of application for approval from the Maintenance of Traffic Exceptions Committee. Approval must be obtained prior to submission for Stage 1 Detailed Design Review.

28. Signal warrants.

29. Documentation of lighting considerations and lighting warrants.

30. Documentation of Proprietary Bid Justification. Approval from the **Office of Traffic Engineering** should be obtained for traffic related items prior to the Stage 1 submittal.

31. Documentation of alternate bid considerations for signal and lighting equipment.

32. Copies of correspondence with railroad/railway companies. Estimates of possible right-of-way acquisition from railroad/railway companies.

33. Copies of utility company correspondence regarding verification of utility locations. Utility companies should identify any relocations outside the proposed construction limits.

34. Minor Project Preliminary Engineering plans should be sent to all involved utilities either before or concurrent with the District review submittal. Utility responses should be considered during Stage 1 design development.

35. Documentation of aesthetic considerations.

36. Noise Wall Justification.

37. Documentation of Airway/Highway Clearance Analysis.

38. Exhibits for a Preliminary Engineering Phase Value Engineering Study. The Preliminary Engineering Phase Value Engineering Study must be completed prior to submission of the Stage 1 Detailed Design.

39. Plans for Constructability Review. The Constructability Reviews will normally be completed concurrently with the Preliminary Engineering Phase Value Engineering Study.

40. Disposition of all environmental commitments.

41. For projects with more than one alternative, a matrix or other summary of advantages and disadvantages of each alternative from a design perspective.

42. Cost estimates for construction, utility reimbursement and right-of-way acquisition. Explain any significant increase or decrease in estimated cost from previous estimates.

43. Detailed schedule for further design development.

44. Discussion of Post-Construction Best Management Practices (BMPs) Conceptual Layout and potential implementation issues.

The Minor Project Preliminary Engineering Study must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.7 Stage 1 Detailed Design

1403.7.1 General

Stage 1 plans are developed to a sufficient level of design detail to ensure that right-of-way plan development may begin immediately after completion of this stage. Construction limits should be accurate; with little or no changes anticipated due to Stage 2 development. All issues affecting environmental clearances should be resolved by the end of Stage 1 design.

Stage 1 Detailed Design is part of Step 8 of the PDP for Major Projects and part of Step 4 of the PDP for Minor Projects. Minimal Projects and Limited Review Projects do not require a Stage 1 Detailed Design Submission.

1403.7.2 Stage 1 Detailed Design Activities

The following activities are usually part of the Stage 1 Detailed Design:

1. Contact property owners, **Natural Resources Conservation Services (NRCS)**, etc. to determine location of all field tiles.

2. Design superelevation transitions.

3. Prepare exaggerated profiles.

4. Design intersection geometry; including proposed elevations for projects with closed drainage systems.

5. Determine vertical and horizontal bridge clearances.

6. Evaluate guardrail length of need. Determine end treatment type.

7. Layout all drives. Determine drive vertical profiles.

8. Prepare Design Exception Request. Submit Design Exception Request and supporting plan sheets to District, who will review and submit through the **Office of Roadway Engineering** for approval. Design Exception approval is required prior to Stage 1 Detailed Design Review submission.

9. Prepare Service Road Justification.

10. Perform additional geotechnical exploration, if needed.

11. Complete the design of all proposed culverts; including grading and outlet protection.

12. Submit deviations from the Pipe Policy to the **Office of Hydraulic Engineering**. Approval of deviations is required for Stage 1 Detailed Design approval.

13. Complete the design of all storm sewer systems; including spread calculations.

14. Obtain approval from the **Office of Hydraulic Engineering** for oversizing storm sewer systems for anticipated development. Approval of oversized systems is required for Stage 1 Detailed Design approval.

15. Evaluate proposed field tile outlets.

16. Prepare a Flood Hazard Evaluation for all water course involvements, except crossings where roadway culverts are selected to satisfy minimum size requirements.

17. Evaluate underdrain placement. Ensure that positive outlet locations are available.

18. Determine ditch flowline elevations.

19. Locate and design all drive pipes.

20. Design ditch drainage system for flow capacity and identify need for erosion protection.

21. Complete Post Construction Storm Water Best Management Practices (BMP) design.

22. Complete channel hydraulic design for relocated channels. Design channel stabilization and erosion protection.

23. Determine potential locations for on and off site stream and wetland mitigation.

24. Prepare channel sections.

25. Determine the amount of proposed fill to be placed below ordinary high water elevation, at each culvert and structure and the amount of proposed fill in wetlands.

26. Complete LD-33 County Engineer approval form.

27. Complete Bridge Preliminary Design Report for all bridge structures. Define all work in streams for final waterway permit applications, if required.

28. Incorporate all **Office of Environmental Services** comments on the waterway permit determination package. Prepare and submit final waterway permit applications to the District, if required. The District will review the permit and submit to the **Office of Environmental Services**. Approval (either **Office of Environmental Services, USACE** or **OEPA**) must be obtained prior to submission of Final Tracings to Central Office.

29. Submit and obtain approval from Local Flood Plain Coordinator for all flood zone encroachments. Obtain approval from Local Flood Plain Coordinator prior to submitting for Stage 1 Detailed Design Review.

30. Complete retaining wall preliminary design.

31. Verify that selected maintenance of traffic scheme will work based on the additional design completed in this stage.

32. Determine if proposed maintenance of traffic phasing will require any right-of-way beyond what is required for the proposed work.

33. Prepare preliminary pavement marking plan.

34. Refine Systems Engineering Analysis for Intelligent Transportation System (ITS) projects.

35. Locate signal poles and controllers.

36. Determine location of the power source for all signal and lighting installations.

37. Identify removal items that will have an impact on right-of-way (e.g., trees, steps, etc.)

38. Refine construction limits. Stage 1 construction limits should encompass all anticipated work. Right-of-Way acquisition will be based off these limits.

39. Conduct title and deed research.

40. Locate property pins.

41. Determine existing property line locations.

42. Determine proposed right-of-way lines.

43. Identify right-of-way encroachments.

44. Identify all total take parcels. Identify commercial and residential relocations.

45. If not previously completed, determine utility depths using subsurface utility engineering through Quality Level “B”, at times Quality Level “A” in critical areas.

46. Evaluate responses from utility company comments on the Preferred Alternative Verification or Minor Project Preliminary Engineering Study plans. Identify utility conflicts. Minimize relocations, where possible.

47. Send copies of the Stage 1 plans to all involved utilities to allow input on the proposed design. Responses should be considered during Stage 2 design development.

48. Determine if any proposed water line or sanitary sewer line will be included in the plans and evaluate any reimbursement issues.

49. Submit Stage 1 Detailed Design plans to Railroad/Railway Company for information and comments. Include information on possible right-of-way acquisition from railroad/railway companies. Railroad/Railway comments must be obtained prior to submission for Stage 2 Detailed Design Review.

50. Determine specific noise wall locations. Assess impact of noise wall locations on proposed drainage system. Modify system, as necessary.

51. Determine if warranty items should be used on the project.

52. Complete Airway/Highway Clearance Analysis, if not completed previously.

53. Identify and incorporate environmental commitments.

54. Prepare exhibits for a Detailed Design Phase Value Engineering Study. Submit exhibits to the District; who will coordinate the Value Engineering Study with the **Office of Roadway Engineering**. The Detailed Design Phase Value Engineering Study must be completed prior to submission of Stage 2 Detailed Design plans. Minor projects that qualify for Value Engineering typically require only one Value Engineering Study that is usually during Preliminary Engineering.

55. Prepare cost estimates for construction, utility reimbursement and right-of-way acquisition for all alternatives.

1403.7.3 Stage 1 Detailed Design Review Submission

The Stage 1 Detailed Design Review Submission should include:

1. Title Sheet including:

    A. Project designation.
    B. Design designation.
    C. Index of sheets for this submission to facilitate review comments.
    D. Location map.
    E. Project description.

2. Schematic Plan sheet including:

    A. Reference lines and stationing.
    B. Horizontal curve data and bearings.
    C. Political boundaries.
    D. Waterways.
    E. Delineated wetlands.
    F. Bridges.
    G. Railroads.
    H. Utility lines as per **Section 1303.14**.
    I. Public roads.
    J. Existing culverts.
    K. Location of permissible on site waste and borrow areas.
    L. Location of permissible on site locations for portable plants.
    M. Benchmarks and reference points.

3. Typical Section sheets including:

    A. Roadway, treated and paved shoulder width and cross-slope.
    B. Location of reference lines and profile grade point.
    C. Typical foreslopes and backslopes.
    D. Pavement buildup.
    E. Longitudinal joints.
    F. Subsurface drainage (e.g., underdrains, aggregate drains).

G. Normal crown and superelevated sections.
H. Approach slabs.
I. Existing pavement buildup (material and thickness).

4. General Note Sheets:

A. Utility company listing (as per **Appendix B, Note G102**)
B. Environmental commitment notes.

5. Plan and Profile sheets including:

A. Existing topography.
B. Existing buildings.
C. Property lines.
D. Existing right-of-way lines.
E. Delineated wetlands and major environmental features.
F. Overhead and underground utilities.
G. Field tile locations.
H. Geologic and geotechnical concerns.
I. Proposed and existing alignment information (e.g., centerlines, curve data).
J. Horizontal alignment data.
K. Proposed pavement.
L. Vertical profile data.
M. Horizontal and vertical clearances.
N. Final construction limits.
O. Proposed Right-of-Way lines.
P. Culverts.
Q. Post Construction Storm Water Best Management Practices (BMP).
R. Storm sewer systems, trunk lines.
S. Drives.
T. Drive pipes.
U. Guardrail.
V. Total take parcels.
W. Commercial and residential relocations.
X. Identify items to be removed that impact right-of-way (e.g., trees, steps).
Y. Signal pole locations.
Z. Noise wall locations.
AA. Retaining walls.

6. Cross Section sheets:

A. Foreslopes and backslopes.
B. Ditch flowline elevations.
C. Grading for guardrail end treatments.
D. Underground utilities.
E. Existing drainage items.
F. Proposed drainage items, including:
    i. Storm sewers.
    ii. Drive pipes.
G. Special benching.
H. Retaining walls.

7. Superelevation table(s).

8. Intersection Details sheets showing:

   A. Turning radii.
   B. Proposed elevations.

9. Interchange Detail sheets showing interchange layout.

10. Drive Detail sheets. Plan and profile information for all drives must be shown in the plans. Plan information may be labeled on the Plan and Profile sheets, on a separate drive detail sheet or in tabular format. Profile information may be shown on the cross sections or on a separate drive detail sheet.

11. Storm Sewer Profile sheets.

12. Culvert Detail sheets. Include all information as per **Section 1312.2**, except estimated quantities and headwall design details.

13. Channel Relocation Detail sheets.

14. Channel Section sheets:

   A. Side slopes.
   B. Flowline elevations.

15. Conceptual Maintenance of Traffic, if revised from previous submissions.

16. Preliminary Pavement Marking Plan.

17. Revised Systems Engineering Analysis for Intelligent Transportation System (ITS) projects.

18. Retaining wall plans, including:

   A. Wall locations.
   B. Wall elevations.
   C. Wall type.
   D. Footing depth.
   E. Foundation type.

19. Exaggerated profiles for areas of superelevation transition.

20. Final Soil Profile, Final Structure Foundation Exploration Sheets, and Final Geotechnical Reports.
21. Documentation of approved Access Point Request Document (also known as Interchange Justification Studies). These documents must be approved through the **Office of Roadway Engineering** prior to submitting for Stage 1 Detailed Design Review.

22. Documentation of approved Design Exception. Design Exceptions must be approved through the **Office of Roadway Engineering**. Approval of Design Exceptions is required for Stage 1 Detailed Design Approval.

23. Service Road Justification.

24. Documentation of approval of deviations from the Pipe Policy.

25. Documentation of approval of oversized storm sewers.

26. Drainage calculations, including:

    A. Culverts. (Include pipe alternates if applicable).
    B. Storm Sewers. (Include pipe alternates if applicable).
    C. Drive pipes. (Include pipe alternates if applicable).
    D. Ditches.
    E. Flood Hazard Evaluation.
    F. Spread Calculations.

27. LD-33 County Engineer approval form. County Engineer approval should be obtained prior to submission for Stage 1 Detailed Design Review.

28. Bridge Preliminary Design report including:

    A. Final Structure Site Plan.
    B. Final Maintenance of Traffic Plan.
    C. Foundation Report.
    D. Supplemental Site Plan for railway crossings.

    For additional requirements refer to the **Bridge Design Manual Section 200**.

29. For projects with historic properties, including historic bridges, submit plans to the **SHPO**, if requested by **SHPO**. The **Office of Environmental Services** will submit to **SHPO** for review and comment.

30. Final waterway permit application. Approval from the **Office of Environmental Services,** the **USACE** or **OEPA**, as applicable, must be obtained prior to submission of Final Tracings to Central Office.

31. Stream and/or wetland mitigations plans, if required.

32. Local Flood Plain Coordinator approvals for all flood zone encroachments.

33. Retaining wall calculations.

34. List of any right-of-way encroachments.

35. List of all total take parcels and relocations.

36. List of known utility conflicts and anticipated relocations.

37. Copies of utility company correspondence including: utility responses to requests for comments during the Preferred Alignment Verification/Minor Project Preliminary Engineering Study and a request for comments on the Stage 1 design. Utility concerns regarding the Stage 1 plans should be evaluated during Stage 2 design development.

38. Description of proposed water line or sanitary sewer line work to be included in the ODOT contract.

39. Copies of all railroad correspondence. Railroad comments must be obtained prior to Stage 2 Detailed Design submission.

40. Documentation, of which warranty items, if any, will be used on the project.

41. Refine proposed Right-of-way lines based on final construction limits.

42. Documentation of Airway/Highway Clearance Analysis, if not previously submitted.

43. Exhibits for a Detailed Design Phase Value Engineering Study. Detailed Design Phase Value Engineering must be completed prior to submission for Stage 2 Detailed Design Review.

44. Cost estimates for construction and right-of-way acquisition. The District Utility Coordinator will prepare a utility reimbursement cost estimate and provide this estimate to the District Planning and Production Administrators for inclusion in the total estimated project cost. Explain any significant increase or decrease in estimated cost from previous estimate.

45. Disposition of Preferred Alternative Verification or Minor Project Preliminary Engineering review comments.

46. Disposition of Constructability Review.

47. Final Post Construction Storm Water Best Management Practices (BMP) Design Calculations and documentation of any BMP implementation issues.

The Stage 1 Detailed Design must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.8 Preliminary Right-of-Way

1403.8.1 General

Right-of-Way plans provide detailed information regarding existing and proposed property rights and how they relate to the proposed project.

Preliminary Right-of-Way is part of Step 9 of the PDP for Major Projects and Step 5 of the PDP for Minor Projects. A Preliminary Right-of-Way Review Submission is required for all plans that involve acquisition of temporary or permanent right-of-way.

1403.8.2 Preliminary Right-of-Way Activities

The following activities are usually part of Preliminary Right-of-Way design:

1. Revise Stage 1 plans based on review comments that have an impact on construction limits and/or right-of-way plan information.

2. Establish proposed right-of-way lines based on construction limits determined during Stage 1 Detailed Design.

3. Identify proposed easements (e.g., temporary, drainage, channel).

4. Prepare a centerline plat detailing the proposed centerline and its precise geographic and boundary related position.

5. Prepare a property map showing the relationship of proposed right-of-way to each entire ownership.

6. Prepare a summary of additional right-of-way that tabulates all aspects of areas involved in the acquisition.

7. Prepare detailed right-of-way plan sheets showing all existing and proposed features and their relationship to existing and proposed rights of way.

8. Prepare Railroad Plats.

9. Prepare draft legal descriptions for railroad parcels, including: bearings, distances and valuation stations.

10. Submit Preliminary Right-of-Way plans and legal descriptions for all railroad parcels to the District. District is to submit this information to the Railroad/Railway Company for review and comments. Comments should be received prior to Final Right-of-Way Tracing Submission.

11. Identify all encroachments.

12. Contact the District Utility Coordinator for a revised cost estimate if Right-of-Way plan development indicates any changes to assumptions used to generate the Stage 1 utility cost estimate (e.g. additional easements found).

13. Prepare an updated right-of-way acquisition cost estimate.

The **Real Estate Policies and Procedures Manual, Section 3100 Right-of-Way Plans**, details additional requirements for the Preliminary Right-of-Way Design Submission.

1403.8.3 Preliminary Right-of-Way Review Submission

The Preliminary Right-of-Way Review Submission should include:

1. Title Sheet, Schematic Plan, General Note, Plan and Profile sheets containing corrected Stage 1 Detailed Design information.

2. Centerline plat:

    A. Centerlines.
    B. Monuments.
    C. Curve data and bearings.

3. Property map:

    A. Entire periphery of ownerships.
    B. Property owner names.
    C. Buildings and drives.

4. Summary of Additional Right-of-Way sheet:

   A. Parcel numbers.
   B. Owner identification.
   C. Owners Record.
   D. Auditor's Parcel numbers.
   E. Record Area.
   F. Total Present Roadway Occupied (P.R.O.).

5. Detailed Right-of-Way Plan sheets:

   A. Existing topographic features.
   B. Property lines.
   C. Parcel boundaries.
   D. Centerlines and associated data.
   E. Proposed right-of-way.
   F. Easements.
   G. Encroachments.
   H. Total take parcels.

6. Railroad Plats.

7. Copies of the deeds and all pertinent information used to resolve the boundary lines and a surveyors report identifying any boundary resolution issues, problems of occupation lines vs. deed calls, boundary closure problems, deeds that do not close, existing centerline of right-of-way resolution issues, etc.

8. Draft legal descriptions for railroad parcels, including: bearings, distances and valuation stations.

9. Copy of railroad correspondence.

10. Right-of-Way acquisition cost estimate with an explanation of any changes from previous submissions. District Utility Coordinator to provide revised utility reimbursement cost estimate, if necessary.

11. Disposition of Stage 1 Detailed Design Review comments as they pertain to the right-of-way plans.

For additional details on the contents of the preliminary right-of-way sheets see the **Real Estate Policies and Procedures Manual, Section 3100 Right-of-Way Plans**.

The Preliminary Right-of-Way Review Submission must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.9 Stage 2 Detailed Design

1403.9.1 General

Stage 2 Detailed Design involves the detailing of the various portions of a plan. At the end of the Stage 2 Detailed Design, all design issues of any significance should be resolved.

Stage 2 Detailed Design is part of Step 9 of the PDP for Major Projects and Step 5 of the PDP for Minor Projects. A Stage 2 Detailed Design Submission is not required for Minimal or Limited Review Projects.

1403.9.2 Stage 2 Detailed Design Activities

The following activities are usually part of Stage 2 Detailed Design:

1. Add pavement elevations to Interchange Details. Develop grading plans.

2. For concrete pavements, determine locations of longitudinal and transverse joints. Show the locations of these joints on the Intersection Details and Interchange Details.

3. Detail underdrain system.

4. Prepare reinforcing details for full height culvert walls.

5. Submit designs for precast reinforced concrete box culverts, three-sided flat-topped culverts and precast reinforced concrete arch sections where the usual maximum height of cover is exceeded. Approval must be obtained prior to submission for Stage 2 Detailed Design Review.

6. Detail new and rehabilitated bridge structures.

7. Prepare and submit Coast Guard Section 9 Bridge Permits to the District. The District will review the permit and submit to the **Office of Environmental Services**. The **Office of Environmental Services** will submit the permit to the **U.S. Coast Guard**. Coast Guard permits are required to construct a new bridge or causeway or to modify an existing bridge or causeway across commercially navigable “Waters of the United States”.

8. The environmental document and 404/401 permits must be approved prior to **U.S. Coast Guard** authorization under **Section 9 of River and Harbor Act. U.S. Coast Guard** approval must be obtained prior to submission of Final Tracings to Central Office.

9. Complete retaining wall detail design.

10. Detail maintenance of traffic phasing plans.

11. Prepare a detour plan.

12. Determine the local alternate detour route. Obtain County Engineer approval. Approval must be obtained prior to submission for Stage 2 Detailed Design Review.

13. Layout pavement markings.

14. Layout signing. Re-evaluate guardrail length of need if use to protect major guide signs.

15. Revise Systems Engineering Analysis for Intelligent Transportation System (ITS) projects.

16. Determine signal design requirements:

    A. Signal head locations.
    B. Loop detector locations.
    C. Phasing diagram.
    D. Loop detector chart.

E. Pedestrian considerations.
F. Emergency transit and/or railroad preemption.

17. Design proposed lighting. Determine:

A. Type of lighting equipment.
B. Type of light source.
C. Light pole layout and circuit design.
D. Need for lighting on signs.
E. Significance of light trespass into surrounding areas.
F. Light pole foundation design.

