

5.0 Typical Sections

Order of Typical Sections

1. Mainline
2. Frontage roads or intersecting alignments
3. Ramps

Note: For file naming conventions, see Section 2.4, Volume 1.

5.1 Control

Typical sections are used in most contract plans developed in the ODOT format. They are an important part of the plans because they show a detailed cross-sectional view of the work to be done.

A typical section is a detailed illustration of the roadway surface design of a project. Therefore, each subsequent typical section or partial section represents a change or variation in the design.

The development of the Typical Sections portion of the contract plans requires communication between the Roadway Designer and the Roadway Drafter. It is the responsibility of the designer to provide redlined or sketched typical sections to the drafter. It is also the responsibility of the Roadway Designer to redline updates to the Typical Sections as the project progresses.

Throughout the development of the project, it is the responsibility of the drafter to maintain ODOT drafting standards as set forth here, in the *Contract Plans Development Guide*.

Review of the contract plans is accomplished at the approved design, preliminary, advanced, and final submittal stages.

5.2 Development

It is the responsibility of either the Roadway Designer or Roadway Drafter to begin development of Typical Section sheets.

5.2.1 Sheet Setup

Set up the Typical Section sheets as described in the following steps 1–8. General information to help you create Typical Sections follows the detailed steps in Section 5.2.2.

Step 1 — Create a Typical Section Active File

Create a new MicroStation™ file from the seed file named SEED2D.DGN found at:

Internal ODOT staff	http://SCDATA3\ODOT_space\standards\seed
External	ftp://ftp.odot.state.or.us/isb/appeng/Microstation/Version8/

and name it KEYNUF.TY1, where “KEYNU” represents your project key number assigned by ODOT (to be filled in by you), “F” represents that this file is part of the final contract plans, and “TY1” is the appropriate extension for the first file of the typical section plan sheets. Subsequent files of Typical Sections shall have extensions “TY2”, “TY3,” etc. This is your **typical section active file**.

5.0 Typical Sections

5.2.1 Sheet Setup (Cont'd)

Step 2 — Add Sheet Borders

Enter ODOT's proprietary software, "Plotypus," to automatically place borders (*File/Plotypus*). "Plotypus" automatically creates the borders at a pre-designated location in the design file. Choose the intended scale and sheet size, placing up to ten borders per design file. See Appendix D, "A Quickguide To Plotypus," for more information on placing borders.

Tip

Step 2 may have been completed as part of another section of the contract plans. If it has, use it here and go on to Step 3.

Step 3 — Create the Project Title and "V" Number Reference File

Create a new MicroStation™ file from the seed file named SEEDV8.NAM found at:

Internal ODOT staff	http://SCDATA3\ODOT_space\standards\seed
External	ftp://ftp.odot.state.or.us/isb/appeng/Microstation/Version8/

and name it KEYNUFNAM, where "KEYNU" represents your project key number (to be filled in by you), "F" represents that this file is part of the final contract plans, and "NAM" represents that this generic file is for the project title information. For example, a new file name might be 01234FNAM.

Title block text is provided in two scales within SEEDV8.NAM for convenient editing.

Edit the project title text in the appropriate place within the title block. When the contract plans are complete and ready to be advertised for bid, the "V" number will be added to this file in the upper right hand corner of each plan sheet. For preliminary, advance and final review submittals, the appropriate block shall be placed here rather than the "V" number (from the cell library ODOT.cel).

Step 4 — Attach Reference Files

Open the new typical section active file created in Step 1. Attach KEYNUFNAM as a reference file and assign a logical name as appropriate for your plan sheet. The active file should now have blank plan sheets with the title blocks filled in.

Step 5 — Add Sheet Titles and Numbers

While in the *active file*, add the title "TYPICAL SECTIONS" in the title block by turning on Level 9 in the KEYNUFNAM reference file created in Step 2. See Figure 2-7 for a listing of the sheet titles and the levels on which they can be found.

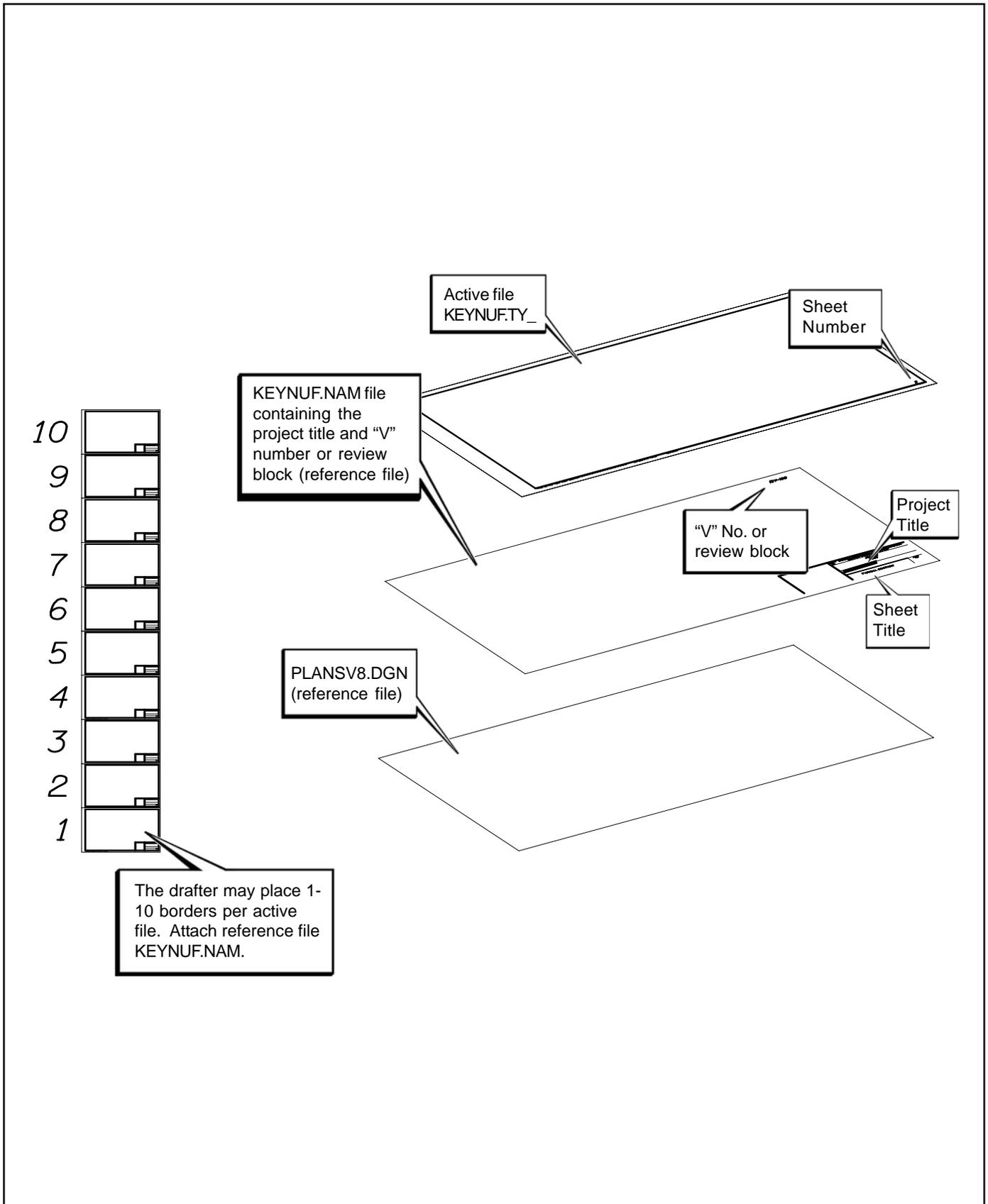
While in the *active file*, add the appropriate sheet numbers, snapping to the point provided in the space.