18. Determine the disposition of all miscellaneous items (e.g., mailboxes).

19. Prepare plan for fencing at right-of-way lines.

20. Add proposed right-of-way lines to Plan and Profile sheets.

21. Add proposed right-of-way lines to Cross Section sheets.

22. Evaluate utility responses to Stage 1 plans. Revise plans to incorporate responses, if warranted.

23. Send copy of Stage 2 plans to utility companies to begin relocation plans. Indicate known utility relocations. Utilities may comment on water line and sanitary sewer work.

24. Notify the District Utility Coordinator of any changes to utility impacts and/or anticipated reimbursements.

25. Evaluate railroad/railway responses to Stage 1 plans. Revise plans to incorporate responses, if warranted.

26. Send copy of Stage 2 plans to railroad/railway company.

27. Complete water work and sanitary sewer design. Send copy of plans to involved utilities for review and approval.

28. Develop landscaping plan.

29. Develop/complete mitigation plan for stream and wetlands, if required. Submit mitigation plan to **USACE** and **OEPA** for approval. Approval must be obtained prior to submission of Final Tracings.

30. Structurally design and detail noise walls.

31. Obtain approval from the Design Aesthetics Committee for all aesthetic items (e.g., noise walls, concrete textures, landscape design, color, etc). Approval must be obtained prior to Stage 2 Detailed Design approval

32. Evaluate and incorporate recommendations from Detailed Design Phase Value Engineering Study.

33. Prepare plans for Second Constructability Review.

34. Update the construction cost estimate.

1403.9.3 Stage 2 Detailed Design Review Submission

The Stage 2 Detailed Design Review Submission should include:

1. Title Sheet including all information per **Section 1302**; except Engineer's seal, Supplemental Specifications, Special Provisions, Standard Construction Drawings, and Earth Disturbed Areas.

2. Schematic Plan sheet including all information per **Section 1303**.

3. Typical Sections sheets including all information per **Section 1304**.

4. General Note sheet listing utility companies as per **Appendix B, Note G102**.

5. Maintenance of Traffic sequence of operations and local alternate detour notes.

6. Maintenance of Traffic Phasing Plans including:

    A. Location of proposed work, by phase.
    B. Existing and maintenance of traffic signing and pavement marking.
    C. Median crossovers.
    D. Channelizing devices (e.g., barriers, drums).
    E. Work zone lane widths.
    F. Pavement for maintaining traffic.
    G. Sections showing existing and proposed pavement and lane widths.
    H. Attenuator.

7. Detour map.

8. Plan and Profile sheets including all information as per **Section 1309**. Estimated quantities are not required. Proposed work should be identified, if not obvious.

9. Cross Sections sheets as per **Section 1310**; except:

    A. Earthwork and seeding calculations.

10. Intersection Details sheets showing:

    A. Turning radii.
    B. Proposed elevations.
    C. Joints for concrete pavement.
    D. Proposed drainage system.

11. Interchange Detail sheets including:

    A. Interchange layout.
    B. Proposed elevations.
    C. Joints for concrete pavement.
    D. Grading details.

12. Drive Detail sheets showing plan and profile information. Plan information may be labeled on the Plan and Profile sheets, on a separate drive detail sheet or in tabular format. Profile information may be shown on the cross sections or on a separate drive detail sheet.

13. Culvert Detail sheets including all information as per **Section 1312.2**, except estimated quantities.

14. Headwall/wingwall details for all headwalls not covered by the Standard Construction Drawings.

15. Channel Relocation Detail sheets.

16. Channel Section sheets. Earthwork quantities not required.

17. Storm Sewer Profile sheets.

18. Water work and sanitary sewer plans, if not covered by the Plan and Profile sheets.

19. Pavement Marking and Signing Plan sheets as per the **Traffic Engineering Manual**; except:

    A. Raised pavement markers.
    B. Delineators.
    C. Barrier reflectors.
    D. Estimated quantities.

20. Revised Systems Engineering Analysis for Intelligent Transportation System (ITS) projects.

21. Signal Plan sheets as per the **Traffic Engineering Manual**; except:

    A. Estimated quantities.
    B. Wiring diagram.
    C. Pole orientation chart.
    D. Timing chart.
    E. Notes.

22. Lighting plan as per the **Traffic Engineering Manual**; except estimated quantities.

23. Landscaping Plan; except estimated quantities.

24. Mitigation Plan, except estimated quantities.

25. Noise wall details.

26. Bridge plans as per the **Bridge Design Manual**; except estimated quantities and reinforcing steel tables. These plans will usually include:

    A. Site Plan.
    B. Stage Construction Detail sheets.
    C. Abutment Detail sheets.
    D. Pier Detail sheets.
    E. Superstructure Detail sheets.
    F. Transverse Section.
    G. General Notes.

27. Documentation of Design Aesthetics Committee approval of aesthetic details.

28. Retaining Wall Detail Sheets.

29. Fencing Plan.

30. Detailed Right-of-Way Plan Sheets from the Preliminary Right-of-Way Review.

31. Coast Guard Section 9 Bridge Permit Application. Approval must be obtained prior to submission of Final Tracings to Central Office. Final permit applications must be indicative of the final project design (i.e., Amount of fill below ordinary high water and bridge navigational clearance). Project designers and waterway permit preparers must coordinate to ensure the applications accurately depict the final design.

32. Documentation of local alternate detour route and County Engineer approval.

33. Lighting analysis to determine pole spacing and locations. Voltage drop calculations.

34. Copies of utility company correspondence.

35. Copies of railroad/railway company correspondence.

36. Disposition of Detailed Design Phase Value Engineering recommendations.

37. Plans for Second Constructability Review. The Second Constructability Review must be completed prior to submission of the Final Right-of-Way.

38. Cost estimate for construction and right-of-way acquisition. The District Utility Coordinator to provide revised utility reimbursement cost estimate, if necessary. Explain any significant increase or decrease in estimated cost from previous estimates.

39. Disposition of Stage 1 Review comments.

The Stage 2 Detailed Design must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.10 Final Right-of-Way

1403.10.1 General

Final Right-of-Way is part of Step 10 of the PDP for Major Projects and part of Step 6 of the PDP for Minor Projects. A Final Right-of-Way Submission is required for any project that involves acquisition of temporary or proposed right-of-way.

1403.10.2 Final Right-of-Way Activities

The following activities are usually part of Final Right-of-Way preparation:

1. Incorporate all comments from the Preliminary Right-of-Way Review as well as any Stage 2 Detailed Design elements that have an impact on the right-of-way plans.

2. Incorporate railroad review comments, if applicable.

3. Prepare a legal description for each parcel to be acquired.

4. Complete a closure calculation for each parcel.

5. Update right-of-way cost estimates.

6. Notify the District Utility Coordinator of any changes to utility impacts or anticipated reimbursements.

1403.10.3 Final Right-of-Way Review Submission

The Final Right-of-Way Submission should include:

1. Legal descriptions.

2. Closure calculations.

3. Centerline Plat**,** Property Map, Summary of Additional Right-of-Way, Detailed Right-of-Way Plan and Special Plat sheets as described in the **Real Estate Policies and Procedures Manual, Section 3100 Right-of-Way Plans**.

4. Corrected Title Sheet, Schematic Plan, General Notes and Plan and Profile sheets from the Stage 2 Detailed Design Review.

5. Copy of railroad correspondence.

6. Right-of-Way cost estimate with an explanation of any changes from previous submissions. District Utility coordinator to provide revised utility reimbursement cost estimate, if necessary.

7. Disposition of Preliminary Right-of-Way Review comments.

The Final Right-of-Way Review Submission must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.11 Final Right-of-Way Tracings

Final Right-of-Way Tracings are part of Step 10 of the PDP for Major Projects and part of Step 6 of the PDP for Minor Projects. Final Right-of-Way Tracings are required for any plan that involves acquisition of temporary or permanent right-of-way. Submission of Final Right-of-Way Tracings should be made within 20 days after receipt of the Final Right-of-Way Review comments unless stated otherwise in the project scope.

Fifteen days prior to submitting the Final Right-of-Way Tracings, conduct an in-depth field review of the project and verify property owners. Determine:

1. Any new ownership transactions.

2. Any changes to topographic features, structures, utilities or ownership.

3. Submit legal descriptions to the County Engineer or County Recorder for pre-approval.

Revise the Right-of-Way plan and descriptions to accurately reflect this information.

The Final Right-of-Way Tracings Submission includes:

1. Centerline Plat**,** Property Map, Summary of Additional Right-of-Way, Detailed Right-of-Way Plan and Railroad Plat sheets as described in the **Real Estate Policies and Procedures Manual, Section 3100 Right-of-Way Plans**.

2. Final legal descriptions with county pre-approval stamp, if applicable.

3. Final closure calculations.

4. Disposition of Final Right-of-Way Review comments.

Final Right-of-Way Tracings are submitted to the District. Additional paper copies for Central Office and external agencies as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.12 Stage 3 Detailed Design

1403.12.1 General

The Stage 3 Detailed Design should complete the design and detailing of the project. These plans must contain all details and quantities required to bid and construct the proposed work. Plans should be numbered and submitted as a complete set, organized as per **Section 1301.1**.

Stage 3 Detailed Design is part of Step 11 of the PDP for Major Projects, Step 7 of the PDP for Minor Projects and Step 2 of the PDP for Minimal Projects. A Stage 3 Detailed Design Review is required for all projects; except Limited Review and Design-Build Projects.

It is recommended that a second Stage 3 Detailed Design Review be conducted if more than two years have elapsed since the first Stage 3 Detailed Design Review and the Final Tracing Package has not been submitted to Central Office. The purpose of this review is to ensure that the plans reflect current field conditions as well as all current design standards, policies and specifications.

1403.12.2 Stage 3 Detailed Design Activities

The following activities are usually part of Stage 3 Detailed Design:

1. Prepare Simplified Plans including:

    A. Plans as per **Section 1301.2**.
    B. Existing utility locations.

C. County Engineer approval of local alternate detour routes.
D. Local Flood Plain Coordinator approval for all flood zone encroachments.
E. Approval of pavement design if required by the **Pavement Type Selection Policy (#20-006(P))**. Pavement design for Minimal Projects is usually completed prior to the project scope.
F. As per the **Traffic Management in Work Zones Interstate and other Freeway Policy (#516-003(P))**, perform quantitative analysis to determine queues generated by proposed lane closures.
G. Submit lane closure exception request to the District Deputy Director. If approved, these requests must then be submitted to the Multi-Lane Coordinator for approval by the Maintenance of Traffic Exceptions Committee. Approval must be obtained prior to submission for Stage 3 Detailed Design Review.
H. Warranty item determination.
I. Innovative contracting methods (e.g., Work Day, Incentive/Disincentive, Liquidated Savings, and A + B Contracts).

2. Prepare underdrain bends and branches list.

3. Prepare Project Site Plan.

4. Determine all estimated quantities throughout the plan. This will include, but is not limited to:

A. Pavement calculations.
B. Drainage quantities.
C. Roadway quantities.
D. Earthwork and seeding calculations.
E. Maintenance of Traffic quantities. (Including workzone pavement marking subsummaries).
F. Pavement Marking subsummaries.
G. Signing subsummaries.
H. Signal subsummary.
I. Bridge estimated quantities and reinforcing steel tables.
J. Lighting subsummaries.
K. Landscape subsummaries.

5. Determine appropriate notes:

A. General Notes.
B. Maintenance of Traffic Notes.
C. Traffic Control Notes.

6. Submit non-standard notes to the appropriate specification committee (i.e., Pavement Materials and Construction, Structures, Earthwork and Hydraulics, Contract Administration or Traffic and Misc.) for approval. Approval must be obtained prior to submission of Final Tracings to Central Office.

7. Confer with the District Planning Administrator to determine if any participation splits are desired.

8. Prepare the General Summary and Bridge Estimated Quantity sheets.

9. Finalize Systems Engineering Analysis for Intelligent Transportation System (ITS) projects.

10. Complete Traffic Signal plans by preparing:

    A. Wiring diagram.
    B. Pole orientation chart.
    C. Timing chart.

11. Complete signing plans by preparing:

    A. Elevation views for major signs.

12. Submit plans to involved railroad/railway companies for approvals. Obtain railroad agreement. Railroad agreement must be obtained prior to submission of Final Tracings to Central Office.

13. Prepare **FAA Form 7460-1** for Airway/Highway Clearance.

14. Submit plans to **ODNR** for all work involving State Scenic Rivers, State Wildlife Areas and State Recreational Areas.

15. Submit plans to the **SHPO** for all projects involving work on historic bridges.

16. Prepare revised construction utility reimbursement cost estimates.

1403.12.3 Stage 3 Detailed Design Review Submission

The Stage 3 Detailed Design Review Submission should include:

1. A complete set of construction and right-of-way plans as per:

    A. **Section 1300** of this Manual
    B. **Bridge Design Manual**
    C. **Traffic Engineering Manual**
    D. **Real Estate Policies and Procedures Manual**
    E. **Specifications for Geotechnical Explorations**

2. Documentation of approval of non-standard plan notes. Approval must be obtained prior to submission of final tracings to Central Office.

3. Systems Engineering Analysis for Intelligent Transportation System (ITS) projects.

4. Railroad Agreement. Railroad agreement must be obtained prior to submission of Final Tracings to Central Office.

5. Completed **FAA Form 7460-1**. The District should submit this form as per **Section 1404.1.7**. **FAA** approval must be obtained prior to submission of Final Tracings to Central Office.
6. **ODNR** plan approvals.

7. Documentation of wetland mitigation plans submitted to **USACE** and **OEPA** for approval. Approval must be obtained prior to submission of Final Tracings.
8. **SHPO** plan approvals.

9. Construction and utility reimbursement cost estimates. Explain any significant increase or decrease in estimated cost from previous estimates.

10. Disposition of Second Constructability Review comments.

11. Disposition of Stage 2 Detailed Design Review comments.

The Stage 3 Detailed Design Review Submission must be reviewed and approved by the District. In addition, Central Office and external agency reviews as listed in the **Project Development Process Manual (PDP), Appendix B – Review Matrices** may be required.

1403.13 Final Tracings

Submission of Final Tracings is part of Step 12 of the PDP for Major Projects, Step 8 of the PDP for Minor Projects and Step 3 of the PDP for Minimal Projects. Final Tracings for Design-Build Projects will include "as-built" details as per the Design-Build Scope of Services. For projects in which a railroad/railway company is involved, a copy of the final plans will be sent to the railroad/railway company.

The submission of completed plans to the District from a consultant should follow **Section 1505**. Submission of the Final Tracing Package to Central Office should follow the **Policy for the Submission of Plan Packages (Policy #26-001(P)).**

1404 Miscellaneous Studies

1404.1 Airway/Highway Clearance Analysis

1404.1.1 Introduction

The purpose of an Airway/Highway Clearance Analysis is to determine if a proposed project will encroach into the theoretical approach or traverse surfaces of an airport or heliport. When a project is identified as being within 20,000 feet of a public-use or military airport or heliport, an analysis must be performed to determine if **FAA** notification is required. The initial determination whether or not a project is within the 20,000 foot distance is to be made at the time of programming, and it should be so noted on the programming forms and in ODOT's project management system.

The Airway/Highway Clearance Analysis procedures contained in this manual are based on the "**Federal Aviation Regulations, Part 77 - Objects Affecting Navigable Airspace**." Information on the location of airports and lengths of runways may be obtained from the "**Ohio Airport Directory**," as published by the **Ohio Department of Transportation, Office of Aviation**.

1404.1.2 Notification Surfaces

The following conditions need to be examined to determine if notification is required.

1. Any construction or alterations of more than 200 feet in height above ground level.

2. Any construction or alteration of greater height than an imaginary surface extending outward and upward at the following slopes:

    A. 100:1, for horizontal distance of 20,000 feet from the nearest point of the nearest runway, for any airport with at least one runway with a length of more than 3,200 feet, excluding heliports.

B. 50:1, for a horizontal distance of 10,000 feet from the nearest point of the nearest runway, for any airport where the length of the longest runway does not exceed 3,200 feet, excluding heliports.
C. 25:1, for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area, for a heliport.

See **Figure 1404-1** for a graphical depiction of these surfaces.

1404.1.3 Traverse Way Adjustments

In determining whether any roadway or other traverse way (e.g., railroad, waterway, bikeway, etc.) will violate the limits described in the previous section, it is necessary to include an additional upward height above the traverse way elevation for vehicles that might travel on the facility. The adjustments are as follows:

1. 17 feet for Interstate highways, other freeways, and expressways.

2. 15 feet for all other public roadways and commercial driveways.

3. 10 feet for all private roads and driveways.

4. 23 feet for railroads.

5. An amount equal to the height of the highest mobile object that would normally traverse the facility, for a waterway or for any other traverse way not previously mentioned.

This additional height must be considered to apply over the full width of the traveled portion and the shoulders of the roadway. **Figure 1404-1** includes examples of several traverse way adjustments.

1404.1.4 Exceptions to Notification Requirements

FAA notification is not required where one or more of the following applies to the object penetrating the notification surface:

1. The object is shielded by existing structures of a permanent and substantial character or by natural terrain or topographic features, of equal or greater height.

2. The object is located in the congested area of a city, town, or settlement where it is evident beyond all reasonable doubt that there could be no adverse effect on safe air navigation.

3. The object is an antenna of 20 feet or less in height, except one that would increase the height of another antenna structure.

Figure 1404-2 includes examples of locations where **FAA** notification is and is not required.

1404.1.5 Temporary Structures and Construction Equipment

It is possible that a project located within 20,000 feet of an airport will not require **FAA** notification for permanent features, but will require notification for temporary structures or construction equipment. **Figure 1404-3** contains height allowances for equipment or structures associated with various types of construction. These allowances should be used to determine if the notification surface will be penetrated. For short projects (100 feet or less in length), any applicable heights should be considered to apply over the entire length of the project.

Judgment must be used when applying these heights to longer projects. For example, the allowance for equipment used to construct a bridge would only be needed in the vicinity of the bridge; however, the allowance for earth moving and paving equipment should be applied over the entire length. When any doubt exists, it is advisable to consult the **FAA**.

1404.1.6 Controlled Areas

Figure 1404-4 displays cross-sectional and profile views of imaginary surfaces that exist above the notification surface. **Figure 1404-5** depicts an area at the end of a runway called the runway protection zone (RPZ). **Figure 1404-6** contains dimensions that define the sizes of RPZ's for different facilities. Projects should be designed so that these controlled areas are not penetrated by any features, as the **FAA** will not normally permit violations.

1404.1.7 FAA Notification/Clearance Procedures

Whenever a project is located within 20,000 feet of a public-use or military airport or heliport, an Airway/Highway Clearance Analysis must be performed. Documentation which provides the information contained in **Figure 1404-7** must be supplied. The District will use this information to complete **FAA Form 7460-1**. The **FAA** requires the use of English units.

The District will submit the following information to the **FAA** for approval:

1. Two completed **FAA Form 7460-1's**. One form is for the proposed project and the other form is for the construction equipment and/or temporary structures.

2. Latitude, longitude (NAD), and elevation (above mean sea level) of the following points:

    A. For short bridge projects, 100 feet or less in length:

        i. Highest point of the superstructure of the bridge.

    B. For all other projects:

        i. Beginning of the project.

        ii. End of the project.

        iii. Highest point of the project.

        iv. Closest point to the runway.

        v. Any other points that may be important to the study (e.g., various high points throughout the project that may penetrate the imaginary surface).

        vi. Each light tower or signal pole. In addition, include: structure number, latitude, longitude, ground elevation, structure height and overall height.

        vii. Highest point of the superstructure of each bridge.

    Accuracy of points should be within 50 feet horizontally and 20 feet vertically.

3. A **USGS** map of the project location relative to the airport showing a reference for each point listed above.

Two copies of all forms and supporting information will be submitted to the **Office of Aviation**.

When approval (or comments) is received from the **FAA**, the District Production Administrator will retain the original correspondence and distribute copies to the **Office of Aviation, Office of Maintenance Administration**, **Office of Estimating** and the **FHWA** (for federal oversight projects only).

FAA comments will generally relate to certification of the coordinates submitted or the submission of **Form 7460-2, Supplemental Notice**. The **FAA** may also request that a light pole or other similarly tall structure be visibly marked or possibly reduced in height.

Approvals are valid for a period of eighteen (18) months. The District Production Administrator will monitor project status (sale date) relative to the approval expiration date, and submit a request for extension to the **FAA** at least two (2) weeks prior to the expiration date.

When construction equipment is expected to penetrate the notification surface of a public-use or military airport or heliport, note **G119A** should be added to the plans. When construction equipment is not expected to penetrate the notification surface, but the project is within the influence area of a public-use or military airport or heliport, note **G119B** should be used.