Note: For information about title block text, see Section 2.8, Volume 1.

Note: For documentation of the entire Cache, see Appendix B, Volume 1.

5.0 Typical Sections

Figure 5-1 Reference Files - Typical Sections



5.0 Typical Sections

Figure 5-2 Sheet Titles - Typical Sections

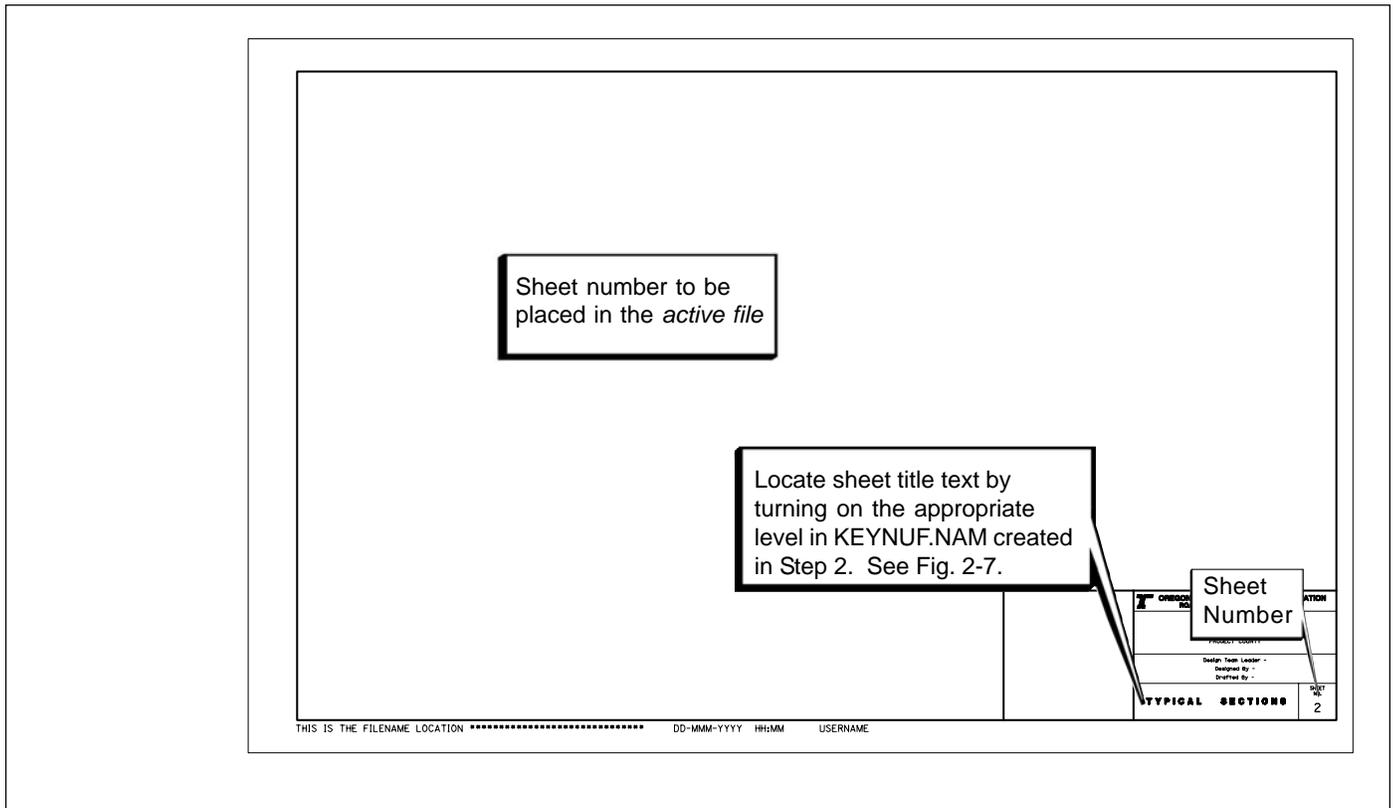
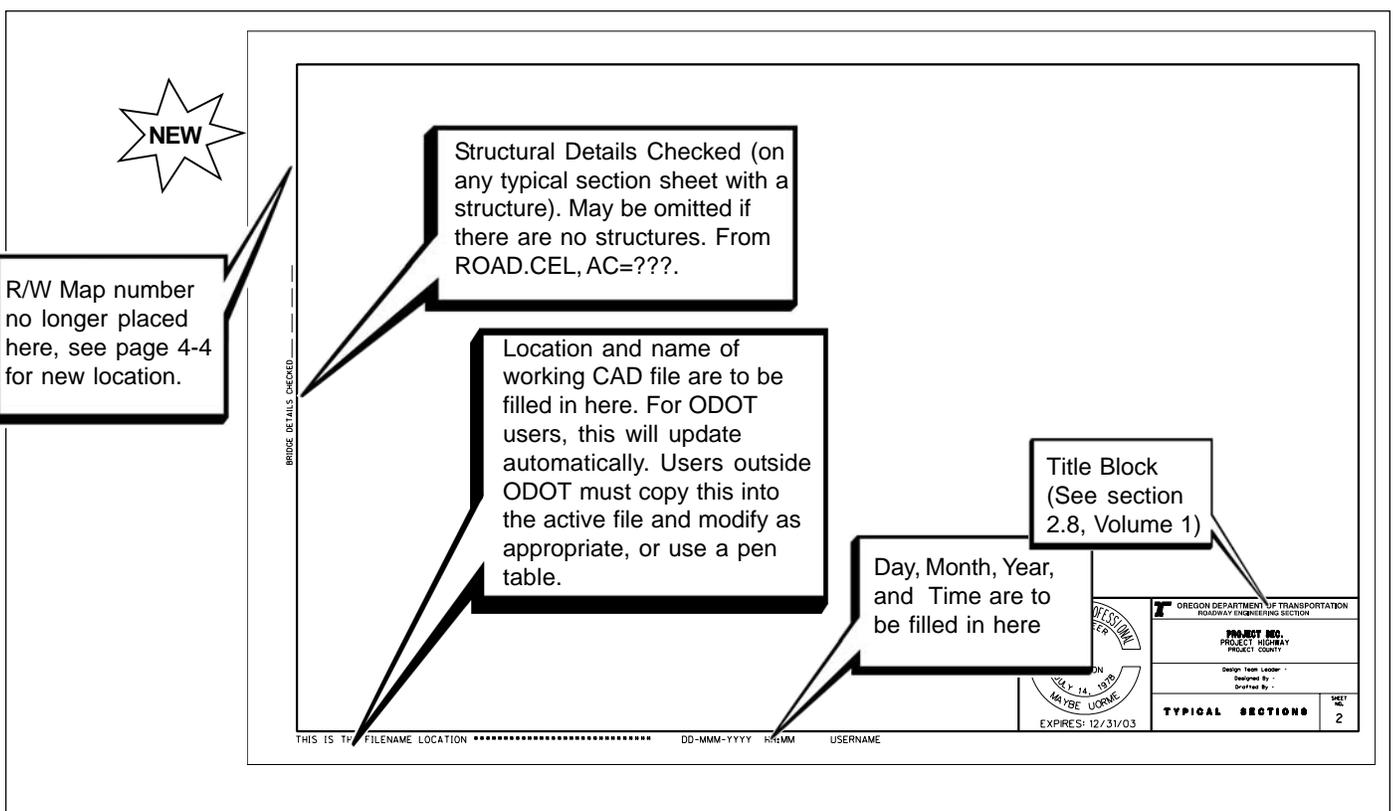


Figure 5-3 Sheet Information - Typical Sections



5.0 Typical Sections

Note: For additional information on sheet specifications, see Section 2.8, Volume 1.

5.2.1 Sheet Setup (Cont'd)

Step 6 — Add Professional Engineer Stamp

While in the *active file*, add the Professional Engineer Stamp cell for the appropriate person signing the plans, snapping the cell to the point provided.

Step 7 — Sheet Information

The location, name and date of the *active file* are to appear in the lower left corner of the sheet as shown in Figure 5-4. For ODOT users, this will update automatically. Users outside ODOT must use an appropriate pen table.

If the Typical Sections involve a bridge, the sheet(s) that reference(s) a bridge or structure must have a space at the left edge for the structural engineer to sign approval after the final mylar has been plotted, as shown in Figure 5-3. If there is no structure on the sheet, this notation may be omitted.

Step 8 — Creating Typical Sections

At this point you are free to create project specific typical sections. Many of the typical section elements you need are available in the “Cache” as illustrated in Figure 5-4. Add text and other items as necessary. See the check list at the end of this section for a complete listing of required and suggested items. See Section 5.2.3 for typical section components.

5.2.2 General Information

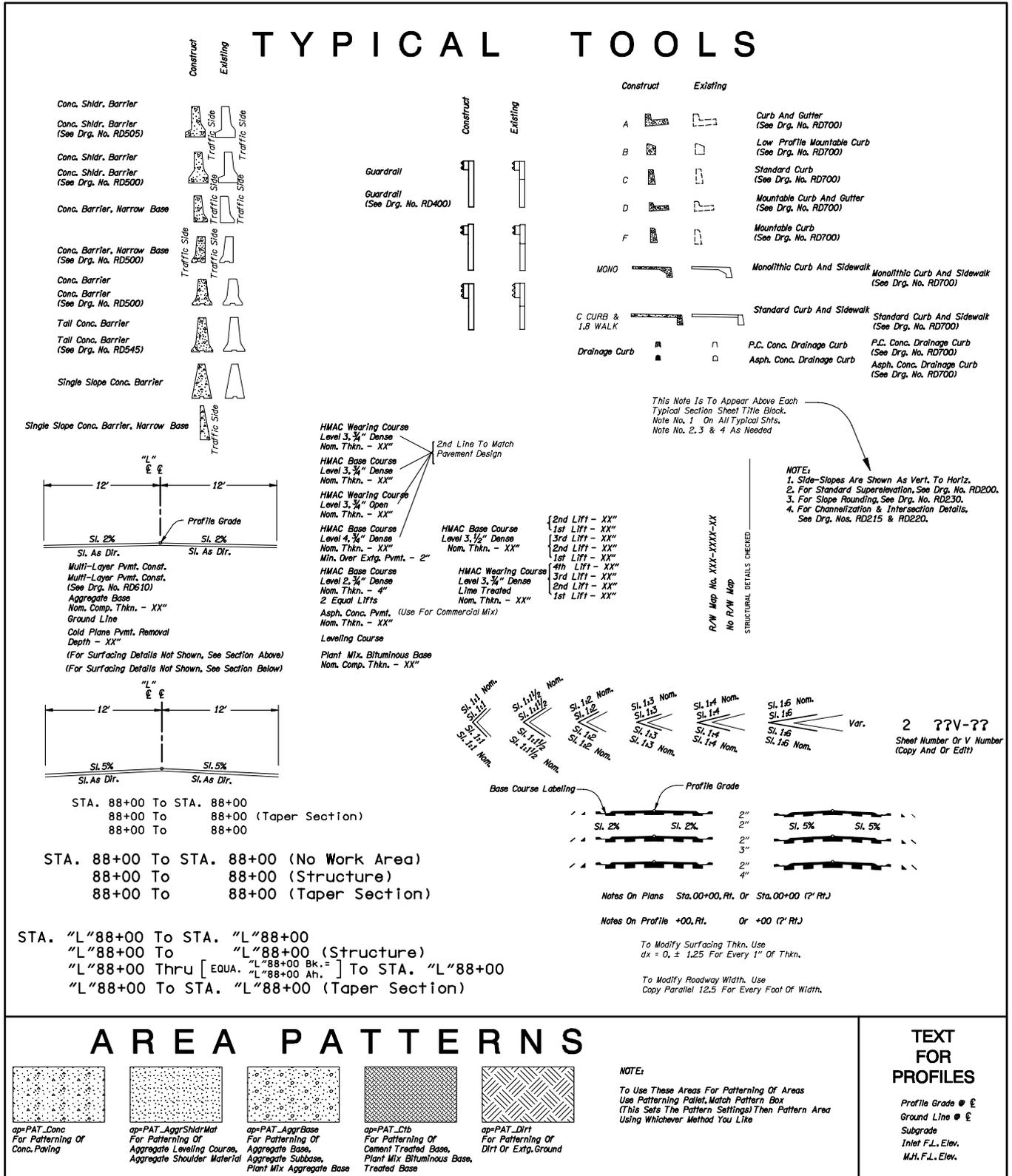
CAD Tools

Many tools are available to aid in the creation of Typical Section sheets. The latest version of PLANSV8.DGN includes a “Cache” of tools for creation of Typical Sections. This “Cache” is shown in Figure 5-4.