1404.1.8 Private Facilities

An Airway/Highway Clearance Analysis is required for private airports and heliports. Coordination with the private owner shall be made and note **G119C** should be added to the plans. Coordination with the **FAA** is not required.

1404.2 Retaining Wall Justification

A Retaining Wall Justification compares the impacts and costs (both right-of-way and construction) of the project with and without retaining walls. Estimated right-of-way costs are to be provided or verified by the **Office of Real Estate**.

A Retaining Wall Justification should include:

1. Plan sheets showing wall and no-wall alternatives, including:

    A. Approximate construction limits.
    B. Right-of-Way parcels affected.

2. Cross sections showing wall and no-wall alternatives.

3. Economic analysis comparing right-of-way and construction costs, with and without the wall.

4. Discussion of environmental impacts with and without the wall (optional).

1404.3 Service Road Justification Study

Service roads (sometimes called access roads or frontage roads) are used to: reduce the number of existing access points, connect roads cut off by highway relocation and to provide access to parcels that would otherwise be landlocked by a highway relocation. The decision to use a service road to decrease the number

of existing access points is usually made for safety or capacity reasons, although in some cases it could be based on economics. Using a service road to connect roads cut off by a relocation is done primarily to provide needed traffic circulation. Providing access via a service road to otherwise landlocked parcels is primarily an economic decision.

When economics is the primary factor in the decision making process, a Service Road Justification Study is required.

Maintenance of service roads by the state is not desirable because, in many cases, these facilities are not readily accessible from a state highway. It is therefore necessary that a statement of acceptance of routine maintenance by a local government agency be obtained.

A Service Road Study Form (see **Appendix D**) must be completed. In preparing the analysis, maintenance costs related to the service road must be considered. For this purpose, a cost equal to ten times the anticipated annual maintenance cost should be added to the construction cost. Estimated right-of-way costs are to be provided or verified by the **Office of Real Estate**. For information and guidance on preparing the Service Road Study Form contact the **Office of Roadway Engineering**.

The Service Road Justification Study should include:

1. Plan sheet showing:

    A. Service Road location.
    B. Property lines of involved parcels.

2. Completed Service Road Study Form.

3. Statement of maintenance responsibility.

1404.4 Pedestrian Overpass Justification

A Pedestrian Overpass Justification compares the impacts and costs of a project with and without a pedestrian overpass. A statement of acceptance of routine maintenance responsibility of the structure and approaches by a local government agency must be obtained. Routine maintenance includes: clearing debris from the deck, sweeping, snow and ice removal, minor wearing surface patching, clearing bridge drainage systems, marking decks for traffic control, minor and emergency repairs to railing and appurtenances, emergency patching of deck and maintenance of traffic signal and lighting systems including the supply of electrical power. For information on Pedestrian Overpass Justification refer to **Location and Design Manual, Volume 1**.

A Pedestrian Overpass Justification should include:

1. An area map showing:

    A. The pedestrian service area.
    B. Major pedestrian attractors.
    C. School zones.
    D. Traffic signals.
    E. Alternate paths for pedestrian travel.
    F. Lengths of alternate travel routes.

2. Alternate designs.

3. Costs of alternate designs.

4. Anticipated peak periods and volumes of pedestrian traffic and the volume of vehicular traffic travel that might be encountered along alternate routes.

5. Statement of acceptance of routine maintenance responsibility.

1404.5 Value Engineering Studies

Value Engineering is a systematic analysis by a multi-discipline team which identifies the functions of a project, establishes the worth of that function, generates alternatives through the use of creative thinking and identifies ways to provide the needed functions at the lowest overall cost.

The Department requires that Value Engineering Studies be performed on:

1. All projects on the Federal-aid system with an estimated total cost (including design, right-of-way and construction) in excess of twenty million dollars.

2. All bridge projects located on or off the Federal-aid system with an estimated total cost (including design, right-of-way and construction) in excess of eighteen million dollars.

3. Any other project selected by the FHWA.

The above requirements apply to all federally funded projects. This includes ODOT-let and local-let projects as well as Design Bid Build and Design Build projects. Value Engineering Studies may also be performed on additional projects; particularly those that involve complex items or whose costs have increased substantially since initial estimates were developed; regardless of funding source.

The District Value Engineering Coordinator is responsible for monitoring project schedules and contacting the **Office of Roadway Engineering's** Value Engineering Coordinator to schedule a Value Engineering Study in accordance with the following:

1. Major Projects: Two Value Engineering Studies are typically conducted; one after completion of the Assessment of Feasible Alternatives (Step 6 of the PDP) and a second following Stage 1 Detail Design development (Step 8 of the PDP). A minimum of one Value Engineering Study is required.

2. Minor Projects: A single Value Engineering Study is conducted after completion of the Preliminary Engineering Study (Step 3 of the PDP).

3. Design Build: A single Value Engineering Study is conducted based on a draft Project Scope and the materials associated with development of this scope (e.g., Preliminary Engineering Studies, etc.).

Appropriate timing of Value Engineering Studies will ensure that there is sufficient information to analyze during the Value Engineering Session and that Value Engineering recommendations can be successfully implemented without impeding the overall project development schedule.

1404.6 Constructability Review

Constructability Review is an evaluation of the project plans, sometimes supplemented by a site visit, conducted by an individual familiar with construction techniques to evaluate construction means and methods; including: site access, material types, maintenance of traffic issues, equipment needs, etc.

To ensure an independent evaluation, constructability reviews should not be conducted by the design consultant who prepared the plans. Designers should routinely consider constructability issues during the normal course of project development.

List of Figures

List of Figures

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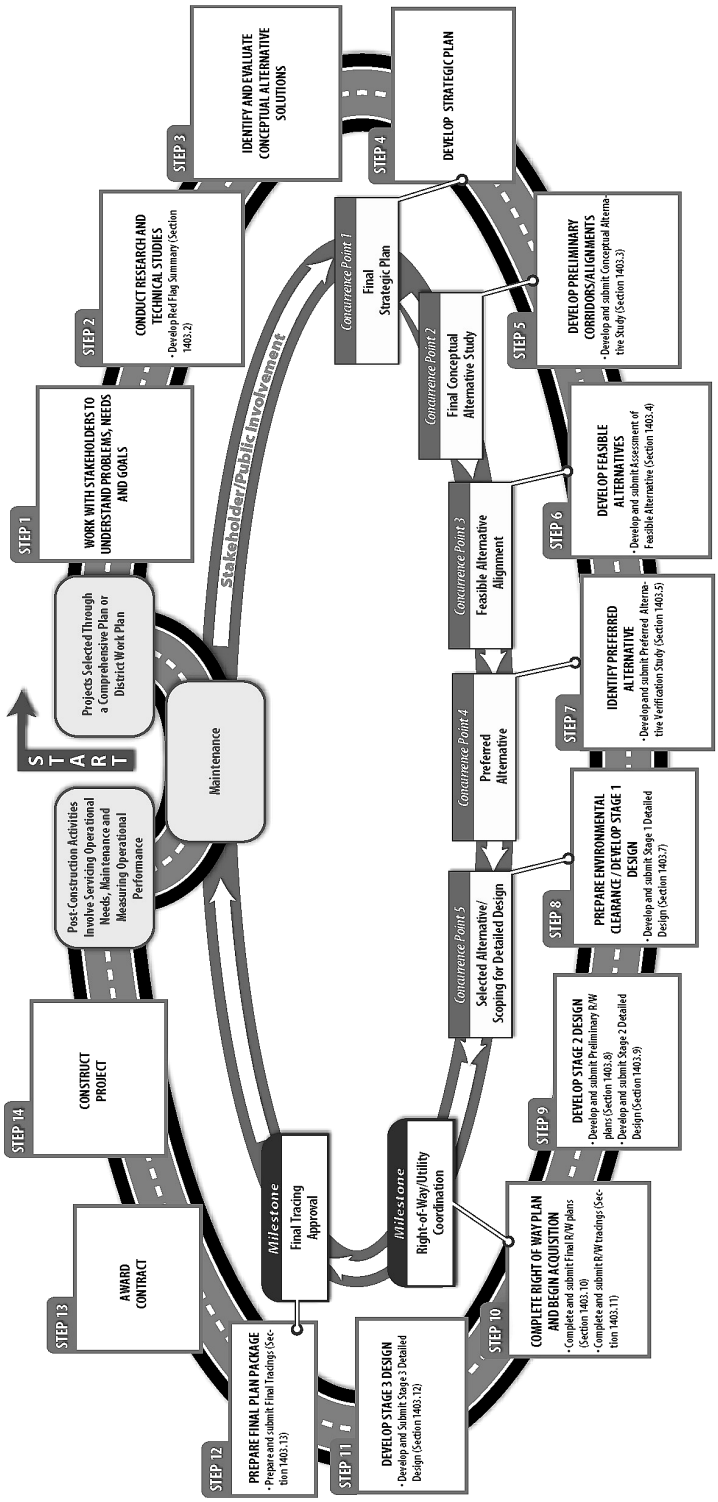
MAJOR PROJECT
DESIGN REVIEW SUBMISSIONS IN THE PROJECT DEVELOPMENT PROCESS

1401-1

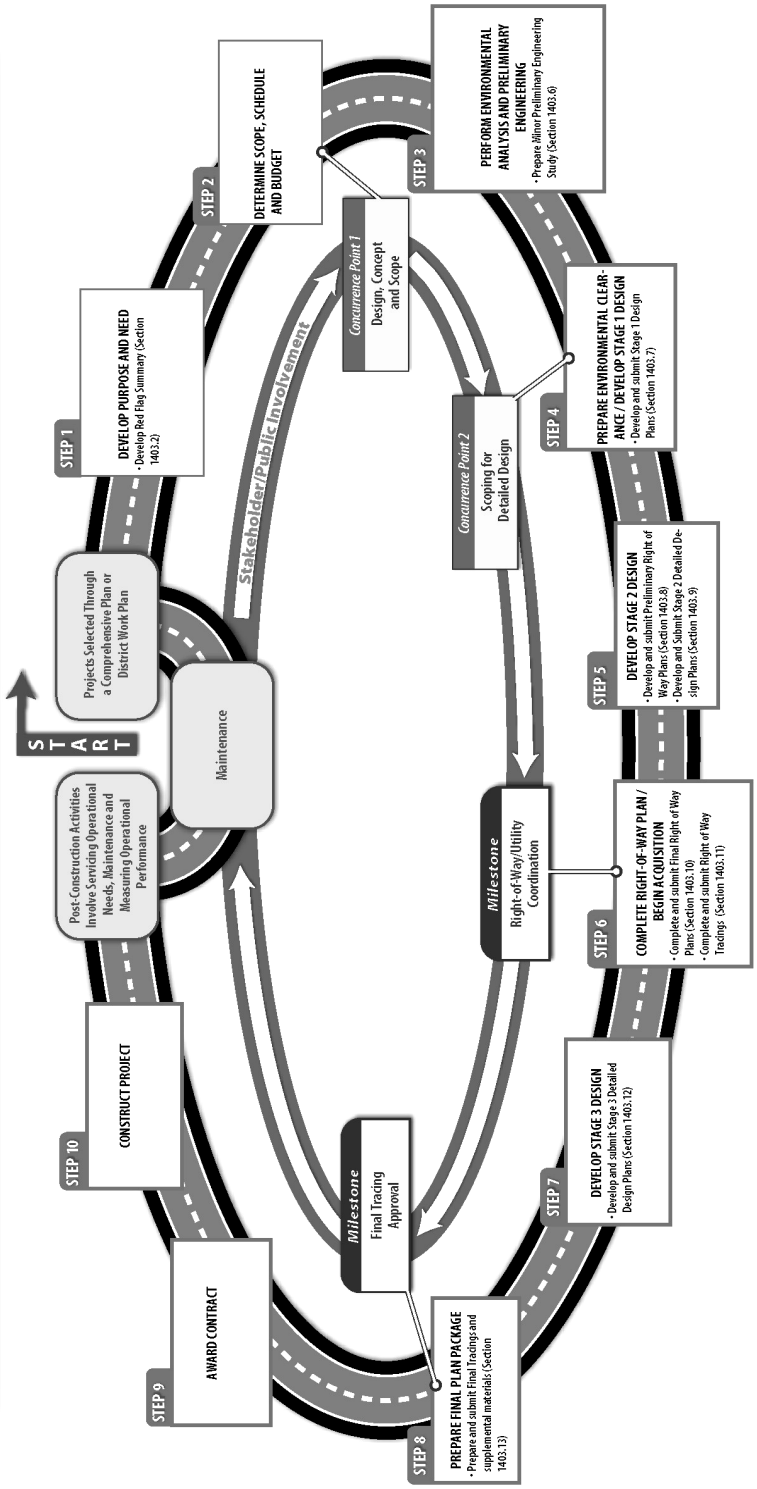
REFERENCE SECTION
1401.3.1



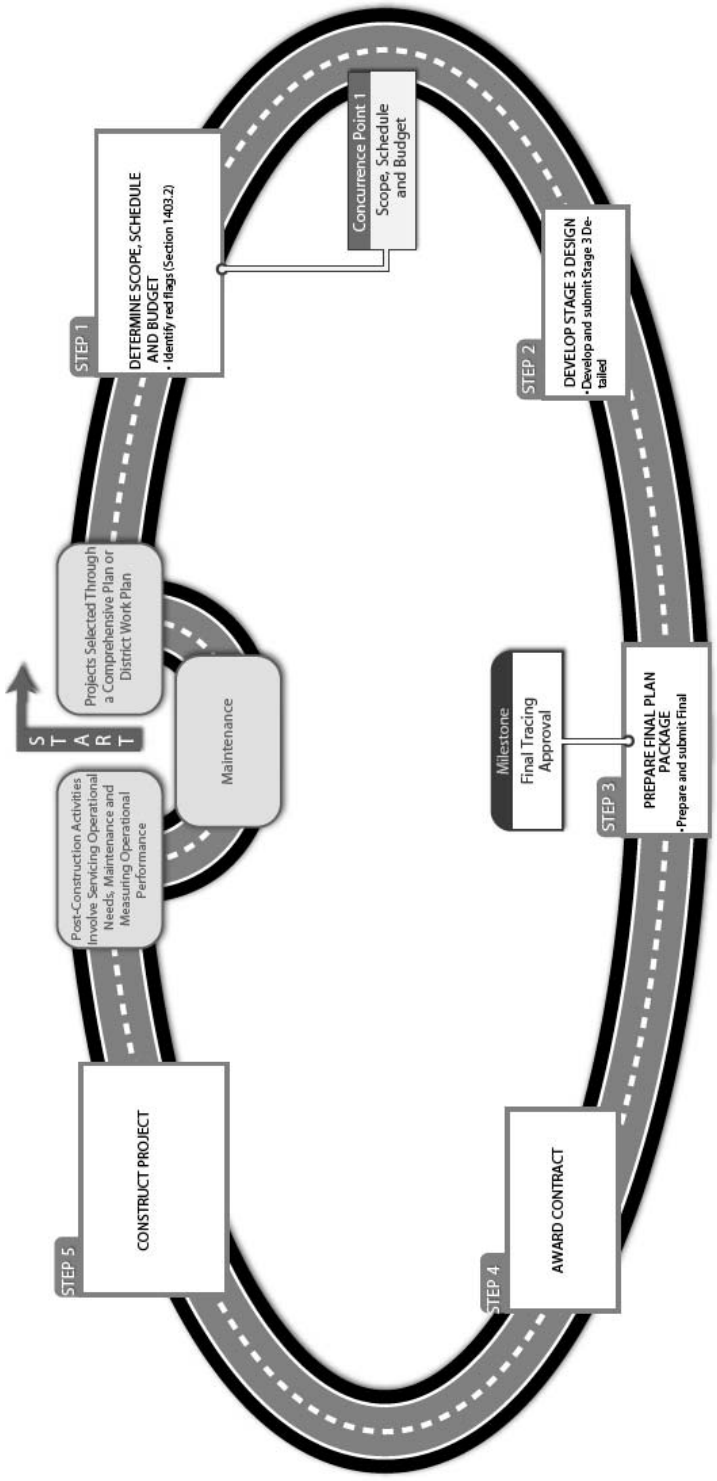
MINOR PROJECT
DESIGN REVIEW SUBMISSIONS IN THE PROJECT DEVELOPMENT PROCESS

1401-2

REFERENCE SECTION
1401.3.2



MINIMAL PROJECT DESIGN REVIEW SUBMISSIONS IN THE PROJECT DEVELOPMENT PROCESS	1401-3
	REFERENCE SECTION **1401.3.3**



DESIGN INFORMATION SOURCES	1402-1 REFERENCE SECTION 1402.1

OFFICE/ SPECIALTY AREA [3]	CENTRAL OFFICE DESIGN AREA OF EXPERTISE	DESIGN MANUALS, STANDARD DRAWINGS AND POLICIES[1][2]
Aviation	• Airway/Highway Clearance Analysis	• Federal Aviation Regulations, Part 77-Objects Affecting Navigable Airspace (Published by the Federal Aviation Administration)
CADD and Mapping Services	• Aerial mapping • Lidar • Ground surveys • CADD (MicroStation and GEOPAK) • GIS	• Design Mapping Specifications • Survey Manual • Location and Design Manual, Volume 3 • Sample Plan Sheets
Construction Administration	• Specifications • Supplemental Specifications • Proposal Notes • Plan Notes • Warranties	• Construction and Materials Specifications • Supplemental Specifications • Proposal Notes • Implementation and Administration of Warranty Provisions (#510-002(P)) • Value Engineering in Construction Policy (#27-008(P)) • Construction and Materials Specification Development Policy (#27-005(P)) and related Standard Procedure (#510-005(SP)) • Innovative Contracting Manual • Alternative Project Delivery Manual
Construction Management	• Alternative Delivery Projects	• Design-Build Scope of Services Manual
Environmental Services	• 404/401 permits • Coast Guard permits • Noise walls	• Categorical Exclusion Confirmation Handbook • Consistent Methodology for Characterization of Ditches • Ecological Manual • Environmental Site Assessment Guidelines • Programmatic Categorical Exclusion • Public Involvement Guide • Section 4(f) Resource Handbook • Technical Guidance on Impact Assessment for Jurisdictional Streams on New Location Projects • Water Quality Data Letter • Analysis and Abatement of Highway Traffic Noise Policy (#21-001(P)) and related Standard Procedure (#417-001(SP)) • Waterway Permits Manual

DESIGN INFORMATION SOURCES	1402-1 REFERENCE SECTION 1402.1

OFFICE/ SPECIALTY AREA [3]	CENTRAL OFFICE DESIGN AREA OF EXPERTISE	DESIGN MANUALS, STANDARD DRAWINGS AND POLICIES[1][2]
Estimating	• Application of design related proposal notes • Historical bid data • Items numbers and item extensions • Construction cost estimates	• Item Master • Summary of Contracts Awarded
Geotechnical Engineering	• Geologic hazards (karst, rockfalls, landslides etc.) • Earthwork (embankments, cut slopes, benching, etc.) • Subgrade • Retaining walls (not attached to bridges) • Abandoned underground mines Hydrogeology	• Manual for Abandoned Underground Mine - Inventory and Risk Assessment • Specifications for Geotechnical Explorations • Geotechnical Engineering Design Checklists • Geotechnical Bulletins
Hydraulic Engineering	• Roadway hydraulics (storm sewers, culverts, headwalls) • Post-Construction Storm Water BMP's	• Hydraulic Standard Construction Drawings • Culvert Management Manual • Location and Design Manual, Volume 2 – Drainage Design
Systems Planning and Program Management	• Traffic data • Crash Data & Analysis	
Pavement Engineering	• Pavement design	• Pavement Design and Rehabilitation Manual • Pavement Preventative Maintenance Program Guidelines • Pavement Design and Selection Process Policy (#515-002(P))
Railroad Coordinator	• Railroad coordination • Railroad agreements	• Design manuals published by individual railroad/railway companies
Real Estate	• Utility locations/relocations • Subsurface Utility Engineering • Right-of-Way plans and legal descriptions • Right-of-Way acquisition and utility relocation cost estimates	• Real Estate Policies and Procedures Manual (Right-of-Way Plans and Utilities)

DESIGN INFORMATION SOURCES	1402-1
	REFERENCE SECTION 1402.1

OFFICE/ SPECIALTY AREA [3]	CENTRAL OFFICE DESIGN AREA OF EXPERTISE	DESIGN MANUALS, STANDARD DRAWINGS AND POLICIES[1][2]
Roadway Engineering	• Geometric features (alignments, profiles, typical sections, drives, slopes, guardrail, barrier wall) • Interchange Justification/Modification Studies • Access modifications • Landscaping • Fencing • Guardrail • Value Engineering for Preliminary and Detailed Design • Lighting • Signing • Maintenance of Traffic • Signal Warrants • Traffic Sign Models (Synchro)	• Location and Design Manual, Volume 1 - Roadway Design • Standard Construction Drawings (Fencing, Guardrail, Landscaping, Roadway Miscellaneous, Traffic Control, Maintenance of Traffic, and Highway Lighting) • Traffic Plan Insert sheets • Policy on the Use of Rumble Strips on Shoulders (#322-001(P)) • Policy for Applying Level of Service and Volume-to-Capacity Ratio in Transportation Development Process (#322-002(P)) • Curb Ramps Required in Resurfacing Plans (#519-002(P)) • Landscaping Guidelines • Ohio Manual of Uniform Traffic Control Devices (OMUTCD) • Sign Design and Markings Manual • Traffic Engineering Manual
Statewide Planning & Research	• Bike & Pedestrian Design	• Basics of Bicycle Facility Design • ADA Standards for Accessible Design • AASHTO Guide for the Development of Bicycle Facilities
Structural Engineering	• Bridges (hydraulics, foundations, structural design) • Retaining walls • Subsurface drainage (underdrains, aggregate drains) • Water lines • Sanitary sewers • Channels	• Bridge Design Manual • Standard Bridge Drawings
Systems Planning and Program Management	• Traffic Data • Crash Data & Analysis	

DESIGN INFORMATION SOURCES	1402-1 REFERENCE SECTION 1402.1

OFFICE/ SPECIALTY AREA [3]	CENTRAL OFFICE DESIGN AREA OF EXPERTISE	DESIGN MANUALS, STANDARD DRAWINGS AND POLICIES[1][2]
Traffic Engineering	• Pavement marking • Signals • ITS	• Traffic Engineering Manual (includes the Design Manual for Directional Guide Signs) • Installation of Traffic Control Signals and Intersection Control Beacons on State Highways Policy (#516-002(P)) • Traffic Management in Work Zones Interstate and Other Freeways Policy (#516-003(P))
Policy	• Aesthetics	• Aesthetic Design Guidelines http://www.dot.state.oh.us/policy/AestheticDesign/

(1) This is not an all all-inclusive list of manuals published by each office. Only those manuals containing design standards and policies are shown.