The “Cache” is a graphic library of Typical Section elements and other contract plans elements that can be copied or used to set symbology. It is a quick means of access to an assortment of slopes, cells, area filled shapes, and scale factors used most frequently in drafting typical sections.

5.0 Typical Sections

Figure 5-4 Typical Tools from the Cache



5.0 Typical Sections

Note: For a detailed list of element attributes and levels, see the *English Level Standards, Appendix D*.

Note: For documentation of the entire Cache, see *Appendix B, Volume 1*.

5.2.2 General Information (Cont'd)

Scales

Acceptable scales generally used for Typical Sections are 1"=5' and 1"=10', depending on the size of the project area and the amount of data that is being shown. Create only as many sheets as needed for clear and readable plans. There is exaggeration between the horizontal and vertical scales, to provide visual clarity for typical section depths.

Horizontal Width

Horizontal width in feet is multiplied by 12.5. For instance, a horizontal distance of 12' = key in 150 (12x12.5) to obtain the correct horizontal lane width for typical sections.

Vertical Depth

Vertical depth in inches is multiplied by 1.25. For instance, a vertical distance of 5" = key in 6.25 (5 x 1.25) to obtain the correct vertical surface depth.

Standard cells for typical section construction are provided in the "cache".

5.2.3 Format

Typical Section Components

Typical section requirements differ from project to project. However, all typical sections share the same general components. See Figures 5-5 and 5-6.

Stacking

Place typical sections one below the other in succession along stationing and aligned by center line in approximately the center of the plan sheet as shown in Figure 5-7. Stack subsections directly above their relative section. Typicals are arranged in order by stationing from top to bottom on a sheet. Stacks are arranged from bottom to top.

Arranging and stacking of typical sections should follow the conventions described below and as shown in Figures 5-7 and 5-8.

- The number of sections and associated subsections (stacks) is limited to the amount of space available per sheet.
- Each section should also include all relevant notes and dimensions.
- A stack can be used for any change or variation within a sections main stationing, as long as its own stationing fits within those limits.
- Notes for identical features on main sections should not be repeated on stacks.

5.0 Typical Sections

Note: For Typical Section sheet examples, see Section 5.0, Volume 2.

Note: For order of sheets and sheet numbering in the contract plans as a whole, see Section 2.1, Volume 1.

Note: For further instruction on the use of plan scale, see Section 2.5, Volume 1.

5.2.3 Format (Cont'd)

- All stacks must have a common reference point on the section with which it is associated (centerline, lane line, etc.).

Dimensioning and Text

Use ODOT standard text fonts and sizes to maintain the look and consistency of the plans. Use the same text fonts and sizes that are generally used for the rest of the road construction contract plan set. Dimensioning should follow the conventions described below and shown in Figure 5-10.

- **Dimension Lines**

A dimension line is terminated by arrowheads and indicates the direction and extent of the dimension.

- **Extension Lines**

An extension point extends from a point on the drawing to which a dimension refers. The dimension line meets the extension line at right angles, except in special cases. A gap of about 10' should be left where the extension line would join the drawing. The extension line should extend about 10' beyond the arrowhead. It is also satisfactory for an extension line to cross another extension line. Extension lines may be partially deleted for a note or have a gap for arrowheads to clarify another dimension.

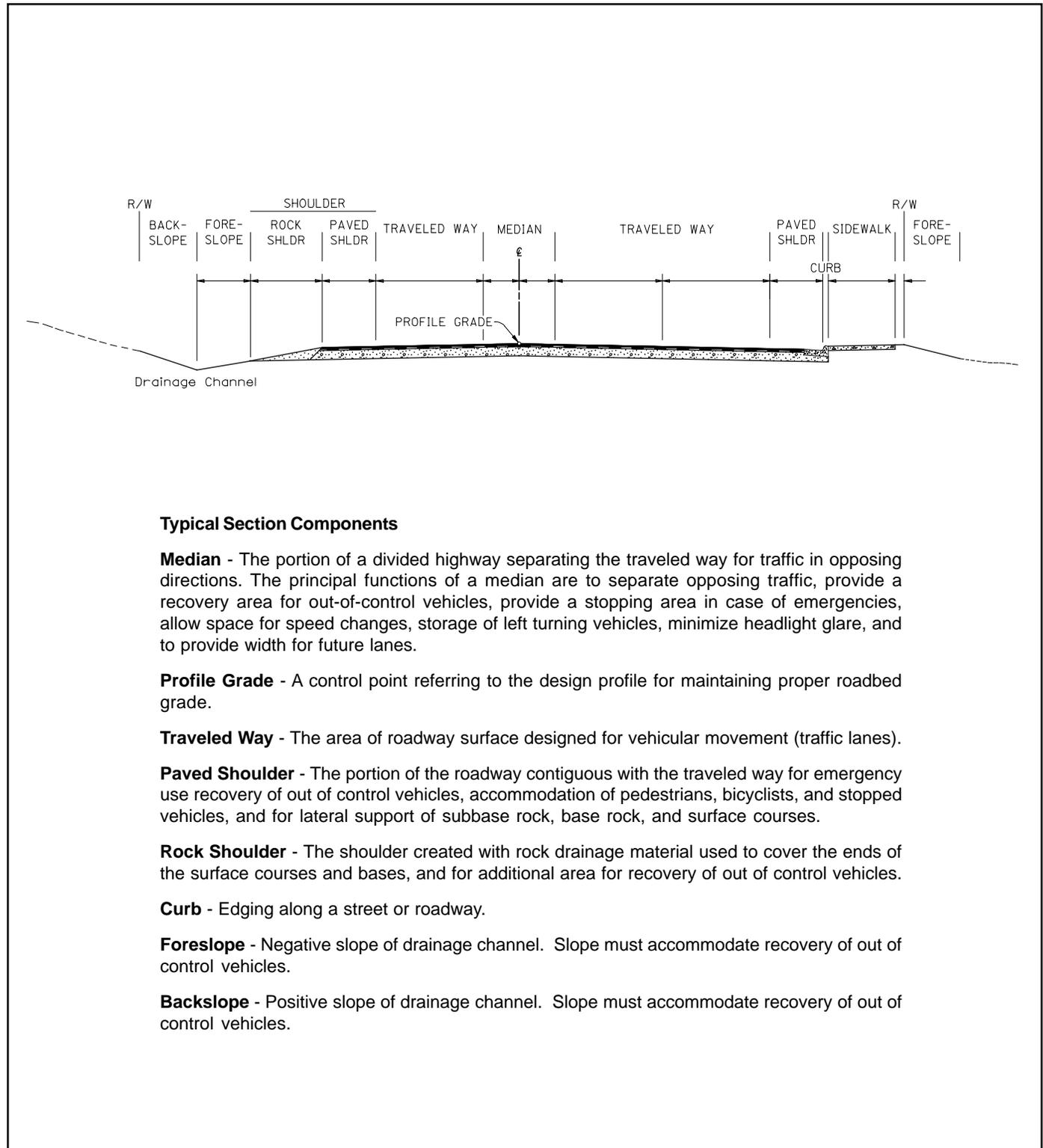
- **Dimension Text**

All text and figures are aligned with the dimension lines. The text and figures are placed at the midpoint and centered on the dimension line. The dimension line is then broken to prevent the line from going through the lettering.

- **Variations of Dimension Text**

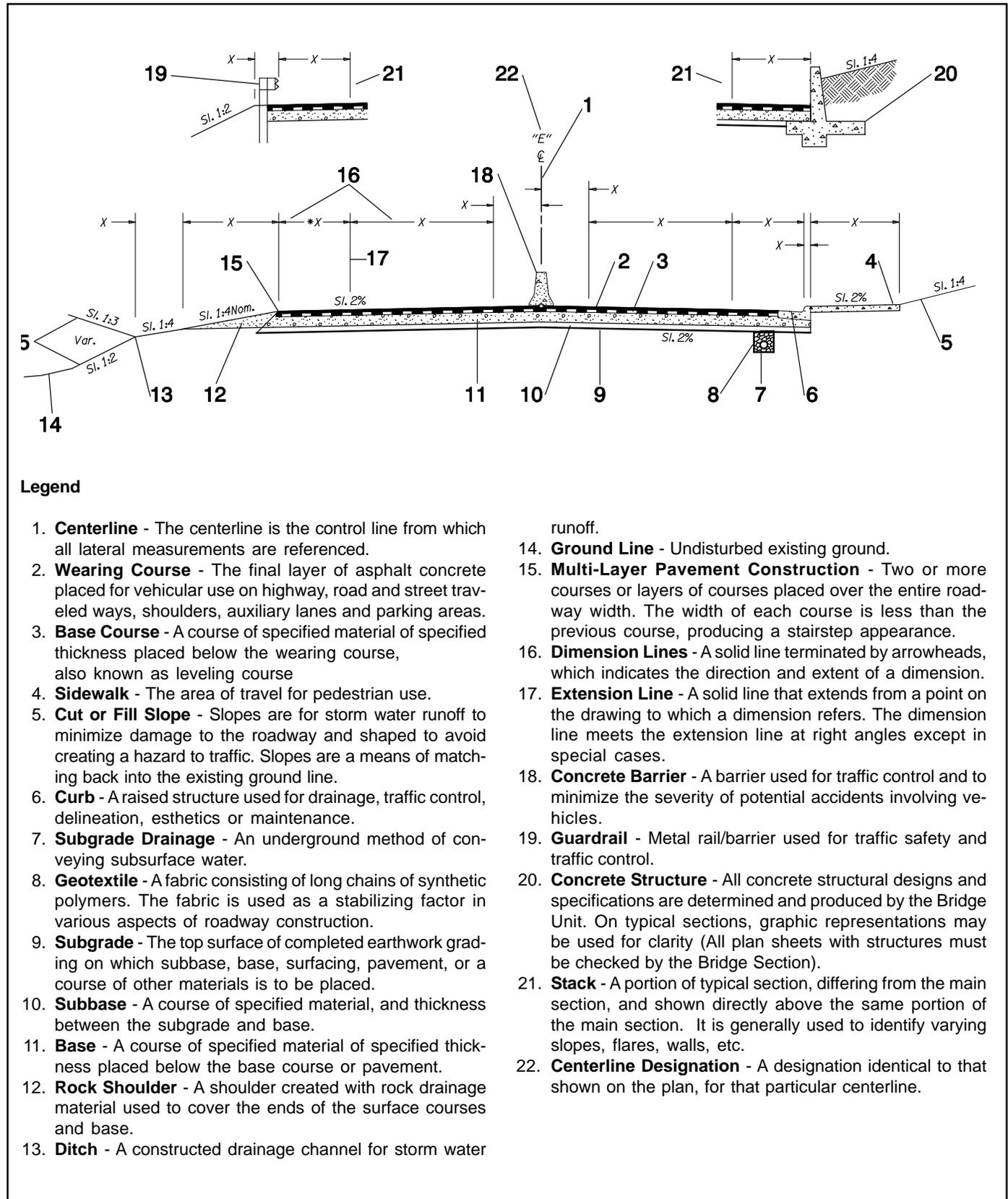
1. Dimension lines, arrowheads and lettering placed inside extension lines.
2. Lettering placed inside extension lines with arrowheads and dimension lines placed outside.
3. Dimension line, arrowheads and lettering placed outside of extension lines.
4. If more than one line of text is necessary, the first line or top line of text should remain centered on the dimension line.
5. If needed, a partial view may be drawn to an enlarged scale to provide space for proper dimensioning (see "Inserts", page ## of this section).
6. If possible, place dimension lettering outside of shaded or patterned areas. When a dimension must be placed in shaded or patterned areas leave an opening in lines or pattern for the dimension.