(2) Design Manuals can be found on the Design Reference Resource Center portion of the ODOT web site.

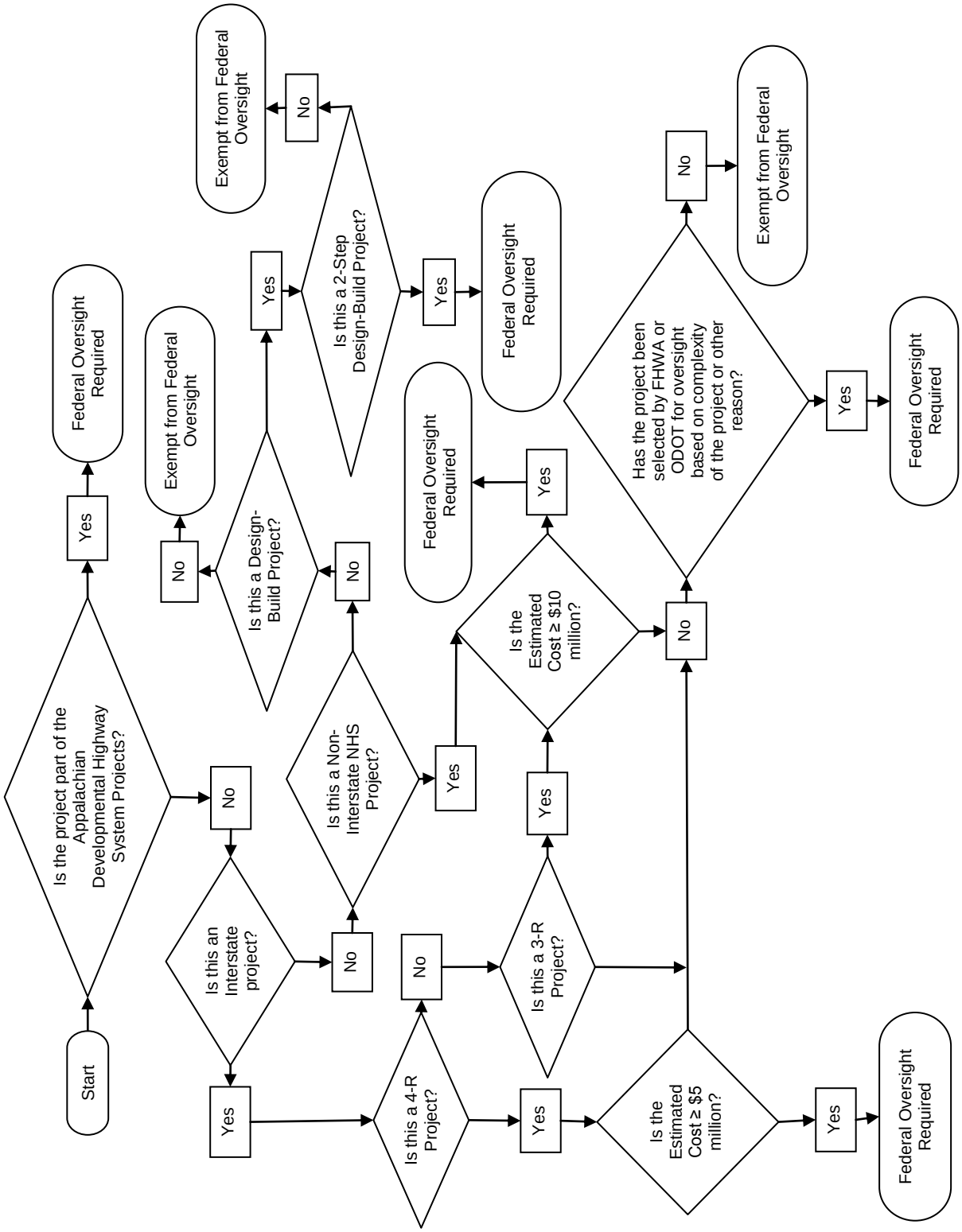
(3) The Office of CADD and Mapping Services is the result of the merger of the former Office of Aerial Engineering and the CADD section from the former Office of Production.

April 2013

FEDERAL OVERSIGHT DETERMINATION PROCESS

1402-8

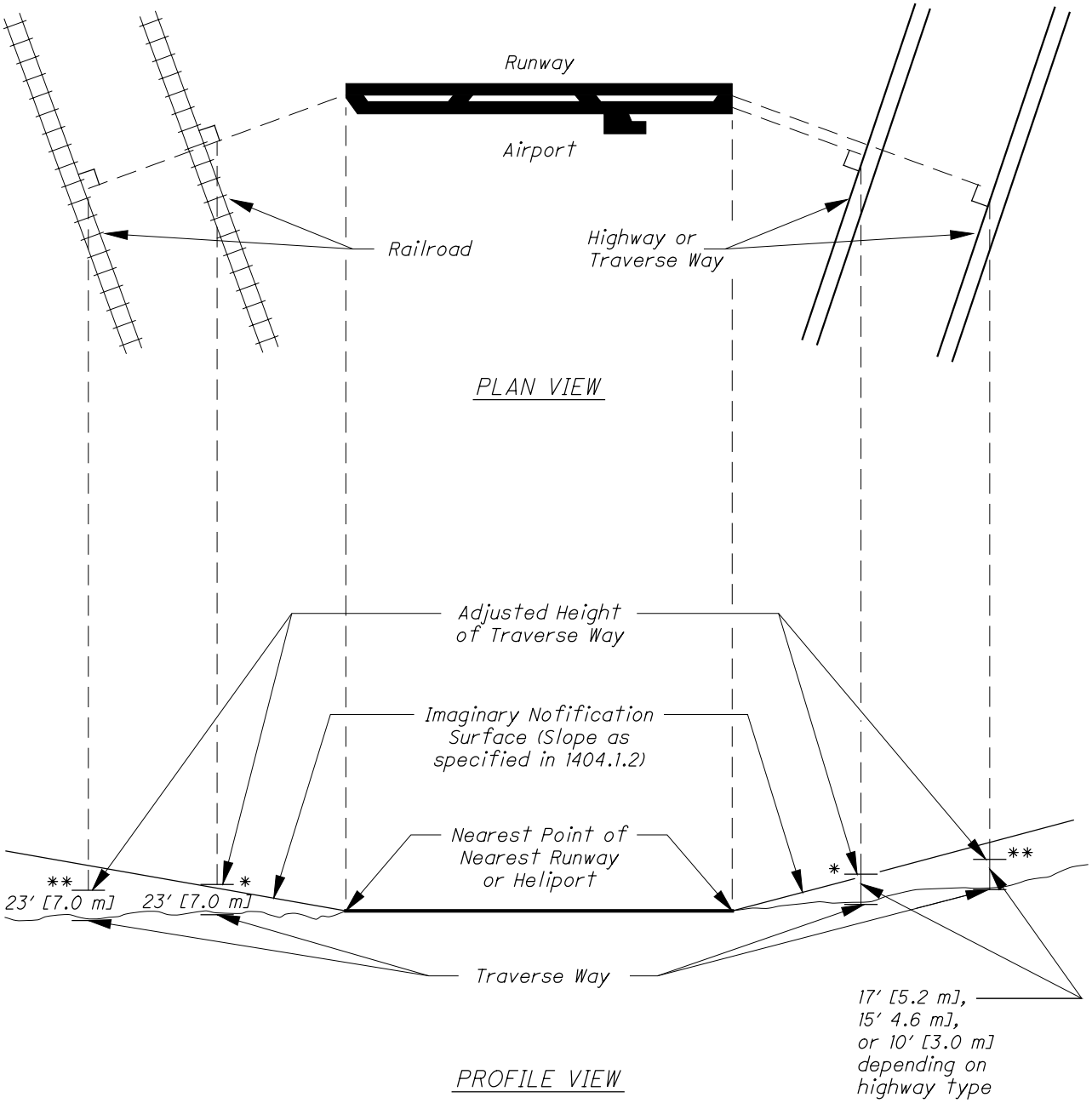
Reference Section 1402.2



RELATIONSHIP OF TRAVERSE WAYS TO THE IMAGINARY NOTIFICATION SURFACE

1404-1

REFERENCE SECTION
1404.1



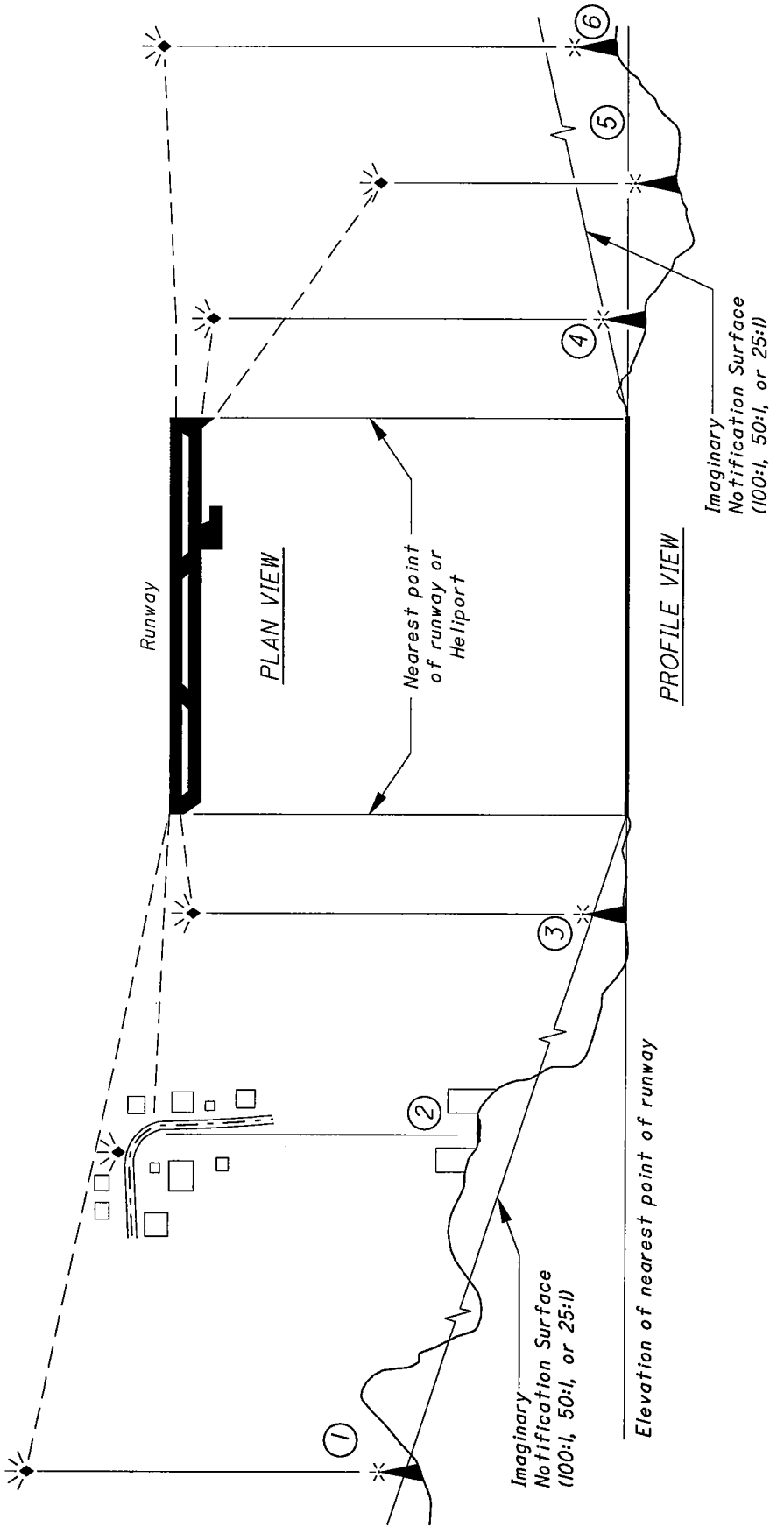
* Notification required
** Notification not required

January, 2006

EXAMPLES OF FACTORS AFFECTING THE IMAGINARY SURFACE

1404-2

REFERENCE SECTION 1404.1.4



= Project Location

= Project Location

1. Nofication not required - object is shielded by natural topographic features.
2. Notification not required - roadway is shielded by existing structures of - permenant and substantial character.
3. Nofification required - penetrates notification surface.
4. Nofification required - penetrates notification surface.
5. Nofification not required - below notification surface.
6. Nofification not required - below notification surface.

MAXIMUM OPERATING HEIGHT OF CONSTRUCTION EQUIPMENT	1404-3
	REFERENCE SECTION 1404.1.5

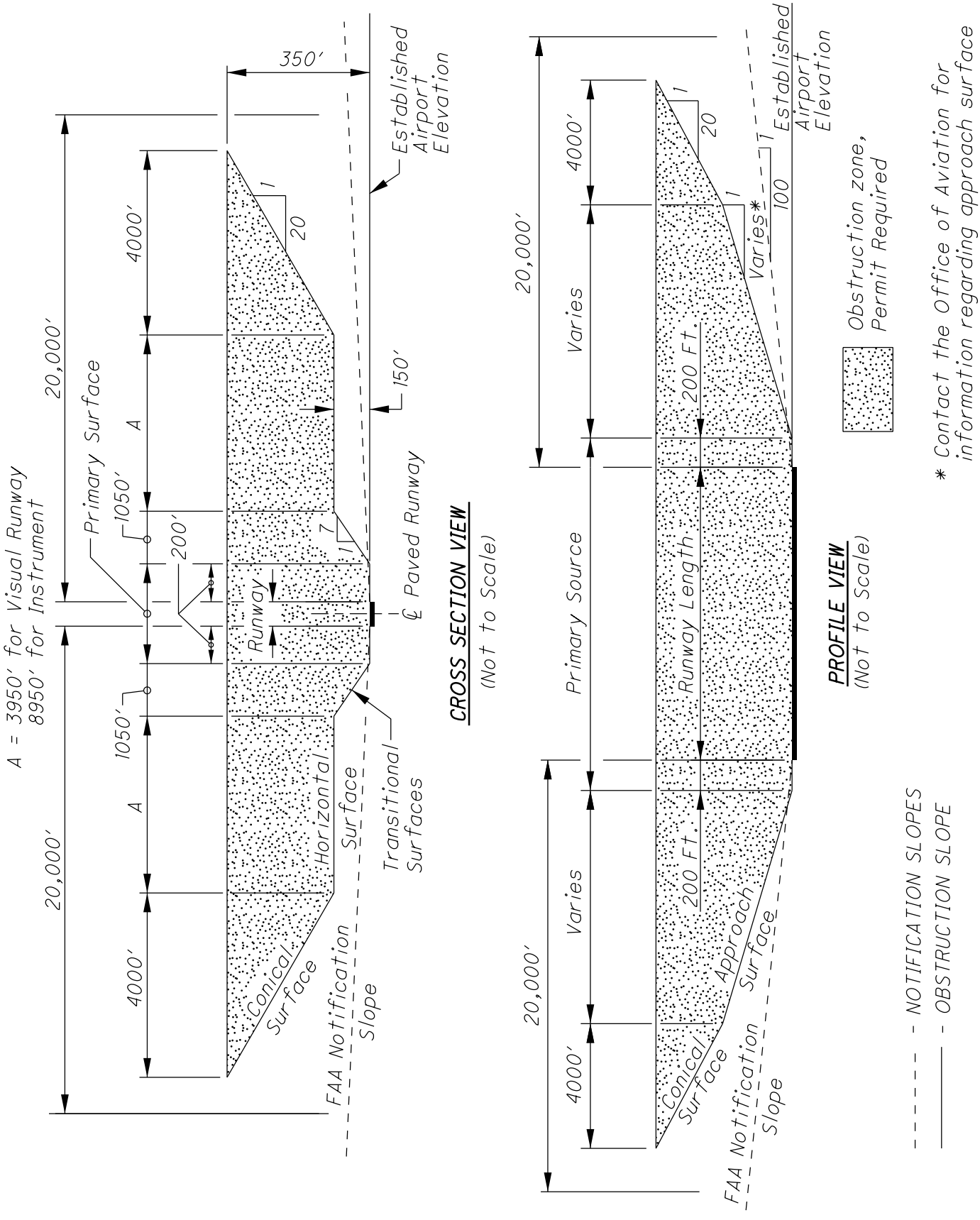
WORK TYPE	HEIGHT	CONTROLLING CRITERIA
Barrier Construction	50 Ft.	Crane
Bikeways	25 Ft,	Truck
Bridge Painting	Bridge Height + 10 Ft.	Containment Structure
Culverts	50 Ft.	Crane
Deck Overlays	25 Ft.	Truck
Earthwork	25 Ft.	Truck
Guardrail	25 Ft.	Auger
Highway Lighting	Pole Height	Pole Height
House Demolition	25 Ft.	Excavator
Large Bridges	100 Ft.	Crane
Mowing/Landscaping	10 Ft.	Mower
Noise Walls	25 Ft.	Crane
Pavement Marking	12 Ft.	Truck
Pavement Repair	25 Ft.	Raised Dump Truck
Pile Driving	50 Ft.	Crane
Resurfacing	25 Ft.	Raised Dump Truck
Rest Areas	50 Ft.	Crane
Slope Repair	25 Ft.	Excavator/Grader
Small Bridges	60 ft.	Crane
Traffic Signals	50 Ft.	Cherry Picker
Trash Collection	25 Ft.	Truck

The heights given are an average height for the specific types of projects. These heights should be adjusted, as necessary, for any project.