5.0 Typical Sections

Figure 5-5 Typical Section Components

5.0 Typical Sections

Figure 5-6 Basic Typical Section Layout and Definitions

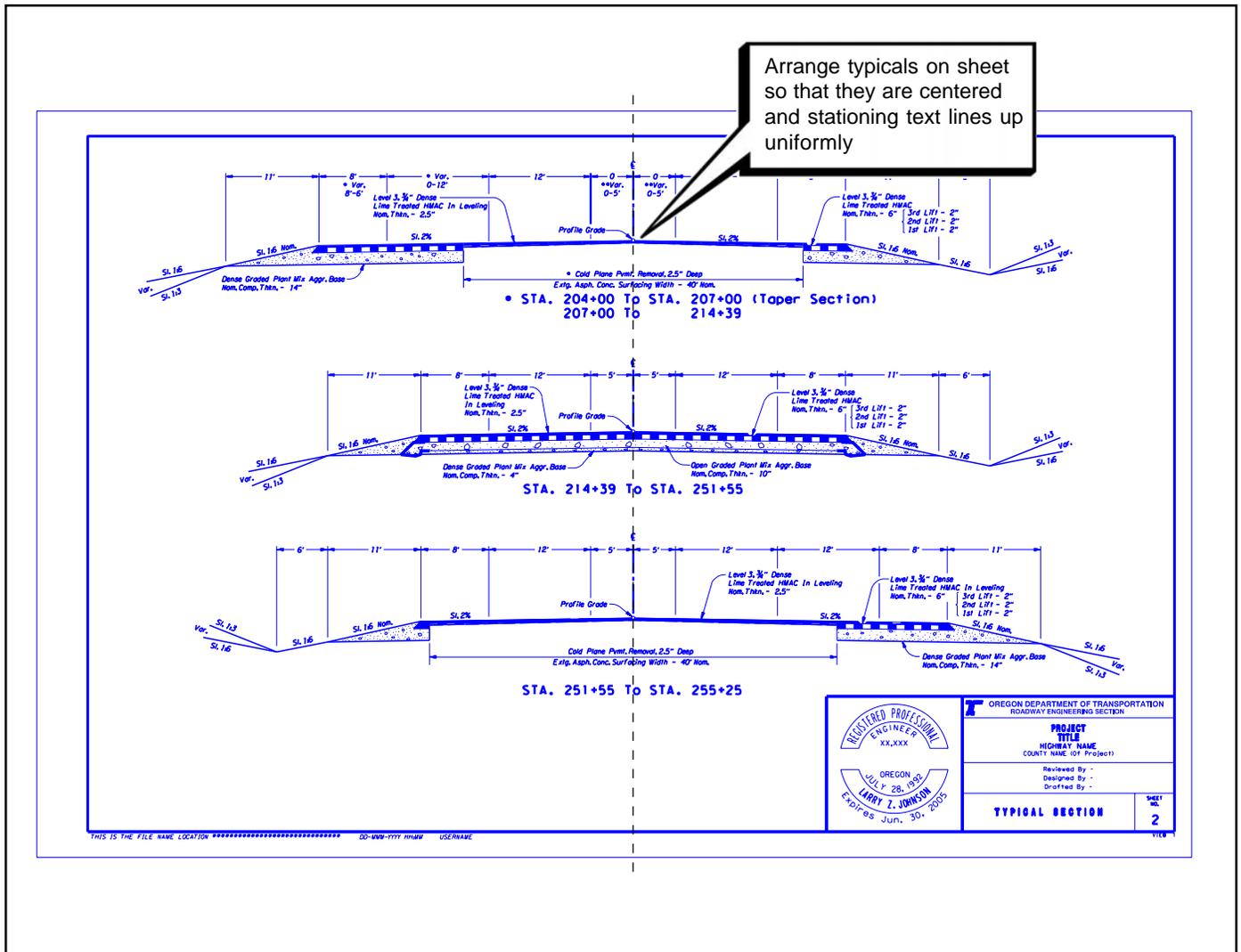


5.0 Typical Sections

5.2.3 Format (Cont'd)

- **Dimension of Angles (Slopes)**
All slopes must be labeled. The slope labels may be placed either above or below the slope line, whichever is most convenient and provides the greatest clarity.
- **English Dimension**
Measurements in feet should be to the closest foot or one tenth of an inch.
- **Accuracy**

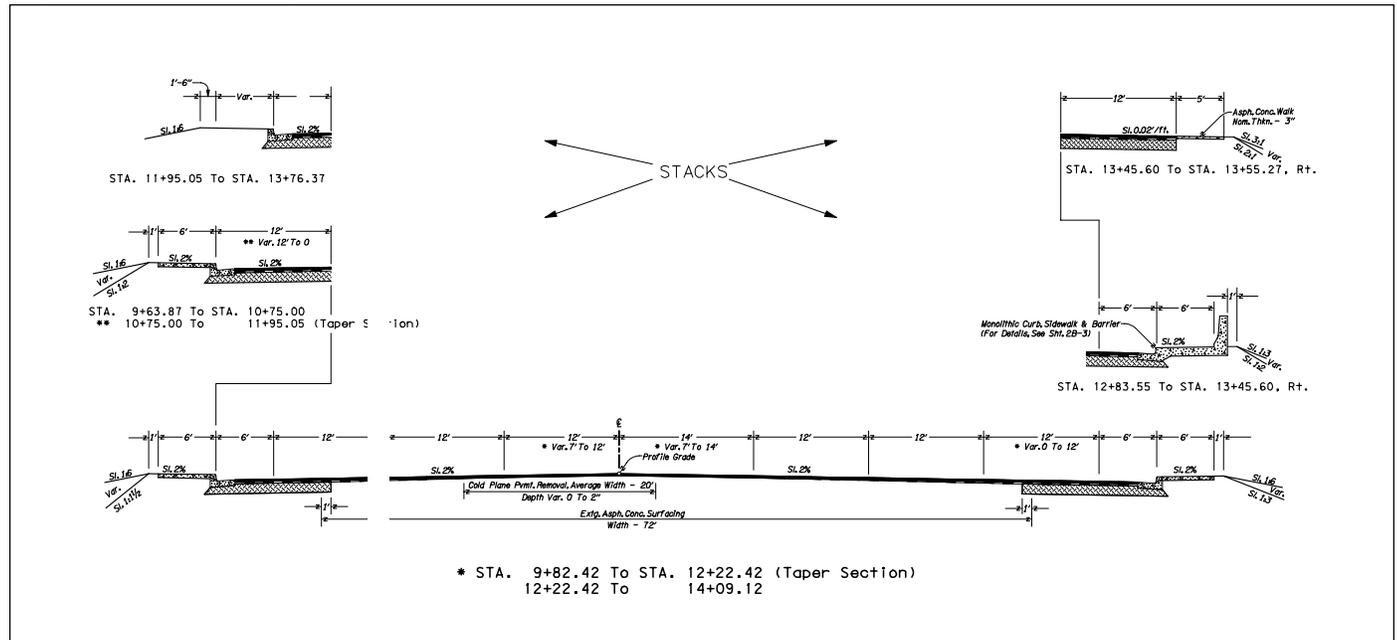
Figure 5-7 Sheet Orientation and Stacking



5.0 Typical Sections

5.2.3 Format (Cont'd)

Figure 5-8 Stacking



Note: For text standards, see Table 2-2, Volume 1.

5.2.3 Format (Cont'd)

Measurements less than a foot should be read in inches and decimal parts of an inch. The hundredth of an inch is the smallest increment of measure to be used in ODOT contract plans.

• **General**

Use a leading zero before the decimal marker. Always use decimals, not fractions (e.g. 0.12). General types of measurements and units are:

Station Increment - Major: 500 feet (major), Minor: 100 feet for 1"=50', 100 feet for 1"=100'

Angle Nomenclature - Degrees - Minutes - Seconds

Pavement Cross Slope - % Slope

Vertical Grade - % Grade

Slope Ratios - Are to be expressed as rise divided by run.

Linear Measurement - Use miles, feet and inches. Do not use fractions of inches.