CROSS-SECTIONAL AND PROFILE VIEWS OF IMAGINARY SURFACES

1404-4

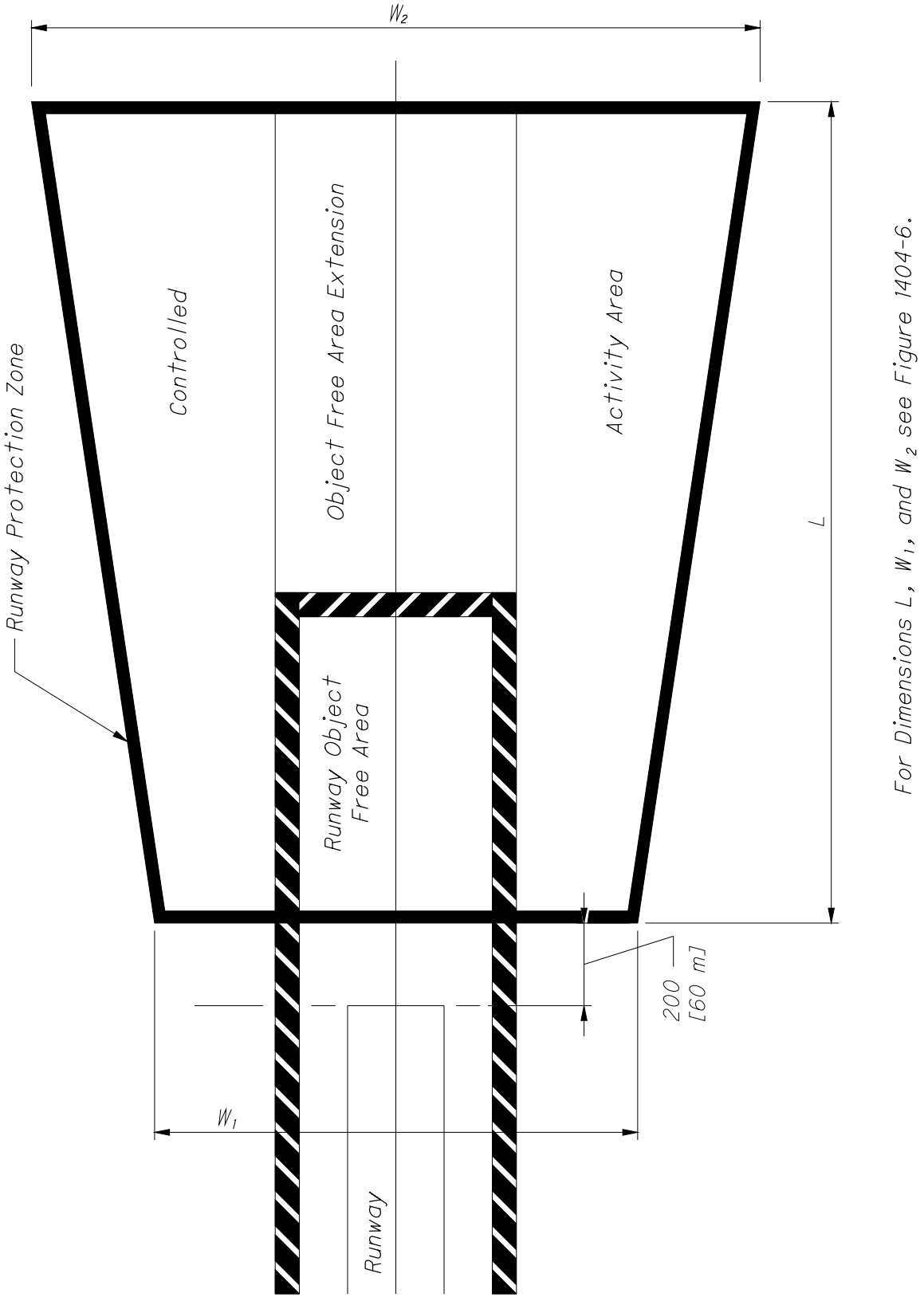
REFERENCE SECTION 1404.1.6



RUNWAY PROTECTION ZONE

1404-5

REFERENCE SECTION 1404.1



For Dimensions L, W_1, and W_2 see Figure 1404-6.

DIMENSIONS FOR RUNWAY PROTECTION ZONE	1404-6
	REFERENCE SECTION 1404.1

FACILITIES EXPECTED TO SERVE	RUNWAY END		DIMENSIONS FOR APPROACH END		
	APPROACH END	OPPOSITE END	LENGTH L	INNER WIDTH W_1	OUTER WIDTH W_2
			Ft.	Ft.	Ft.
ONLY SMALL AIRPLANES	V	V	1000	250	450
		NP	1000	500	600
		NP ¾ P	1000	1000	1050
	NP	V NP	1000	500	800
		NP ¾ P	1000	1000	1200
LARGE AIRPLANES	V	V NP	1000	500	700
		NP ¾ P	1000	1000	1100
	NP	V NP	1700	500	1010
		NP ¾ P	1700	1000	1425
ALL	NP ¾	V NP NP ¾ P	1700	1000	1510
	P	V NP NP ¾ P	2500	1000	1750

V = Visual approach
NP = Nonprecision instrument approach with visibility minimums not more than ¾ statute mile
NP ¾ = Nonprecision instrument approach with visibility minimums as low as ¾ statute mile
P = Precision instrument approach

For locations of L, W_1, and W_2 see Figure 1404-5.

SAMPLE LETTER OF AIRWAY/HIGHWAY CLEARANCE ANALYSIS	1404-7
	REFERENCE SECTION 1404.1.7

District Production Administrator
Title
ODOT-District Office
Address
City, State & Zip

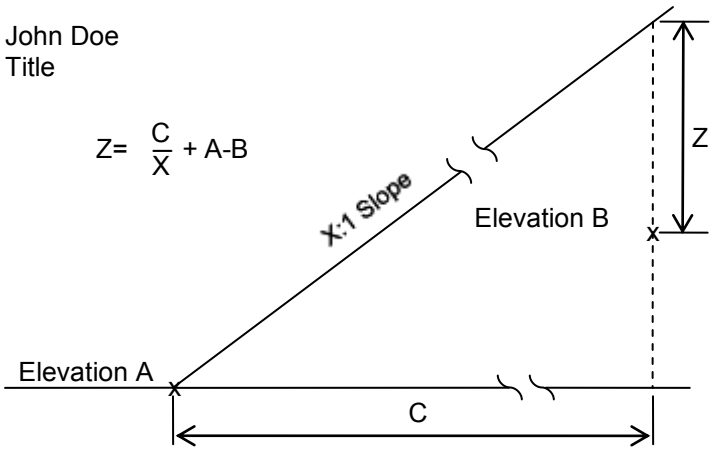
Re: Airway/Highway Clearance Analysis
County-Route-Section
PID:

Dear Mr. /Ms. :

We have reviewed the above mentioned project and have determined that the project (will/will not) not encroach into the (X:1) notification surface. This determination is based on an airport elevation of (A) feet, a project elevation of (B) feet, with a distance of (C) feet between the airport and the project locations. The attached diagram will provide a detailed analysis of the study. The study has also determined that a height of (Z) feet exists between the (X:1) notification surface and the project. Therefore, based on this height and the heights from Figure 1404-3, plan note *[G119A: Use note G119A when the construction equipment penetrates the notification surface of a public use airport or heliport; G119B: Use note G119B when the construction equipment does not penetrate the notification surface of a public airport or heliport; or G119C: Use note G119C when the construction equipment penetrates the notification surface of a private use airport.]* (will/will not) be required.

Respectfully,

John Doe
Title



X:1 – Notification Slope *[See Section 1404.1.2 to determine Notification Slope]*
A – Airport Elevation
B – Project Elevation
C – Distance between Project and Airport
Z – A positive value of Z is the amount of clearance.
A negative value of Z will require notification.

[The Z value should be calculated at critical points for projects of considerable length and variable heights (i.e. closest point, highest point, etc.).]

[Positive Z values are inserted into Plan Note G119B or G119C, unless the heights from Figure 1404-3 exceed the Z value calculated.]

Section 1500
Plan Related Actions

1501 Introduction

Section 1400 describes the design reviews required in the Project Development Process. There are several other actions that are required to complete the processing of a highway construction plan. **Section 1500** includes a detailed discussion of these related actions.

1502 Documentation of Environmental Commitments

It is important that environmental commitments be considered at all phases of plan development by those personnel involved in reviewing and developing plans. The procedures listed below should therefore be followed on all projects:

A. Following approval of the environmental document, the District Environmental staff will compile a list of the commitments for mitigating, minimizing or avoiding environmental impacts, and forward the list to the District Design staff. If there are no commitments required, this should be noted.

B. When there is a substantial delay (three years) between approval of the final environmental document (Environmental Impact Statement, Environmental Assessment or Categorical Exclusion) and the completion of contract plans or between completion of the contract plans and construction, the District will evaluate the project with respect to the environmental document, updating the environmental studies and re-coordinating with the resource and regulatory agencies for any coordination over three years old. This written evaluation will focus primarily on ensuring that the project scope, social, economic and environmental factors have not changed substantially since approval of the document. If there are substantial changes, additional analysis will be made by the **Office of Environmental Services**, the District and the design agency.

C. Review comments should discuss how the plans have addressed, or should have addressed, any environmental mitigative measures.

D. Following completion of the contract plans, the Environmental Consultation Form will need to be completed and signed by the District Environmental Coordinator. This form will need to be included with the Project Plan Package which should be transmitted to the **Office of Estimating**. A copy of this form should also be kept on file at the District Office. The intent of the Environmental Consultation Form is to ensure that all the environmental clearances and assumptions are still valid. The form also ensures that any required environmental commitments have been implemented into the design and there are appropriate plan notes or other measures in place to ensure adequate disposition of any remaining commitments during the construction phase. If any clearances or other issues are still pending, these documents should not be signed and sent to the **Office of Estimating.** The Environmental Consultation form template is available on the **Office of Environmental Services** website.

E. On projects where environmental commitments are carried into the construction plans, District personnel knowledgeable on this subject should be present at the preconstruction conference to clearly define and emphasize the responsibility for implementation of these commitments.

F. During the construction phase, if a change order modifies the scope of work or disturbs additional area, the District Environmental Coordinator must be notified and the Environmental Consultation Form must be reevaluated and sent to the **Office of Highway Management** before that change order can be approved.

Section 1500
Plan Related Actions

1503 CADD File Requirements for Design and Construction

1503.1 CADD Software Requirements

All projects requiring submittal of CADD files shall be developed using MicroStation and GEOPAK or Autodesk in accordance with the **CADD Engineering Standards Manual** and the project's scope of services.

ODOT will provide no support, standards, documentation, or guidance of any kind with respect to design and delivery using Autodesk tools. All CADD related documentation, training, supporting files, and customization provided by ODOT shall be MicroStation/GEOPAK based only.

The design software to be used on a project shall be mutually agreed upon by the district and consultant, and shall be explicitly stated in the project's scope. Once the decision has been made to use either MicroStation/GEOPAK or Autodesk, there shall be no deviation from the agreed upon design package, and the same one shall be used until the project's completion.

ODOT will continue to operate internally using MicroStation and GEOPAK only.

The final deliverables of an Autodesk designed project in printed or electronic format shall mimic that of a project designed and delivered using MicroStation/GEOPAK. The electronic deliverables for projects designed using Autodesk tools shall be delivered in the native Autodesk format, and not converted to MicroStation/GEOPAK format.

1503.2 CADD File Requirements

As defined in the following sections, CADD files will be made available to contractors during ODOT's construction contract bidding process. Provide CADD files and a Project Index File in accordance with the requirements for Electronic Submittals described in the **CADD Engineering Standards Manual, Section 500**.

Unlike electronic image files (i.e. TIFF images) that are part of the contract documents, CADD files provided to contractors are currently provided for reference purposes only. In the event that there is a conflict between the CADD files and the bidding documents, the bidding documents shall take precedence.

If any of the files listed in the following sections of 1503 are available for Local Public Agency projects (both ODOT let and local let), they shall be submitted as well.

1503.2.1 Requirements for Minimal Projects following the Old PDP

For Minimal Projects, as defined by the **Project Development Process Manual**, the following files are required for reference purposes only:

1. Existing Plans (Roadway and Bridge)
2. Designer Office Calculations (such as Pavement, Earthwork, and Structure Quantities)

1503.2.2 Requirements for Minor Projects following the Old PDP

The District Planning and Engineering Administrator may elect to waive all or a portion of the CADD file requirements (except for the submittal of existing plans and the designer's office calculations) for Minor Projects that have less than 1.0 (one) acre of earth disturbed area. Waiver of these requirements shall be noted in the scope of services document.

For minor projects, as defined by the **Project Development Process Manual**, the following sheet files (MicroStation format) are traditionally developed during design and are to be made available to all bidders:

1. Plan and Profile Sheets

2. Cross Section Sheets

3. Intersection/Interchange Details

4. Project Site Plan

All existing and proposed base maps referenced to the files in this section must be provided. In addition, all cross section cell files are to be provided.

The Excel file containing project general summary is to be submitted if required by **Location and Design Manual, Volume 3, Section 1307.1**.

The following files are used to develop the sheet files and are useful when laying out and constructing the project in the field. These files are to be made available to all bidders:

1. GEOPAK (.gpk file)

2. Existing Ground Triangle Model (.tin file)

The following files are to be created from existing design information and made available to all bidders:

1. ASCII text file(s) listing:

    a. Chain data for all existing and proposed horizontal alignments; including the centerline of construction, the centerline of right of way and ramp baselines.

    b. Vertical alignment data for all existing and proposed profiles.

    c. Northing, easting, station, offset and elevation for all monuments to be used during construction.

    A separate file name should be used for each horizontal or vertical alignment. The **CADD Engineering Standards Manual** provides specific requirements for the content of the required ASCII reports and provides directions on how to create these reports using GEOPAK software.

2. LandXML files for:

    a. The existing ground triangle model (.tin file)

b. All existing and proposed horizontal alignments and vertical profiles.

The **CADD Engineering Standards Manual** provides direction on how to create these reports directly from GEOPAK software.

The following files are required for reference purposes only:

1. Existing Plans (Roadway and Bridge)
2. Designer Office Calculations (such as Pavement, Earthwork, and Structure Quantities)

Additional files such as maintenance of traffic details, right of way plan sheets and staking reports similar to those required for Major Projects may be required at the District's discretion.

1503.2.3 Requirements for Major Projects following the Old PDP

For Major Projects, as defined by the **Project Development Process Manual**, provide all files required for Minor Projects and, in addition, create and provide GEOPAK cross section staking reports (ASCII text files) for all baselines with earth or pavement work. This report shall include the northing, easting, station, offset and finish grade elevation (i.e., top of pavement, top of proposed ground in areas with no pavement) for all break points shown on the cross section sheets, including:

1. Profile grade points

2. Edges of pavement

3. Breaks in pavement cross slope

4. Edges of treated shoulder

5. Edges of graded shoulder

6. Breaks in shoulder cross slope

7. Each edge of all ditch bottoms

8. Points where proposed grading meets existing grading

The staking report is not required to include break points for ramps, intersections, bridges or other information not shown on a project's cross section sheets. Additional staking points may be provided, but must be clearly identified within the ASCII file.

The **CADD Engineering Standards Manual** provides specific guidance on how to create this report using GEOPAK software.

On large or complex projects, the District may also require that the designer create and provide a proposed surface model in GEOPAK (.tin file) and LandXML format. The addition of this requirement will be noted in the Scope of Services document.

1503.2.4 Requirements for Projects following the New PDP Path 1

For projects scoped to follow the new PDP, Path 1, all files shall be provided as directed by Section 1503.2.1 for a Minimal Project following the old PDP.

1503.2.5 Requirements for Projects Following the New PDP Paths 2, 3, 4, and 5

For projects scoped to follow the new PDP, Paths 2, 3, 4, and 5, all files shall be provided as directed by Section 1503.2.3 for a Major Project following the old PDP. This includes the submission of files required for a Minor project.

The District Planning and Engineering Administrator may elect to waive all, or a portion, of the CADD file requirements (except for the submittal of existing plans and designer office calculations) for Path 2 projects. Waiver of these requirements shall be noted in the scope of services document.

1503.3 Submission of Files to the District

CADD files and electronic image files shall be supplied to ODOT along with the final plan submittal described in Section 1504. CADD files and electronic image files will be submitted via CD, DVD, or other media as approved by the District pursuant to the project scope of services document.

1503.4 Submission of Files to Central Office

CADD files and electronic image files will be transmitted from the District to the **Office of Estimating and Office of Contracts** via the Central Office server (**CADD Engineering Standards Manual, Section 504)** along with the other portions of the Project Plan Package. The CADD files to be provided to bidders shall be consolidated into a ZIP file and placed in the appropriate District folder as described in the **CADD Engineering Standards Manual, Section 504.8**. The **Office of Contracts** will post the CADD files on the ODOT website for contractor access during the bidding process.

1504 Submission of Completed Plans to District

1504.1 General

When a design agency other than ODOT prepares the construction plans, the final plan shall be submitted to the District Office. The final plan submittal shall include information per **Section 1504.1.1 or 1504.1.2**.

1504.1.1 Projects Administered by ODOT

The final plan submission should contain the following enclosures and information:

A. Final construction plans including soil profile or foundation exploration sheets in an electronic image file format (i.e. TIFF images). Provide electronic image files in accordance with the requirements of the electronic image file submission procedures available on the **Office of Contracts** website.

B. Completed Right of Way Plans (reflecting any revisions made since original submittal to the District) in electronic image file format. Provide electronic image files in accordance with the requirements of the electronic image file submission procedures available on the **Office of**

Contracts website. Provide hard copy versions of the Right of Way Plans as required by the Scope of Services document.

C. Completed Standard Forms

1. LD-4, Estimating Form - This form is a summation of a project's specific quantities, and cost information that is used in developing the official engineer's estimate. A reproducible copy of this form is included in Appendix D. A blank copy of this form is available on **Location and Design Manual, Volume 3** website.

2. Copy of LD-33, County Engineer Approval Form (including signature). This form is required per Ohio Revised Code 6131.631. See **Location and Design Manual, Volume Two** for a copy of this form.

D. Marked review plans (if retained by the design agency) and the disposition of all review comments.

E. Excel file containing project general summary if required by **Location and Design Manual, Volume 3, Section 1307.1**.

F. Quantity calculations that are not included in the plans (i.e. structure calculations and pavement calculations).

G. Cost estimates for waterwork items and/or services or other special items as furnished by the local government.

H. Documents/Records (photography, survey data, reports, studies, drawings, maps, computations, plans, specifications, estimates, CADD files per the **CADD Engineering Standards Manual**, and all other items specified in the scope of services) per the **Specifications for Consulting Services**.

I. CADD files in accordance with **Section 1503**. The electronic image file requirement applies to all ODOT Let projects. However, Local Let projects may elect to waive the electronic image file requirement with specific submittal guidance provided in the project scope of services document.

1504.1.2 Projects Administered through the Local Public Agency Policy

Local-let Local Public Agency (LPA) projects should include the applicable information required in accordance with the **Locally Administered Transportation Projects Manual of Procedures – Advertising, Sale and Award Section**. Project submittal checklists for Local Let LPA projects are also available on the **Office of Local Projects** website.

Traditional LPA projects (i.e., LPA projects administered by ODOT) must follow **Section 1504.1.1**.

1505 Review of Completed Plans

1505.1 Plan Checking

Plans for projects processed through the Staged Review Process should be thoroughly checked by the District per **Sections 1505.1.1 or 1505.1.2**. Such checking is not required for plans processed through the Limited Review Process.

1505.1.1 Projects Administered by ODOT

Plans processed under the Staged Review Process should be thoroughly checked by District Personnel to ensure the following.

A. The proposed design is in compliance with current specifications, standards, policies and procedures.

B. Plans are adequate to clearly depict the intended construction features without unnecessary confusion or chance of misinterpretation.

C. Existing topographic features are adequately and properly designated on the plans.

D. The proposed right-of-way (physical taking and types of titles) is adequate to construct and maintain the proposed facility.

E. Provisions are made for the removal of all right-of-way encroachments.

F. Provision is made for the relocation of utilities affected by the project.

The District Office shall determine the review process to be followed and shall assume responsibility for determining when the plan is complete and ready for sale.

1505.1.2 Projects Administered through the Local Public Agency Policy

Plans shall be checked in accordance with the **Locally Administered Transportation Projects Manual of Procedures**.

1505.2 Field Verification

District representatives should conduct a field verification to ensure that conditions have not materially changed before filing the plans with Central Office.

1506 Submission of Completed Plans to Central Office

1506.1 General

After the District Office completes its review of the construction plans submitted and the supplemental information described in **Section 1504**, the information (if applicable) as specified in the following sections is to be supplied in the Project Plan Package.

Section 1500
Plan Related Actions

1506.1.1 Projects Administered by ODOT

The District shall complete and include the *Project Plan Package Submittal Form*. The form is available on the **Office of Estimating** intranet site. The Project Plan Package submittal should include the enclosures and information identified in the *Project Plan Package Submittal Form*.

The District shall notify Central Office by email when the Project Plan Package is ready and has been placed on the Central Office server using the following email group – *CEN.Contracts.PlanSubmittal*.

Further information on this submittal may be found in the Policy for the Submission of Plan Packages (26-001(P)). Binding and additional copies, as indicated in Policy #26-001(P), are not required for construction plans submitted in electronic image file format.

1506.1.2 Projects Administered through the Local Public Agency Policy

The information that is to be submitted to the **Office of Local Projects** shall be that which is referenced in **Section 1504.1.2**.

1507 Record of Plans

After the project has been awarded, the District Office shall provide permanent storage in accordance with the records retention policy and shall make arrangements to return completed plans for off-system projects to the originating agency.