Stations and Equations

Stationing should follow the conventions described below and shown in Figures 5-11 and 5-12.

Station - Must be upper case letters. "Station" is abbreviated as STA.

5.0 Typical Sections

5.2.3 Format (Cont'd)

Line Designation - Usually an upper case letter inside quotation marks. “L” refers to “Main Located Line.” Any alternate lines include a number designation such as: “L2” or “L3.” Interchange ramp lines are usually designated as “A,” “B,” “C,” or “D”.

Space - A space after the quotation is optional but must be consistent throughout the project.

Plus Sign - Signifies division between hundreds of feet and feet.

Feet - Numbers preceding the plus sign indicate hundreds of feet. Numbers following the plus sign are in feet.

Stationing Note - Upper and lower case letters. Place a note within parenthesis, with no space between the station number and parenthesis (see Figure 5-11).

Equation - Upper case and centered. “Bk. =” & “Ah.” - are both upper and lower case. Bracket 8” x 39’ - May vary (see Figure 5-12).

Patterning

Typical sections employ four patterns, as shown in Figure 5-13. Attach ODOT.CEL and use the appropriate area patterns, or use the “typical tools” located in the cache, from the PLANSV8.DGN reference file. See Figure 5-4.

Match Lines

When a single typical section is too large to be placed in entirety on the length of a plan sheet as a continuous drawing, portions that overextend may be broken and continued in a more convenient location by either stacking or placement on another plan sheet. Stacks are offset and match lines should be used as described below.

- Stacks may be offset toward the center of the sheet if more drawing space is needed for the partial section. A reference match line, however, must also be included to clearly define the match point or the common line of reference. A partial Section with a match line does not need a centerline reference. See Figure 5-14.
- Extremely long and complex extensions may be placed on the following plan sheet.
- Each break point must be labeled with a match line and proper labeling to locate or match with the continuing portion.

Inserts may be needed to enlarge a detailed portion of the drawing that is difficult to read at the base scale. Inserts should follow the conventions described below and shown in Figure 5-15.

Note: For text standards, see Table 2-2, Volume 1.

Note: For examples of various dimension text formats, see Sections 5 and 6, Volume 2.

5.0 Typical Sections

5.2.3 Format (Cont'd)

- **Bracket**

A circle is used to encompass the areas. Symbol should be partially deleted so as not to interfere with notes or graphics and to appear as brackets.

- **Scale**

Lane, curb, and other tapers are common in roadway design. These tapers need to be shown clearly on the Typical Sections as appropriate. Simple tapers can be shown with an asterisk in the lane dimension, which references to a station interval indicated below the Typical Section as shown in Figure 5-16. More complicated tapers may require the use of a table, as shown in Figure 5-17.

Note: For standard number of decimal places used for Typical Sections, see Section 5, Volume 2.

Table 5-1 Typical Sections Dimensioning

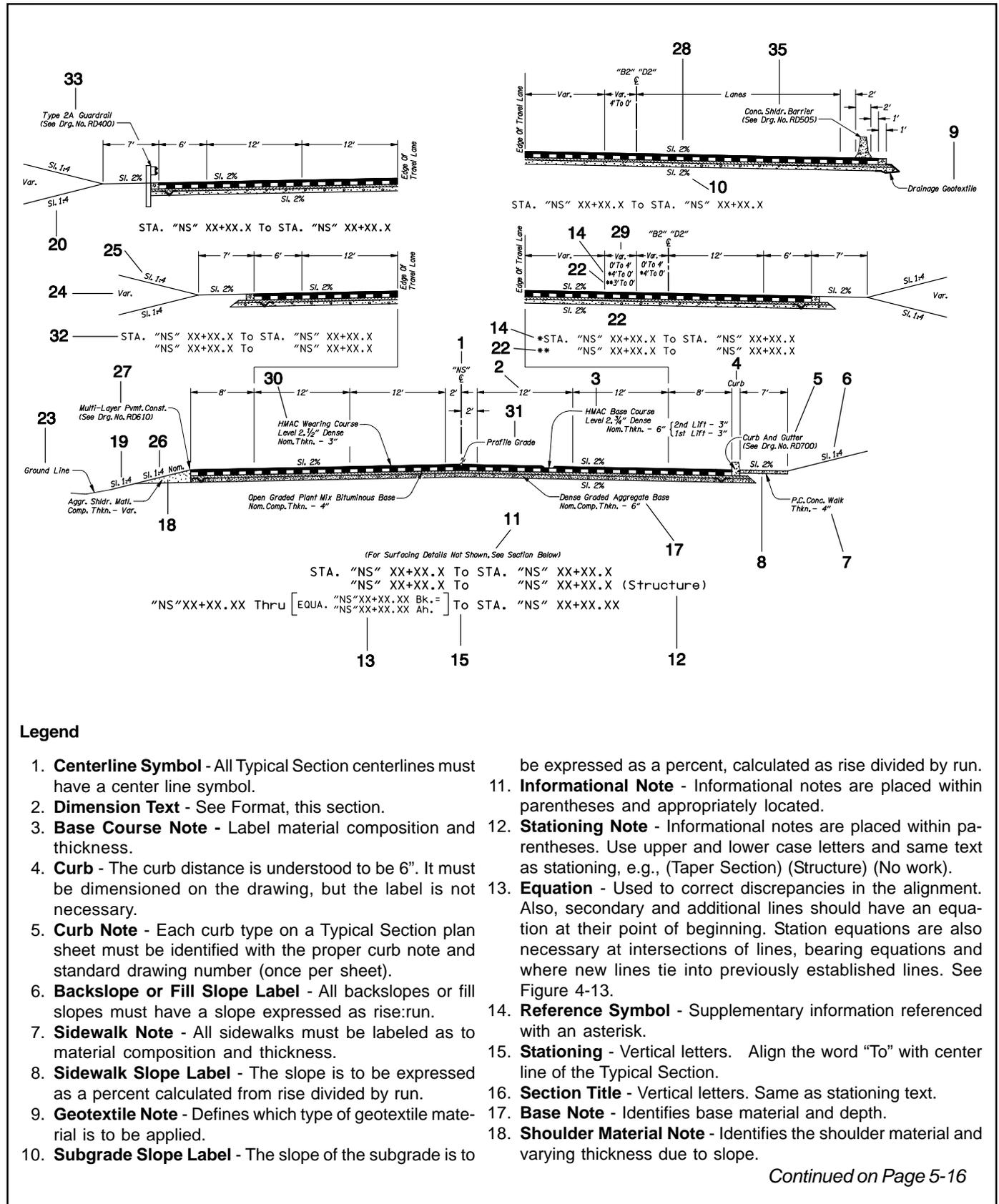
<u>Lane Width</u>	<u>Shoulders</u>
2.7 m = 9 ft	0.6 m = 2 ft
3.0 m = 10 ft	1.2 m = 4ft
3.3 m = 11 ft	1.8 m = 6 ft
3.6 m = 12 ft	2.4 m = 8 ft
	3.0 m = 10 ft