Appendix B
Sample Plan Notes

The sample plan notes included in this Appendix are those most frequently used. Each note is accompanied by a "Designer Note" in an attempt to give some guidance as to when the note should be used and how to estimate quantities for some of the items where the methods for quantity calculations are not obvious.

The following note categories are included:

Category	Letter Prefix	Sheet Number
General Notes	G	B1-B14
Pavement Notes	P	B15-B20
Environmental Notes	V	B21-B26

Additional notes may be found in the following manuals:

Traffic Engineering Manual
Bridge Design Manual
Location and Design Manual, Volume 1
Location and Design Manual, Volume 2

None of these notes should be used unless the situation is known, or is considered likely, to occur on the project involved. All sub-paragraphs and parenthetical phrases that do not apply to the project involved shall be excluded. If quantities are provided in the notes, participation splits shall be shown when required.

Appendix B
Sample Plan Notes

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GENERAL

NUMBER	NAME
G101	Rounding
G102	Utilities
G103	Existing Plans
G104	Construction Noise
G105	Surveying Parameters
G106	Work Limits
G107	Protection of Right-of-Way Landscaping
G108	Clearing and Grubbing
G109	Benching of Foundation Slopes
G110	Monument Assemblies
G111	Item 204 - Proof Rolling
G112	Item 601 – Dumped Rock Fill, Type _____, As Per Plan / Item 203 – Granular Material, Type _____, As Per Plan
G113	Item 203 - Embankment Using No. 8 Aggregate
G114	Additional Soil Information
G115	Channel Embankments
G116	Borrow Material
G117	Item 607 - Fence Rebuilt, Type _____
G118	Airway/Highway Clearance for Airports and Heliports
G119	Fence Lengths
G120	Item Special - Soil Sterilant
G121	Item 204 – Subgrade Compaction and Proof Rolling

Appendix B
Sample Plan Notes

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G101 – ROUNDING

THE ROUNDING AT SLOPE BREAKPOINTS SHOWN ON THE TYPICAL SECTIONS APPLIES TO ALL CROSS-SECTIONS EVEN THOUGH OTHERWISE SHOWN.

Designer Note: When appropriate, the Typical Sections should show rounding at the slope breakpoints in accordance with the Location and Design Manual, Volume 1. Since rounding is not shown on the cross-sections, the above plan note should be used on all plans where rounding is called for on the Typical Sections.

G102 – UTILITIES

Designer Note: Note G102A is used on all plans where utilities presently exist within the construction limits of the project. The second paragraph (G102A1, A2, or A3) is in reference to the location of existing underground utilities. The specific paragraph shall be determined as follows:

Note G102A1 is used when all known underground utilities are shown in the plan.

Note G102A2 is used when the existing underground utilities will not be adversely affected because of the nature of the proposed work (no excavation, other ground penetration, etc.).

Note G102A3 is used only if there are no existing underground utilities within the construction limits.

Note G102B is used only if no underground or overhead utilities exist within the construction limits.

G102A

LISTED BELOW ARE ALL UTILITIES LOCATED WITHIN THE PROJECT CONSTRUCTION LIMITS TOGETHER WITH THEIR RESPECTIVE OWNERS:

(List all sanitary, telephone, electric, gas, water, cable TV, etc.)	(Name of Owner, Street or P.O. Box, City, State, Zip Code, and Emergency Telephone Number.)

G102A1

THE LOCATION OF THE UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE AS OBTAINED FROM THE OWNERS AS REQUIRED BY SECTION 153.64 O.R.C.

G102A2

THERE ARE NO UNDERGROUND UTILITIES SHOWN ON THIS PLAN. THE NATURE OF THE WORK REQUIRED BY THIS PROJECT WILL NOT AFFECT ANY KNOWN UNDERGROUND UTILITIES THAT EXIST UNDER OR ADJACENT TO THE WORK AREA.

G102A3

THERE ARE NO KNOWN UNDERGROUND UTILITIES ON THIS PROJECT.

G102B

THERE ARE NO KNOWN UNDERGROUND OR OVERHEAD UTILITIES WITHIN THE PROJECT CONSTRUCTION LIMITS.

Appendix B
Sample Plan Notes

G103 - EXISTING PLANS

EXISTING PLANS ENTITLED _____ MAY BE INSPECTED IN THE ODOT DISTRICT ____ OFFICE IN _____.

Designer Note: Use this note when existing plans are available.

G104 - CONSTRUCTION NOISE

ACTIVITIES AND LAND USE ADJACENT TO THIS PROJECT MAY BE AFFECTED BY CONSTRUCTION NOISE. IN ORDER TO MINIMIZE ANY ADVERSE CONSTRUCTION NOISE IMPACTS, DO NOT OPERATE POWER-OPERATED CONSTRUCTION-TYPE DEVICES BETWEEN THE HOURS OF _____ AND _____. IN ADDITION, DO NOT OPERATE AT ANY TIME ANY DEVICE IN SUCH A MANNER THAT THE NOISE CREATED SUBSTANTIALLY EXCEEDS THE NOISE CUSTOMARILY AND NECESSARILY ATTENDANT TO THE REASONABLE AND EFFICIENT PERFORMANCE OF SUCH EQUIPMENT.

Designer Note: The above note should be used when work is to be accomplished in noise-sensitive areas. Times are usually normal sleeping hours, however, other time periods may be used depending upon the area.

G105 – SURVEYING PARAMETERS

Designer Note:

Use note G105A, unless otherwise directed by the District Survey Operations Manager, for all projects scoped prior to October 15, 2010. Specify the appropriate vertical and horizontal positioning parameters used for the existing mapping of the project by filling in the blanks after each item. Ensure the combined scale factor is carried to the 9^{th} decimal place and is scaled about the origin of the coordinate system. Contact the surveyor responsible for preparing the survey for assistance in completing the note. Contact the District Survey Operations Manager for approval of any modifications to the information being provided in the note.

Use note G105B, unless otherwise directed by the District Survey Operations Manager, for all projects scoped on or after October 15, 2010 that include SS823 on the Title Sheet of the plans. These projects should have utilized the Department's Survey and Mapping Specification dated October 15, 2010 or later. In addition to the requirements of G105A for vertical and horizontal positioning parameters, specify primary project control parameters and provide a table in the plans with the following information for primary project control monuments, including azimuth marks and temporary benchmarks: Point Number, Grid Coordinates (Northing, Easting), Scaled Coordinates (Northing, Easting), Elevation, and Description of Monument. At a minimum, the Description of Monument in the table shall indicate the type of monument (i.e. iron pin, concrete monument, etc.) and whether the monument is for project control or traverse purposes. If a Monument, Type B, is used for project control, do not provide an elevation in the Elevation column of the table. Use of a Monument, Type B, establishes horizontal control only. A separate vertical benchmark (i.e. aluminum disc on bridge abutment) will need to be included in the table. Project control is typically established prior to construction. If the designer determines that the location of the monuments associated with project control may be disturbed by the Contractor's construction activities, provide quantities for resetting the monuments in the plans according to Supplemental Specification 823. Standard Construction Drawing RM-1,1 and the Department's Mapping and Survey Specification provide further information regarding project control.

G105A

USE THE FOLLOWING VERTICAL POSITIONING AND HORIZONTAL POSITIONING PARAMETERS FOR ALL SURVEYING:

VERTICAL POSITIONING

ORTHOMETRIC HEIGHT DATUM: _____
GEOID: _____

HORIZONTAL POSITIONING

REFERENCE FRAME: _____
ELLIPSOID: _____
MAP PROJECTION: _____
COORDINATE SYSTEM: _____
COMBINED SCALE FACTOR: _____

UNITS ARE IN U.S. SURVEY FEET.

G105B

PRIMARY PROJECT CONTROL MONUMENTS GOVERN ALL POSITIONING ON ODOT PROJECTS. SEE SHEET ___ OF THE PLANS FOR A TABLE CONTAINING PROJECT CONTROL INFORMATION.

USE THE FOLLOWING PROJECT CONTROL, VERTICAL POSITIONING, AND HORIZONTAL POSITIONING PARAMETERS FOR ALL SURVEYING:

PROJECT CONTROL

POSITIONING METHOD: _____
MONUMENT TYPE: _____

VERTICAL POSITIONING

ORTHOMETRIC HEIGHT DATUM: _____
GEOID: _____

HORIZONTAL POSITIONING

REFERENCE FRAME: _____
ELLIPSOID: _____
MAP PROJECTION: _____
COORDINATE SYSTEM: _____
COMBINED SCALE FACTOR: _____
ORIGIN OF COORDINATE SYSTEM: _____

USE THE POSITIONING METHODS AND MONUMENT TYPE USED IN THE ORIGINAL SURVEY TO RESTORE ALL MONUMENTS RELATED TO PRIMARY PROJECT CONTROL THAT ARE DAMAGED OR DESTROYED BY CONSTRUCTION ACTIVITIES. RESTORE THE DAMAGED OR DESTROYED MONUMENTS IN ACCORDANCE WITH SUPPLEMENTAL SPECIFICATION 823.

UNITS ARE IN U.S. SURVEY FEET.

Appendix B
Sample Plan Notes

G106 - WORK LIMITS

THE WORK LIMITS SHOWN ON THESE PLANS ARE FOR PHYSICAL CONSTRUCTION ONLY. PROVIDE THE INSTALLATION AND OPERATION OF ALL WORK ZONE TRAFFIC CONTROL AND WORK ZONE TRAFFIC CONTROL DEVICES REQUIRED BY THESE PLANS WHETHER INSIDE OR OUTSIDE THESE WORK LIMITS.

Designer Note: Use the above note on projects where temporary traffic control devices are located outside normal work limits.

G107 - PROTECTION OF RIGHT-OF-WAY LANDSCAPING

PRIOR TO BEGINNING WORK, THE CONTRACTOR, THE PROJECT ENGINEER, AND A REPRESENTATIVE OF THE MAINTAINING AGENCY WILL REVIEW AND RECORD ALL LANDSCAPING ITEMS WITHIN THE RIGHT-OF-WAY (BOTH WITHIN AND OUTSIDE THE CONSTRUCTION LIMITS) A RECORD OF THIS REVIEW WILL BE KEPT IN THE PROJECT ENGINEER'S FILES. PRIOR TO FINAL ACCEPTANCE, A FINAL REVIEW OF LANDSCAPING ITEMS WILL BE MADE.

CONSTRICT ALL ACTIVITIES, EQUIPMENT STORAGE, AND STAGING TO WITHIN THE CONSTRUCTION LIMITS. UNLESS OTHERWISE IDENTIFIED IN THE PLANS OR PROPOSAL, THE CONSTRUCTION LIMITS ARE IDENTIFIED AS 30 FEET FROM THE EDGE OF PAVEMENT.

SUBMIT A WRITTEN REQUEST TO THE PROJECT ENGINEER TO USE ANY AREA OUTSIDE THESE LIMITS. THE DOCUMENT SUBMITTED MUST CLEARLY IDENTIFY THE AREA AND EXPLAIN THE PROPOSED USE AND RESTORATION OF THE AREA. EXCEPT AS INDICATED ON SHEET ____, USE OF THESE AREAS FOR DISPOSAL OF WASTE MATERIAL AND CONSTRUCTION DEBRIS, EXCAVATION OF BORROW MATERIAL AND PLACEMENT OF PORTABLE PLANTS IS PROHIBITED. THE REQUEST MUST BE APPROVED, IN WRITING, BEFORE THE CONTRACTOR HAS PERMISSION TO USE THE AREA.

ANY ITEMS DAMAGED BEYOND THE CONSTRUCTION LIMITS, AS DEFINED ABOVE, WILL BE REPLACED IN KIND OR AS APPROVED BY THE PROJECT ENGINEER.

Designer Note: This note should be used on all interstate projects. On non-interstate projects, the District will decide if this note should be included in the plan. Edit note to provide locations where disposal of waste material and construction debris, excavation of borrow material and placement of portable plants is permitted.

G108 - CLEARING AND GRUBBING

Designer Notes: Note G108A should be used when Item 201, Clearing and Grubbing is in the plan and no trees or stumps have been specifically marked for removal.

Note G108B should be used when Item 201, Clearing and Grubbing, is in the plan and individual trees and stumps to be removed are clearly shown on the plan. If there are no trees or stumps to be removed greater than 12 inches in diameter, use note G108A. See 201.05 of the Specifications for conversion from actual size to size to be used in the note.

Note G108C should be used on heavily wooded projects where an accurate count of trees is not practical. Where feasible, individual trees and stumps should be shown in the plans. In areas where it is difficult to survey the locations of individual trees, the limits of heavily wooded areas should be shown. All trees within the construction limits which are to remain must be shown and labeled as ”Do Not Disturb“ on the Plan and Profile and the Right-of-Way Plan sheets. An estimate of the number of trees and stumps to be removed must be listed on the LD-4 Estimating Information form for all projects. In heavily wooded areas, in lieu of actual count on the entire area, a representative area may be counted and the results used to calculate the count for the entire area.

G108A

ALTHOUGH THERE ARE NO TREES OR STUMPS SPECIFICALLY MARKED FOR REMOVAL WITHIN THE LIMITS OF THE PROJECT, A LUMP SUM QUANTITY IS INCLUDED IN THE GENERAL SUMMARY FOR ITEM 201, CLEARING AND GRUBBING. ALL PROVISIONS AS SET FORTH IN THE SPECIFICATIONS UNDER THIS ITEM ARE INCLUDED IN THE LUMP SUM PRICE BID FOR ITEM 201, CLEARING AND GRUBBING.

G108B

REMOVE ALL TREES AND STUMPS SPECIFICALLY MARKED FOR REMOVAL WITHIN THE CONSTRUCTION LIMITS UNDER THE LUMP SUM BID FOR ITEM 201, CLEARING AND GRUBBING. THE FOLLOWING IS AN APPROXIMATE ESTIMATE OF THE NUMBER OF TREES AND STUMPS TO BE REMOVED.

SIZES	NO. TREES	NO. STUMPS	TOTAL
18"			
30"			
48"			
60"			

G108C

THE DEPARTMENT HAS NOT MARKED INDIVIDUAL TREES AND STUMPS FOR REMOVAL. UNLESS SPECIFICALLY DESIGNATED AS ”DO NOT DISTURB“ IN THE PLANS, REMOVE ALL TREES AND STUMPS WITHIN THE CONSTRUCTION LIMITS UNDER THE LUMP SUM BID FOR ITEM 201 CLEARING AND GRUBBING.

Appendix B
Sample Plan Notes

G109 - BENCHING OF FOUNDATION SLOPES

ALTHOUGH CROSS-SECTIONS INDICATE SPECIFIC DIMENSIONS FOR PROPOSED BENCHING OF THE EMBANKMENT FOUNDATIONS IN CERTAIN AREAS, NO WAIVER OF THE SPECIFICATIONS IS INTENDED. BENCH ALL OTHER SLOPED EMBANKMENT AREAS AS SET FORTH IN 203.05. NO ADDITIONAL PAYMENT WILL BE MADE FOR BENCHING REQUIRED UNDER THE PROVISIONS OF 203.05

Designer Note: Use this note in conjunction with special embankment slope foundation benching.

G110 – MONUMENT ASSEMBLIES

CONSTRUCT MONUMENT ASSEMBLIES IN ACCORDANCE WITH THE DETAILS SHOWN ON THE STANDARD CONSTRUCTION DRAWINGS AND AT THE LOCATIONS SHOWN ON SHEET NO. _____.

Designer Note: This note should be used when monument assembly construction is included in the plan.

G111 - ITEM 204 - PROOF ROLLING

THE FOLLOWING QUANTITY IS PROVIDED IN THE GENERAL SUMMARY TO ADDRESS LOCATIONS REQUIRING PROOF ROLLING. SEE PLAN SHEET NO_____FOR ADDITIONAL INFORMATION.

ITEM 204 – PROOF ROLLING_____HOUR.

Designer Note: The estimate should be based on one hour of roller time for each 2000 Sq. Yd. of 204, Subgrade Compaction for reconstruction projects and 3000 Sq. Yd. of Item 204, Subgrade Compaction for new construction. Proof Rolling is recommended on all projects where subgrade compaction is required, except very short projects such as bridge approaches.

G112 - ITEM 601 – DUMPED ROCK FILL, TYPE, AS PER PLAN / ITEM 203 – GRANULAR MATERIAL, TYPE, AS PER PLAN

IN THE AREA BETWEEN STATIONS_____AND_____, DUMPED ROCK FILL, TYPE _____/GRANULAR MATERIAL, TYPE ____, AS SHOWN ON THE CROSS-SECTIONS, MAY BE PLACED BY THE METHOD OF END DUMPING IF SURFACE WATER IS PRESENT AT THE TIME OF CONSTRUCTION. END DUMPING METHODS MAY BE USED UP TO AN ELEVATION 2 FEET ABOVE THE WATER LEVEL. ABOVE THIS ELEVATION, EMBANKMENT CONSTRUCTION METHODS WILL BE IN ACCORDANCE WITH 203.05 TO 203.07 INCLUSIVE. DURING NORMAL CLEARING AND GRUBBING, WHERE END DUMPING IS PERMITTED, THE REQUIREMENTS OF 201.04 FOR SCALPING SHALL BE WAIVED.

Designer Note: Use this note for placement of embankment through standing water. Granular Materials Type C, D, or E may be used where water depth is less than 5.0 feet and displacement of soft soils is not anticipated. Dumped Rock may be used where water depths are greater than 5.0 feet and/or soft soil displacement is anticipated. Larger sizes are to be used for greater depths.

G113 – ITEM 203 – EMBANKMENT USING NO. 8 AGGREGATE

FURNISH DURABLE, NATURAL AGGREGATE NO. 8 SIZE. PLACE THE AGGREGATE AT THE THICKNESS AND SLOPE AS SHOWN ON THE CROSS-SECTIONS.

Designer Note: This note is used where a drainage blanket is placed on the slope before placing embankment.

G114 - ADDITIONAL SOIL INFORMATION

THE SOIL PROFILE AND/OR STRUCTURE FOUNDATION INVESTIGATIONS SHEETS CONTAIN ALL AVAILABLE SOIL AND BEDROCK INFORMATION WHICH CAN BE CONVENIENTLY SHOWN. ADDITIONAL SUBSURFACE INVESTIGATION INFORMATION IS AVAILABLE FROM _____.

Designer Note: All soil information obtained for a project should normally be provided with the plans. Use this note ONLY when some portion of the information will not be provided with the plan. The note should be edited to give the location where soils information can be obtained (e.g. District Office, Office of Geotechnical Engineering, etc.).

This note should appear on the first soil profile sheet or first structure foundation investigation sheet. In the event that no soil sheets accompany the plan, the note should be placed in the General Notes.

G115 - CHANNEL EMBANKMENTS

FILL AND SLOPE PORTIONS OF THE EXISTING CHANNEL TO DRAIN AS SHOWN IN THESE PLANS. IN CHANNEL EMBANKMENT AREAS WHICH WILL NOT SUPPORT ANY PORTION OF THE NEW ROAD BED OR STRUCTURAL EMBANKMENTS, THE CONTRACTOR MAY UTILIZE EMBANKMENT METHODS MEETING THE FOLLOWING REQUIREMENTS:

CLEAR ALL WEEDS AND BRUSH IN AREAS WHERE CHANNEL EMBANKMENTS ARE TO BE PLACED. THE REQUIREMENTS FOR MOISTURE, DENSITY CONTROL, BENCHING AND SUITABLE MATERIALS IS WAIVED. PLACE THE MATERIAL IN 8-INCH LOOSE LIFTS. THE ENGINEER MAY INCREASE THE LIFT THICKNESS IN ORDER TO BRIDGE THE SOFT OR WET FOUNDATIONS DEPENDING ON THE STABILITY OF THE FOUNDATION. THE ENGINEER MAY INCREASE THE LIFT THICKNESS UP TO 24 INCHES TO OBTAIN STABILITY AT THE TOP OF THE LIFT.

PAYMENT FOR ALL OF THE ABOVE SHALL BE INCLUDED IN THE CONTRACT PRICE FOR ITEM 203, EMBANKMENT.

Designer Note: This note should be used whenever there is considerable channel embankment outside roadway or structure earthwork areas.

G116 - BORROW MATERIAL

IDENTIFICATION OF BORROW AREAS ON THE PLANS DOES NOT INDICATE THAT THE MATERIAL AVAILABLE FROM THESE AREAS MEETS THE REQUIREMENTS OF CMS 203.

Designer Note: Use this note when borrow areas are indicated on the plans.

Appendix B
Sample Plan Notes

G117 - ITEM 607 - FENCE REBUILT, TYPE ( )

CAREFULLY RECONDITION AND RE-ERECT FENCE AND COMPONENT PARTS AS DETAILED ON THE PLANS. DO NOT DAMAGE THE FENCE OR COMPONENT PARTS. ANY NEW PARTS WHICH ARE NEEDED, AS DETERMINED BY THE ENGINEER, WILL BE SUPPLIED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE STATE.

THE AMOUNT OF REBUILT FENCE TO BE PAID FOR WILL BE THE NUMBER OF FEET REBUILT, COMPLETE IN PLACE, AND MEASURED AS PROVIDED FOR IN 607.09.

PAYMENT FOR THE ABOVE WILL BE PAID FOR AT THE CONTRACT PRICE PER FOOT FOR ITEM 607, FENCE REBUILT, TYPE _____.

Designer Note: Fence which is to be rebuilt shall be removed under Item 202, Fence Removed for Reuse. The length removed for reuse should equal the length rebuilt.

G118 – AIRWAY/HIGHWAY CLEARANCE FOR AIRPORTS AND HELIPORTS

G118A

THIS PROJECT HAS BEEN IDENTIFIED AS BEING WITHIN THE INFLUENCE AREA OF A PUBLIC USE AIRPORT OR HELIPORT. NO TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT AT MAXIMUM OPERATING HEIGHT SHALL EXCEED A HEIGHT OF____ FT. IF ANY TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT WILL EXCEED THIS HEIGHT, FURTHER COORDINATION WITH THE FEDERAL AVIATION ADMINISTRATION (FAA), AND ODOT OFFICE OF AVIATION, WILL BE NECESSARY PRIOR TO ERECTING SUCH TEMPORARY STRUCTURES OR OPERATING SUCH EQUIPMENT ON THE PROJECT. THE CONTRACTOR WILL BE REQUIRED TO FILE A NEW FAA FORM 7460-1, ADVISING THE FAA THAT AERONAUTICAL STUDY NO.____ IS BEING RESUBMITTED AND THAT AN ALTERATION TO THE ORIGINAL SUBMISSION IS REQUESTED.

COPIES OF THE ALTERATION AND FORM 7460-1 SHALL BE FORWARDED TO THE ODOT OFFICE OF AVIATION. NO TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT SHALL EXCEED THE PERMISSIBLE HEIGHT, UNTIL A COPY OF THE FAA APPROVAL AND ODOT OFFICE OF AVIATION PERMIT HAS BEEN FURNISHED TO THE PROJECT ENGINEER.

FAA APPROVAL MAY TAKE UP TO 45 DAYS. ALL SUBMISSIONS SHALL BE DIRECTED TO THESE OFFICES:

Express Processing Center
The Federal Aviation Administration
Southwest Regional Office
Air Traffic Airspace Branch ASW-520
2601 Meachan Blvd.
Fort Worth, TX 76137-4298

Ohio Department of Transportation
Office of Aviation
2829 West Dublin-Granville Road
Columbus, Ohio 43235
614-387-2346

Designer's Note: Use note G118A when the construction equipment penetrates the notification surface of a public use airport or heliport. The omitted height shall be that which is determined by the FAA in its letter of response or approval to Form 7460-1, regarding the elevations that were submitted. If the FAA approves the original submission, then the maximum height included in the original submission shall be entered in the note. However, if the FAA approves contingent upon a lesser elevation, then that elevation shall be entered. The Aeronautical Study No. is set by the FAA when the Form 7460-1 is originally submitted.

G118B

THIS PROJECT HAS BEEN IDENTIFIED AS BEING WITHIN THE INFLUENCE AREA OF A PUBLIC USE AIRPORT OR HELIPORT. NO TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT AT MAXIMUM OPERATING HEIGHT SHALL EXCEED A HEIGHT OF____ FT. IF ANY TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT WILL EXCEED THIS HEIGHT, FURTHER COORDINATION WITH THE FEDERAL AVIATION ADMINISTRATION (FAA), AND ODOT OFFICE OF AVIATION, WILL BE NECESSARY PRIOR TO ERECTING SUCH TEMPORARY STRUCTURES OR OPERATING SUCH EQUIPMENT ON THE PROJECT. THE CONTRACTOR WILL BE REQUIRED TO SUBMIT FORM 7460-1 TO THE FAA. A COPY OF THE SUBMISSION AND TWO COPIES OF FORM 7460-1 SHALL BE FORWARDED TO THE ODOT OFFICE OF AVIATION.

NO TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT SHALL EXCEED THE PERMISSIBLE HEIGHT, UNTIL A COPY OF THE FAA APPROVAL AND ODOT OFFICE OF AVIATION PERMIT HAS BEEN FURNISHED TO THE PROJECT ENGINEER.

Express Processing Center
The Federal Aviation Administration
Southwest Regional Office
Air Traffic Airspace Branch ASW-520
2601 Meachan Blvd.
Fort Worth, TX 76137-4298

Ohio Department of Transportation
Office of Aviation
2829 West Dublin-Granville Road
Columbus, Ohio 43235
614-387-2346

Designer's Note: Use note G118B when the construction equipment does not penetrate the notification surface of a public airport or heliport. The omitted height shall be the available clearance below the notification surface.

G118C

THIS PROJECT HAS BEEN IDENTIFIED AS BEING WITHIN THE INFLUENCE AREA OF A PRIVATE USE AIRPORT OR HELIPORT. NO TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT AT MAXIMUM OPERATING HEIGHT SHALL EXCEED A HEIGHT OF ____ FT. IF ANY TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT WILL EXCEED THIS HEIGHT, COORDINATION WITH THE AIRPORT OWNER WILL BE NECESSARY PRIOR TO ERECTING SUCH TEMPORARY STRUCTURES OR OPERATING SUCH EQUIPMENT ON THE PROJECT. FOR PRIVATE USE AIRPORTS OR HELIPORTS, COORDINATE WITH THE AIRPORT OWNER. NO TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT SHALL EXCEED THE PERMISSIBLE HEIGHT, UNTIL COORDINATION IS MET AND DOCUMENTATION HAS BEEN FURNISHED TO THE PROJECT ENGINEER. IF COORDINATION IS NOT OBTAINED, THEN THE PROJECT ENGINEER WILL HAVE THE AUTHORITY TO PROVIDE RESTRICTIONS AS REQUIRED.

The Private Airport
The Private Airport Owner
Address of Airport
City, State, Zip Code
(Area Code) - Phone Number

Designer's Note: Use note G118C when the construction equipment penetrates the notification surface of a private use airport. The omitted height shall be the available clearance below the notification surface.

Appendix B
Sample Plan Notes

G119 - FENCE LENGTHS

THE LENGTHS OF FENCE SHOWN IN THE PLANS ARE HORIZONTAL DIMENSIONS. MEASUREMENTS OF THE FINAL QUANTITIES WILL BE IN ACCORDANCE WITH ITEM 607.

Designer's Note: This note should be used on every project that includes fence quantities.

G120 - ITEM SPECIAL - SOIL STERILANT

USE ONE OF THE SOIL STERILANT PRODUCTS LISTED BELOW OR AN APPROVED EQUAL. APPLY THE SOIL STERILANT TO LOCATION(S) WHERE IN-ROAD VEGETATION EXISTS AS DETERMINED BY THE ENGINEER. THIS SHOULD BE DONE IMMEDIATELY PRIOR TO PLACING THE PROPOSED (ROAD SURFACE).

PRAMITOL 25E
GIBA SPECIALTY CHEMICALS
MCINTOSH, ALABAMA 36553

ROUNDUP PRO L
MONSANTO COMPANY
800 N. LINDBERGH BLVD.
ST. LOUIS, MO. 63167

HYVAR XL
DUPONT CORPORATION
1007 MARKET STREET
WILMINGTON, DELAWARE 19898

COMPACT THE SITE FOLLOWING PLOWING OR DISKING. APPLY THE SOIL STERILANT AT THE SUGGESTED MANUFACTURER'S RATE.

THE PREFERRED TIME FRAME TO APPLY THE SOIL STERILANT IS BETWEEN JUNE 15 AND OCTOBER 15. VERY DRY SOIL CONDITIONS MAY RESULT IN POOR WEED CONTROL. DO NOT APPLY THE SOIL STERILANT TO SOIL OR BALLAST MATERIAL WHICH IS SATURATED WITH WATER. CONSULT WITH MANUFACTURER IN REGARD TO THE HANDLING AND PHYSICAL CHEMICAL HAZARDS ASSOCIATED WITH THE SOIL STERILANT.

PAYMENT FOR THE ABOVE REFERENCED ITEM IS INCLUDED IN THE PRICE PER SQUARE YARD OF ITEM SPECIAL, SOIL STERILANT. A QUANTITY OF _____ SQUARE YARDS IS INCLUDED IN THE GENERAL SUMMARY TO BE USED AT LOCATIONS AS DETERMINED BY THE ENGINEER.

EACH SUCCESSFUL BIDDER MUST BE LICENSED BY THE STATE OF OHIO, DEPARTMENT OF AGRICULTURE, AS A COMMERCIAL APPLICATOR. IN ADDITION, ALL PERSONS INVOLVED IN THE ACTUAL SPRAYING OF HERBICIDE WILL BE LICENSED AS COMMERCIAL OPERATORS IN THE APPROPRIATE SPRAY CATEGORY. SUBMIT APPROPRIATE LICENSES TO THE PROJECT ENGINEER, PRIOR TO COMMENCING WORK, FOR VERIFICATION.

Designer's Note: This note should be used on all projects using soil sterilant.

G121- ITEM 204 - SUBGRADE COMPACTION AND PROOF ROLLING

CONSTRUCT THE SUBGRADE AS FOLLOWS AND IN THE FOLLOWING SEQUENCE:

1. SHAPE THE SUBGRADE TO WITHIN 0.2 FEET OF THE PLAN SUBGRADE ELEVATION.

2. EXCAVATE AND REPLACE UNSUITABLE SUBGRADE BEFORE PROOF ROLLING. THE EXCAVATION LIMITS ARE SHOWN AND LABELED ON THE CROSS SECTIONS AS UNSUITABLE SUBGRADE. UNSUITABLE SUBGRADE INCLUDES UNSUITABLE SOIL (A-4B, A-2-5, A-5, A-7-5, AND SOIL WITH A LIQUID LIMIT GREATER THAN 65) AND ANY COAL, SHALE, OR ROCK WHICH NEEDS TO BE REMOVED ACCORDING TO 204.05.

   IF THERE IS UNSUITABLE SUBGRADE IN A SHALLOW FILL LOCATION, EXCAVATE AND REPLACE THE UNSUITABLE SUBGRADE BEFORE CONSTRUCTING THE SHALLOW FILL AND SHAPING THE SUBGRADE.

3. COMPACT THE SUBGRADE ACCORDING TO 204.03.

4. APPROXIMATE LIMITS FOR EXCAVATION OF UNSTABLE SUBGRADE ARE SHOWN AND LABELED ON THE CROSS SECTIONS AS UNSTABLE SUBGRADE. THE ENGINEER WILL IDENTIFY THE ACTUAL LIMITS OF EXCAVATION FOR UNSTABLE SUBGRADE BASED ON THE PROOF ROLLING RESULTS AND VISUAL OBSERVATIONS.

   PROOF ROLL THE COMPACTED SUBGRADE ACCORDING TO 204.06.

5. EXCAVATE UNSTABLE SUBGRADE AS DIRECTED BY THE ENGINEER AND STABILIZE BY REPLACING WITH THE SPECIFIED MATERIALS ACCORDING TO 204.07. EXCAVATIONS WILL EXTEND 18 INCHES BEYOND THE EDGE OF THE SURFACE OF THE PAVEMENT, PAVED SHOULDERS, OR PAVED MEDIANS.

6. PROOF ROLL THE STABILIZED AREAS ACCORDING TO 204.06 TO VERIFY STABILITY.

7. FINE GRADE THE SUBGRADE TO THE SPECIFIED GRADE.

THE QUANTITIES FOR EXCAVATING THE UNSUITABLE SUBGRADE AND UNSTABLE SUBGRADE ARE BOTH PAID UNDER ITEM 204 EXCAVATION OF SUBGRADE.

Designer's Note: Use this note when subgrade stabilization by excavating and replacing is required. Label the unsuitable subgrade and/or unstable subgrade on the cross sections. Add the two quantities, unsuitable subgrade and unstable subgrade, together and have one pay item as Excavation of Subgrade.

In shallow fills, unsuitable soils must be removed to a depth of three feet below proposed subgrade (refer to C&MS 203.03). Coal, shale and rock must be removed to a depth of two feet below bottom of pavement (refer to C&MS 204.05).

Base the subgrade compaction quantity on the total subgrade area, plus the area that will require stabilization, estimated according to Geotechnical Bulletin 1 (GB1). Base the proof rolling quantity on the total quantity of subgrade compaction, converted to hours, according to GB1 Section E. Provide quantities and types of replacement materials according to GB1.

Appendix B
Sample Plan Notes

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PAVEMENT

NUMBER	NAME
P101	Paving at Railroad Crossing
P102	Profile and Alignment
P103	Contraction and/or Expansion Joints
P104	Contraction Joints in Concrete Pavement or Base Widening
P105	Part-Width Construction
P106	Median and/or Curbing on Approach Slabs
P107	Item 880 Asphalt Concrete with Warranty
P108	Pavement Restoration for Pipe Installations and/or Removals
P109	Pavement Restoration for Drainage Structure Installations
P110	Pavement Restoration for Monument Assembly Installations

Appendix B
Sample Plan Notes

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P101 - PAVING AT RAILROAD CROSSING

WORK THE CROWN OUT OF THE PROPOSED PAVEMENT ON EACH SIDE OF THE RAILROAD CROSSING, BEGINNING 50 FEET FROM THE NEAREST RAIL, BY RAISING THE EDGES OF THE NEW PAVEMENT TO MEET THE PLATFORM ELEVATION.

Designer's Note: Use this note on resurfacing projects involving at-grade railroad crossings.

P102 - PROFILE AND ALIGNMENT

PLACE THE PROPOSED PAVEMENT TO FOLLOW THE ALIGNMENT AND PROFILE OF THE EXISTING PAVEMENT. (PREVIOUS CONSTRUCTION PLANS, PROJECT NO. ____, SHOWING THE ORIGINAL ALIGNMENT AND PROFILE, ARE AVAILABLE FOR INSPECTION AT THE ODOT DISTRICT _____ OFFICE). PLACE THE PROPOSED ASPHALT CONCRETE OVERLAY (WITH A UNIFORM THICKNESS OF _____ INCHES (VARYING IN THICKNESS FROM _____ INCHES AT THE CROWN TO _____ INCHES AT THE PAVEMENT EDGE)(AS SHOWN ON THE TYPICAL SECTIONS).

Designer's Note: Use this note on resurfacing projects where the profile and alignment are not shown on the plan. Eliminate the second sentence if old plans are not available.

P103 - CONTRACTION AND/OR EXPANSION JOINTS

ALTHOUGH SPECIFIC LOCATIONS OF CERTAIN CONTRACTION AND EXPANSION JOINTS HAVE BEEN DETAILED ON THIS PLAN, NO WAIVER OF THE SPECIFICATIONS IS INTENDED. IN ALL CASES, THE PROVISION OF EXPANSION JOINTS AT ALL MAJOR STRUCTURES INCLUDING THE MAXIMUM SPACING BETWEEN CONTRACTION JOINTS IS IN ACCORDANCE WITH STANDARD CONSTRUCTION DRAWING BP-2.2 AND THE SPECIFICATIONS.

Designer's Note: Use this note with concrete pavement or base.

P104 - CONTRACTION JOINTS IN CONCRETE PAVEMENT OR BASE WIDENING

P104A

WHERE NEW CONCRETE IS PLACED ADJACENT TO EXISTING CONCRETE, PROVIDE CONTRACTION JOINTS IN THE NEW CONCRETE TO FORM CONTINUOUS JOINTS WITH THOSE IN THE EXISTING CONCRETE.

THE MAXIMUM DISTANCE BETWEEN THE JOINTS IN THE NEW CONCRETE ARE IN ACCORDANCE WITH STANDARD CONSTRUCTION DRAWING BP-2.2, IF NECESSARY, ADDITIONAL JOINTS MAY BE PROVIDED IN THE NEW CONCRETE AT APPROXIMATELY EQUAL INTERVALS BETWEEN EXISTING JOINTS THAT EXCEED THE MAXIMUM SPACING.

Designer's Note: Use this note with concrete pavement or concrete base widening that is not tied to the existing concrete.

P104 - CONTRACTION JOINTS IN CONCRETE PAVEMENT OR BASE WIDENING (CONTINUED)

P104B

WHERE NEW CONCRETE IS PLACED ADJACENT TO AND TIED TO EXISTING CONCRETE, THE CONTRACTION JOINT SPACING REQUIRED IN STANDARD CONSTRUCTION DRAWING BP-2.2 WILL BE WAIVED. CONSTRUCT CONTRACTION JOINTS IN THE NEW CONCRETE PAVEMENT TO FORM A CONTINUOUS LINE WITH ALL CONTRACTION JOINTS IN THE EXISTING CONCRETE PAVEMENT. INSTALL EXPANSION JOINTS IN THE NEW CONCRETE PAVEMENT TO FORM A CONTINUOUS LINE WITH ALL EXPANSION JOINTS IN THE EXISTING CONCRETE PAVEMENT.

Designer's Note: Use this note with concrete pavement or concrete base widening that is tied to the existing concrete. The concrete placed using this note shall be an "as per plan" item on the general summary.

P105 - PART-WIDTH CONSTRUCTION

BECAUSE OF THE NECESSITY TO BUILD THIS PROJECT UNDER TRAFFIC AND TO CONSTRUCT THE FULL PAVEMENT WIDTH IN STAGES, EXERCISE CARE TO PREVENT THE CONSTRUCTION OF A BUTT JOINT IN THE BASE COURSES. LAP LONGITUDINAL JOINTS AS SHOWN ON STANDARD CONSTRUCTION DRAWING BP-3.1.

Designer's Note: Use this note only on projects with flexible pavement requiring part-width construction.

P106 - MEDIAN AND/OR CURBING ON APPROACH SLABS

WITHIN THE LIMITS OF THE APPROACH SLAB, TRANSITION THE SHAPE OF THE MEDIAN AND/OR CURBING ON APPROACH SLABS FROM THE STANDARD SECTION ON THE APPROACHES TO THE SECTION USED ON THE BRIDGE.

Designer's Note: Use this note when the height, width or shape of a median or curb changes from the approach to the bridge.

P107 - ITEM 880 - ASPHALT CONCRETE WITH WARRANTY

INDIVIDUAL LIFT THICKNESSES AND STEP WIDTHS SHOWN IN THE PLAN ARE THE PLAN LINES AND DIMENSIONS USED FOR QUANTITY CALCULATION. THEY ARE NOT THE REQUIRED LIFTS OR STEPS FOR ACTUAL CONSTRUCTION, BUT NO ADJUSTMENT WILL BE MADE TO THE PLAN QUANTITY DUE TO DIFFERENT LIFT THICKNESSES AND/OR STEP WIDTHS WHEN A UNIFORM THICKNESS IS SPECIFIED.

Designer's Note: Add this note whenever Item 880, Asphalt Concrete Pavement with Warranty is specified.

P108 - PAVEMENT RESTORATION FOR PIPE INSTALLATIONS AND/OR REMOVALS

THE FOLLOWING QUANTITY HAS BEEN PROVIDED FOR PAVEMENT RESTORATION FOLLOWING INSTALLATION AND/OR REMOVAL OF PIPES.

ITEM 301 - ASPHALT CONCRETE BASE, PG64-22 _____ CU. YDS.

THE ABOVE QUANTITY IS BASED ON A 301 THICKNESS OF _____ INCHES AND A PAVEMENT RESTORATION WIDTH THAT INCLUDES THE TRENCH WIDTH PLUS TWO FEET ON EACH SIDE OF THE TRENCH.

PROVIDE ANY MATERIALS USED OUTSIDE THE LIMITS STATED ABOVE AT NO ADDITIONAL COST.

Designer's Note: Use this note whenever pipe is removed under Item 202 and/or Item 611, 605, or 638 are specified and will require pavement restoration not otherwise covered in the plans. Edit note to call out Item 605 or 638, when these items are included in the plans. Include 301 thickness used in the quantity calculations. Add additional items such as 448 or 609 when they are needed for repairs. Revise note if a different method of calculation was used to determine the pavement restoration quantity (e.g., for very deep pipes an additional width might be needed). For projects with full-depth pavement work, pavement removal associated with pipe installations shall be included under the applicable pay item used for pavement removal or excavation (Item 202 Pavement Removed, Item 202 Pavement Removed, Asphalt or Item 203 Excavation). For projects without other pavement work, the designer shall add a quantity of Item 202 Pavement Removed, Item 202 Pavement Removed, Asphalt or Item 203 Excavation.

P109 - PAVEMENT RESTORATION FOR DRAINAGE STRUCTURE INSTALLATIONS

THE FOLLOWING QUANTITY IS PROVIDED FOR PAVEMENT RESTORATION FOLLOWING INSTALLATION OF ITEM 611, DRAINAGE STRUCTURES.

ITEM 301, ASPHALT CONCRETE BASE, PG64-22 _____ CU. YDS.

THE ABOVE QUANTITY IS BASED ON A 301 THICKNESS OF _____ INCHES AND A WIDTH OF TWO FEET AROUND THE PERIMETER OF THE DRAINAGE STRUCTURE.

PROVIDE ANY MATERIALS USED OUTSIDE THE LIMITS STATED ABOVE AT NO ADDITIONAL COST.

Designer's Note: Use this note whenever 611 or 638 items are specified and will require pavement restoration not otherwise covered in the plans. Edit note to call out Item 638 when included. Include 301 thickness used in the quantity calculations. Add additional items such as 448 or 609 when they are needed for repairs. Revise note if a different method of calculation was used to determine the pavement restoration quantity.

Appendix B
Sample Plan Notes

P110 - PAVEMENT RESTORATION FOR MONUMENT ASSEMBLY INSTALLATIONS

THE FOLLOWING QUANTITY IS PROVIDED FOR PAVEMENT RESTORATION FOLLOWING INSTALLATION OF ITEM 623, MONUMENT ASSEMBLIES.

ITEM 301, ASPHALT CONCRETE BASE, PG64-22 _____ CU. YDS.

THE ABOVE QUANTITY IS BASED ON A 301 THICKNESS OF _____ INCHES AND A WIDTH OF TWO FEET AROUND THE PERIMETER OF THE MONUMENT ASSEMBLIES.

PROVIDE ANY MATERIALS USED OUTSIDE THE LIMITS STATED ABOVE AT NO ADDITIONAL COST.

Designer's Note: Use this note whenever Item 623, Monument Assembly, is specified and will require pavement restoration not otherwise covered in the plans. Include 301 thickness used in the quantity calculations. Add additional items such as 448, or 609 when they are needed for repair. Revise note if a different method of calculation was used to determine the pavement restoration quantity.

ENVIRONMENTAL

NUMBER	NAME
V101	Contractor's Use of ODOT Right-of-Way
V102	Stream Channel Excavation
V103	Archaeological Sites Adjacent to Right-of-Way
V104	Temporary Construction Fill

Appendix B
Sample Plan Notes

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V101 - CONTRACTOR'S USE OF ODOT RIGHT-OF-WAY

Designer's Note: This note should be used when waste and borrow areas are shown on the plans. The note should be edited to include one note from each of the following sets.

Note V101A1 should be used when waste and borrow areas shown on the plans have been investigated for water quality requirements (e.g., wetlands, 404/401 permits, etc.).

Note V101A2 should be used when the contractor is required to hire an environmental consultant to investigate water quality requirements.

Note V101B1 should be used when waste and borrow areas shown on the plans have been investigated for archeological requirements. Use this note in conjunction with note V103, Archeological Sites Adjacent to Right-of-Way, when there are archeological sites on the plan.

Note V101B2 should be used when the Contract Documents require a cultural resource investigation be done by the Contractor. Contact the Office of Environmental Services for guidance on using this note. Use this note in conjunction with note V103, Archeological Sites Adjacent to Right-of-Way.

Note V101C1 should be used when waste and borrow areas shown on the plans have been determined not to be in a FEMA floodplain zone.

Note V101C2 should be used when the waste and borrow areas shown on the plans have been determined to be in a FEMA floodplain zone. The contractor is required to obtain FEMA clearances.

Note V101D1 should be used when there might be suspect borrow areas having contaminated soil or water.

V101A1

THE WASTE AND BORROW AREAS SHOWN IN THE PLANS HAVE BEEN PREVIOUSLY INVESTIGATED FOR ECOLOGICAL RESOURCES. IT IS NOT NECESSARY TO HIRE AN ECOLOGICAL ENVIRONMENTAL CONSULTANT AS PER CONSTRUCTION AND MATERIAL SPECIFICATION 105.16 TO INVESTIGATE THESE AREAS. ALL OTHER REQUIREMENTS OF CMS 105.16 APPLY.

V101A2

HIRE AN ECOLOGICAL ENVIRONMENTAL CONSULTANT TO CERTIFY THAT THE PROPOSED BORROW AND WASTE OPERATIONS WILL NOT IMPACT "THE WATERS OF THE UNITED STATES", OR AN ISOLATED WETLAND(S), OR TO OBTAIN AN U.S. ARMY CORPS OF ENGINEERS 404 PERMIT AND AN OHIO EPA 401 PERMIT, PER THE REQUIREMENTS OF CONSTRUCTION AND MATERIAL SPECIFICATIONS 105.16.

V101B1

THE WASTE AND BORROW AREAS SHOWN IN THE PLANS HAVE BEEN INVESTIGATED BY A CULTURAL RESOURCE CONSULTANT. IT IS NOT NECESSARY TO HIRE A CULTURAL RESOURCE CONSULTANT AS PER CONSTRUCTION AND MATERIAL SPECIFICATION 105.16 TO INVESTIGATE THESE AREAS. ALL OTHER REQUIREMENTS OF CMS 105.16 APPLY.

V101 - CONTRACTOR'S USE OF ODOT RIGHT-OF-WAY (CONTINUED)

V101B2

HIRE A CULTURAL RESOURCE ENVIRONMENTAL CONSULTANT PER CONSTRUCTION AND MATERIAL SPECIFICATIONS IN 105.16 TO PERFORM A CULTURAL RESOURCE INVESTIGATION FOR ALL WASTE AND BORROW AREAS OUTSIDE THE RIGHT-OF-WAY LIMITS.

V101C1

THE WASTE AND BORROW AREAS SHOWN ON THE PLANS HAVE BEEN INVESTIGATED AND ARE NOT IN THE FEMA FLOODPLAIN ZONE.

V101C2

THE WASTE AND BORROW AREAS SHOWN ON THE PLANS ARE WITHIN FEMA FLOODPLAIN ZONE. WORK WITH ODOT DISTRICT OFFICE TO OBTAIN THE REQUIRED APPROVAL FROM THE LOCAL FLOODPLAIN COORDINATOR BEFORE WORKING IN THESE AREAS.

V101D1

THE CONTRACTOR SHALL NOT BORROW FROM A SITE KNOWN OR SUSPECTED OF HAVING CONTAMINATED SOIL OR WATER.

V102 - STREAM CHANNEL EXCAVATION

STREAM CHANNEL EXCAVATION WITHIN "WATERS OF THE US" IS SUBJECT TO US ARMY CORPS OF ENGINEERS (USACE) REGULATORY JURISDICTION AND WILL REQUIRE AUTHORIZATION BY THE USACE VIA THE WATERWAY PERMITTING PROCESS (404/401). IN ACCORDANCE WITH THE APPLICABLE WATERWAY PERMITS (404/401) STREAM CHANNEL EXCAVATION CAN NOT EXCEED THE QUANTITIES AND/OR SURFACE AREA THAT HAS BEEN PERMITTED. THE WATERWAY PERMITS ARE ATTACHED TO THE CONSTRUCTION PLANS AS SPECIAL PROVISIONS AND WILL BE AVAILABLE IN THE PROJECT CONSTRUCTION OFFICE.

TAKE ALL PRECAUTIONS NECESSARY TO PREVENT ANY INCIDENTAL DISCHARGES ASSOCIATED WITH THE EXCAVATION AND HAULING OF MATERIAL FROM THE STREAM CHANNEL. THIS PERTAINS TO ANY EXCAVATION OPERATIONS SUCH AS, FOUNDATION PIER OR ABUTMENT EXCAVATION, CHANNEL CLEANOUT, EXCAVATION FOR ROCK CHANNEL PROTECTION AND REMOVAL OF ANY TEMPORARY FILL ASSOCIATED WITH CONSTRUCTION OPERATIONS.

Designer's Note: The need for the above note, together with its final wording, must be concurred with by the Office of Environmental Services prior to inclusion in a plan.

V103 - ARCHAEOLOGICAL SITES [HISTORIC PROPERTIES] ADJACENT TO RIGHT-OF-WAY

AS A RESULT OF A CULTURAL RESOURCE SURVEY, ARCHAEOLOGICALLY [OR HISTORICALLY] SENSITIVE AREAS HAVE BEEN IDENTIFIED ADJACENT TO THE PROPOSED RIGHTS-OF-WAY. THESE ARCHAEOLOGICALLY [OR HISTORICALLY] SENSITIVE AREAS HAVE BEEN DENOTED ON MAPPING THAT IS AVAILABLE FOR REVIEW AT THE OHIO HISTORIC PRESERVATION OFFICE, (OHIO HISTORICAL SOCIETY, 800 EAST 17TH AVENUE, COLUMBUS, OHIO 43211-2474), ODOT'S OFFICE OF ENVIRONMENTAL SERVICES, AND THE DISTRICT ____ OFFICE (LOCATION). THESE IDENTIFIED AREAS CANNOT BE USED FOR BORROW AREAS, WASTE, OR ANY OTHER PROJECT RELATED ACTIVITIES, SUCH AS TEMPORARY OFF SITE STORAGE OR FIELD OFFICE PLACEMENT, PORTABLE PLANT LOCATIONS, ETC., UNLESS PRIOR APPROVAL IS OBTAINED, IN WRITING, FROM THE OHIO HISTORIC PRESERVATION OFFICE IN COLUMBUS.

Designer's Note: Use this note when there are known archaeological sites or historically significant properties on a project that will be protected as a result of a formal agreement between ODOT and the Ohio Historic Preservation Office.

V104 - TEMPORARY CONSTRUCTION FILL

ANY TEMPORARY CONSTRUCTION ACCESS FILL WITHIN "WATERS OF THE US" (EG., STREAMS, WETLANDS) SUBJECT TO US ARMY CORPS OF ENGINEERS (USACE) REGULATORY JURISDICTION WILL REQUIRE AUTHORIZATION BY THE USACE PRIOR TO THE PLACEMENT OF TEMPORARY FILL VIA THE WATERWAY PERMITTING PROCESS (404/401). ALL TEMPORARY CONSTRUCTION ACCESS FILLS SHOULD BE CONSTRUCTED IN ACCORDANCE WITH THE APPLICABLE WATERWAY PERMITS (404/401) AND SHOULD NOT EXCEED THE QUANTITIES AND/OR SURFACE AREA OF TEMPORARY FILL THAT HAS BEEN PERMITTED. ADDITIONALLY, SOME TEMPORARY CONSTRUCTION ACCESS FILLS MAY ONLY BE ALLOWED IN SPECIFIC LOCATIONS, PER THE WATERWAY PERMITS (404/401) AND/OR OTHER ENVIRONMENTAL COMMITMENTS, AND SHOULD BE CONSTRUCTED IN ACCORDANCE WITH ANY SUCH LOCATIONAL RESTRICTIONS TO AVOID ENVIRONMENTALLY SENSITIVE AREAS. THE WATERWAY PERMITS ARE ATTACHED TO THE CONSTRUCTION PLANS AS SPECIAL PROVISIONS AND ARE AVAILABLE IN THE PROJECT CONSTRUCTION OFFICE.

Designer's Note: The need for the above note, together with its final wording, must be concurred with by the Office of Environmental Services prior to inclusion in a plan.

Appendix B
Sample Plan Notes

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Appendix D
Reproducible Forms

(All forms are available from the ODOT web site)

LD-4 FORM USER NOTE

The LD-4 form is a summation of a project's specific quantities, and cost information. It is to be completed by district personnel, municipalities, or consultants and included in the Final Plan Package.

It is an important tool used by the Office of Estimating's *Construction Cost Section* to develop the official Engineer's Estimate.

In order to estimate the cost of a project as accurately as possible, this form must be completed in its entirety. Regardless of the units of measure shown in the plans, using terms such as "variable" for a depth, or "LUMP" for a volume on the LD-4 form is not permitted. Specific quantities must be used.

LD-4
Rev. 04-13

OHIO DEPARTMENT OF TRANSPORTATION
ESTIMATING INFORMATION

COUNTY: _____ **ROUTE:** _____ **SECTION:** _____

1. ITEM 201 - TREES AND STUMPS TO BE REMOVED AND DISPOSED BY:

Sizes	< 12 in.	18 in.	30 in.	48 in.	60 in.
No. of Trees					
No. of Stumps					

2. ITEM 202 - EXISTING PAVEMENT TO BE REMOVED AND DISPOSED OF:

Type											
Thickness (in.)											
Quantity (Yd^2)											

3. ITEM 202 - EXISTING PIPE REMOVED:

Size and Type of Pipe										
Quantity (Ft.)										
Avg. Depth of Trench (Ft.)										

4. ITEM 202 - EXISTING STRUCTURES (OR PORTIONS OF) REMOVED AND DISPOSED OF:

Culvert or Structure No.										
Plain Concrete (Yd^3)										
Reinforced Concrete (Yd^3)										
Stone Masonry (Yd^3)										
Structural Steel (lb)										
Timber Deck (in. thick & ft^2)										
Asphalt Surface (in. thick & ft^2)										
Other _____										

NOTE: The above information is for structures of any span and is not limited to the definition of a structure.

5. ITEM 203 - CLASSIFICATION OF ROADWAY EXCAVATION INTO:

(A) Earth	_____ %	(B) Silt, Peat, Waterbearing Sand	_____ %	(C) Shale (laminated, broken)	_____%
(D) Shale (firm, solid)	_____ %	(E) Sandstone (laminated, broken)	_____ %	(F) Sandstone (firm, solid)	_____%
(G) Limestone (broken, laminated)	_____ %	(H) Limestone (firm, solid)	_____ %	(I) Other: _____	_____%

SERVICE ROAD STUDY

Rev. 7-05

D-4

COUNTY: _____ **ROUTE:** _____ **SECTION:** _____

LOCATION: _____

Col. 1: Station numbers on Service Rd. Col. 2: R/W Parcel crossed by Service Rd. Col. 3: Cost of construction Col. 4: R/W cost for this Portion	Col. 5: Est. total Service Rd. cost to un-landlock next parcel (col. 3 plus col. 4) Col. 6: Parcel number of parcel being unlocked Col. 7: Est. value of unlocked parcel (with Service Rd.) Col. 8: Est. value of landlocked parcel (without Service Rd.)	Col. 9: Column 7 minus column 8 Col. 10: Repeat column 5 Col. 11: Algebraic sum of columns 9 & 10 Col. 12: Algebraic sum of column 11 & previous total

1		2	3	4	5	6	7	8	9	10	11	12
Station		Over Parcel Number	Cost of Construction of Service Rd	R/W Cost of Service Rd	Total Cost of Service Rd	Affected Parcel Number	Value of Landlocked Area Without Service Rd	Value of Landlocked Area Without Service Rd	Damaged Reduced By Service Rd	Service Rd Cost	Net Gain For Parcel	Cummulative Gain or Loss
From	To											
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00

OHIO DEPARTMENT OF TRANSPORTATION
ESTIMATING INFORMATION

6. ITEM 203 - BORROW AND EMBANKMENT:

Required (Yd^3): _____ Average Haul (Miles) _____

7. AGGREGATE INFORMATION:

Size: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Avg. Haul: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

8. ITEM 446 OR 448 - ASPHALT CONCRETE:

Item: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Avg. Haul: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

9. ITEM 502 - STRUCTURE FOR MAINTAINING TRAFFIC:

Description: _____

NOTE: Describe the structure; include estimated quantities (if not detailed in the plans).

10. ITEM 503 - UNCLASSIFIED EXCAVATION:

Structure No.: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Required (Yd^3): _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

NOTE: Provide a quantity when this item is bid as LUMP SUM.

11. ITEM 509 - REINFORCING STEEL:

Structure No. or Type: _____ _____ _____ _____ _____

Description of Item (ie., Wall, Deck, etc.): _____ _____ _____ _____ _____

Required (lb.): _____ _____ _____ _____ _____

NOTE: Provide a quantity when this item is bid as LUMP SUM.

12. ITEM 511 - CONCRETE:

Type: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Avg. Haul: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

OHIO DEPARTMENT OF TRANSPORTATION
ESTIMATING INFORMATION

13. ITEM 513 - STRUCTURAL STEEL:

Structure No. _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Pound _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

NOTE: Provide a quantity when this item is bid as LUMP SUM.

14. ITEM 514 - STEEL SURFACES TO BE PAINTED:

Structure No.: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

OZEU (Ft^2): _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

IZEU (lb): _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

NOTE: Provide a quantity when this item is bid as LUMP SUM.

15. ITEM 518 - POROUS BACKFILL:

Structure No.: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Required (Yd^3): _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

NOTE: Provide a quantity when this item is bid as LUMP SUM.

16. ITEM 611 - PIPE CULVERTS, SEWERS AND DRAINS:

Size and Type of Conduit: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Avg. Depth (Ex. ground to flowline): _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Size and Type of Conduit: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Avg. Depth (Ex. ground to flowline): _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

17. ITEM 611 - MANHOLES, CATCH BASINS, AND INLETS:

Type: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Quantity: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Avg. Depth: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

18. ITEM 615 - ROADS AND PAVEMENTS FOR MAINTAINING TRAFFIC:

Excavation (Yd^3): _____ _____ _____ _____ _____ _____

Embankment (Yd^3): _____ _____ _____ _____ _____ _____

Guardrail (Ft.): _____ _____ _____ _____ _____ _____

Drainage (Ft.): _____ _____ _____ _____ _____ _____

Other: _____ _____ Description: _____

OHIO DEPARTMENT OF TRANSPORTATION
ESTIMATING INFORMATION

19. ITEM SPECIAL - RETAINING WALL:

Wall Designation:	_____	_____	_____	_____	_____
Wall Type:	_____	_____	_____	_____	_____
Leveling Pad Concrete, f'c = 2500 PSI (Yd^3):	_____	_____	_____	_____	_____
Select Granular Fill Material, CMS 304 or CMS 703.11, Type 2 (Yd^3):	_____	_____	_____	_____	_____
Embankment Material, CMS 203 (Yd^3):	_____	_____	_____	_____	_____
Porous Backfill with Filter Fabric, CMS 518 (Yd^3):	_____	_____	_____	_____	_____
6" Perforated Plastic Pipe, CMS 707.33 (Ft.):	_____	_____	_____	_____	_____
Excavation, CMS 503 (Yd^3):	_____	_____	_____	_____	_____
Pile Sleeves, CMS 707.33 or 707.42 (Ft.):	_____	_____	_____	_____	_____
Epoxy Urethane Sealer, CMS 512 (Yd^2):	_____	_____	_____	_____	_____

20. ITEM SPECIAL - CONCRETE COPING

ITEM SPECIAL - CONCRETE COPING, INCLUDING SLEEPER SLAB:

Wall Designation:	_____	_____	_____	_____	_____
Class _____Concrete, CMS 511 (Yd^3):	_____	_____	_____	_____	_____
Epoxy Urethane Sealer, CMS 512 (Yd^2):	_____	_____	_____	_____	_____
Epoxy Coated Reinforcing Steel, CMS 509 (lb):	_____	_____	_____	_____	_____

21. MISCELLANEOUS ITEMS:

Item:	_____	_____	_____	_____	_____
Unit:	_____	_____	_____	_____	_____
Qty.:	_____	_____	_____	_____	_____

SUBMITTED BY: _____ **DATE:** _____

Appendix D
Reproducible Forms

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SERVICE ROAD STUDY

Rev. 7-05

D-6

COUNTY: _____ **ROUTE:** _____ **SECTION:** _____

LOCATION: _____

Col. 1: Station numbers on Service Rd. Col. 2: R/W Parcel crossed by Service Rd. Col. 3: Cost of construction Col. 4: R/W cost for this Portion	Col. 5: Est. total Service Rd. cost to un-landlock next parcel (col. 3 plus col. 4) Col. 6: Parcel number of parcel being unlocked Col. 7: Est. value of unlocked parcel (with Service Rd.) Col. 8: Est. value of landlocked parcel (without Service Rd.)	Col. 9: Column 7 minus column 8 Col. 10: Repeat column 5 Col. 11: Algebraic sum of columns 9 & 10 Col. 12: Algebraic sum of column 11 & previous total

1		2	3	4	5	6	7	8	9	10	11	12
Station		Over Parcel Number	Cost of Construction of Service Rd	R/W Cost of Service Rd	Total Cost of Service Rd	Affected Parcel Number	Value of Landlocked Area Without Service Rd	Value of Landlocked Area Without Service Rd	Damaged Reduced By Service Rd	Service Rd Cost	Net Gain For Parcel	Cummulative Gain or Loss
From	To											
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00
					$0.00				$0.00	$0.00	$0.00	$0.00

Appendix D
Reproducible Forms

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