Table 5-2 Metric Conversion (Approximate)

1/2" = 12.7 mm	11" = 275 mm	11' = 3.4 m
1" = 25 mm	12" = 300 mm	12' = 3.6 m
1.5" = 38 mm	1' = 0.3 m	13' = 3.9 m
2" = 50 mm	2' = 0.6 m	14' = 4.2 m
3" = 75 mm	3' = 0.9 m	15' = 4.5 m
4" = 100 mm	4' = 1.2 m	16' = 4.8 m
5" = 125 mm	5' = 1.5 m	17' = 5.1 m
6" = 150 mm	6' = 1.8 m	18' = 5.4 m
7" = 175 mm	7' = 2.1 m	19' = 5.7 m
8" = 200 mm	8' = 2.4 m	20' = 6.0 m
9" = 225 mm	9' = 2.7 m	21' = 6.4 m
10" = 250 mm	10' = 3.0 m	22' = 6.7 m

5.0 Typical Sections

Figure 5-9 Typical Sections Text Definitions

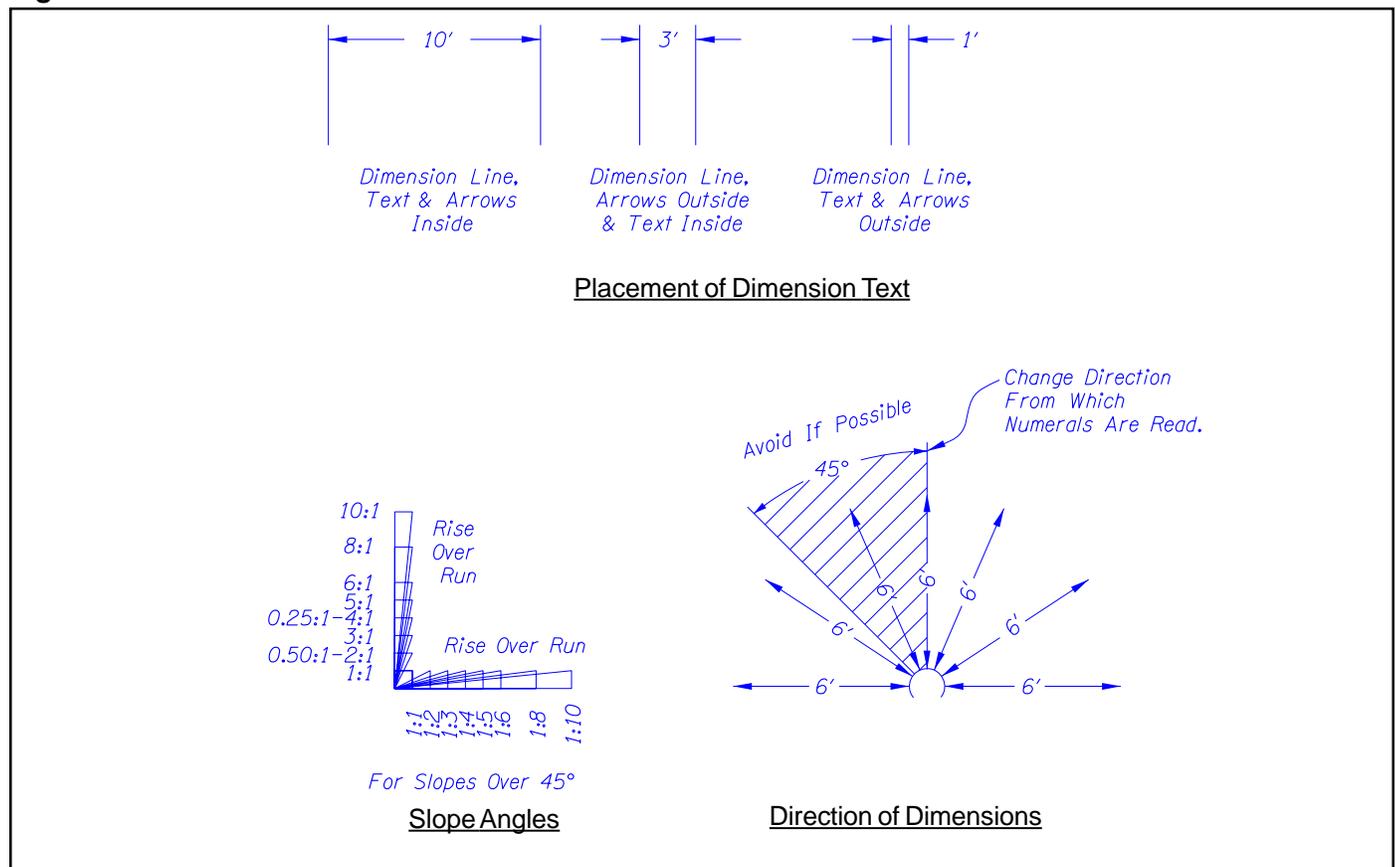


5.0 Typical Sections

Figure 5-9 Typical Sections Text Definitions (Cont'd)

- | | |
|---|--|
| <ul style="list-style-type: none"> 19. Foreslope Label - Slope is to be expressed as rise:run. 20. Cut Slope Label - Slope is to be expressed as rise:run. 21. Secondary Reference Symbol - Reference to supplementary information. 22. Secondary Reference Note - Supplementary information referred to by secondary reference symbol. 23. Ground Line - Undisturbed existing ground. 24. Variable Slope Label - Indicates slopes will vary between given slopes and distance determined by stationing. 25. Backslope Label - All backslopes are to be expressed as rise:run. 26. Rock Shoulder Label - Rock Shoulder Slopes are determined by a specific height and distance and then rounded to closest whole number. Rock slopes are therefore labeled nominal. 27. Multi-Layer Pvmnt. Note - Signifies that during construction HMAC is applied in lifts. A reference must be made to standard drawing No. RD610. 28. Cross Slope Label - The slope of pavement from the crown to the shoulder and expressed as a percent. The cross slope is parallel to the subgrade slope. 29. Variable Dimension - Begins with "Var." and the word "To" is between the min. and max. distance. | <ul style="list-style-type: none"> 30. Wearing Course Note - Label material composition and thickness. 31. Profile Grade Label - The control point for maintaining roadbed grade. 32. Sub Stationing - Must be all vertical capital letters. 33. Guardrail Note - Specifies guardrail type and refers to the standard drawing No. RD400. 34. Sub Section Title - Vertical letters, same as the sub stationing text. 35. Concrete Barrier Note - Specifies the type of barrier and refers to the standard drawing number. |
|---|--|

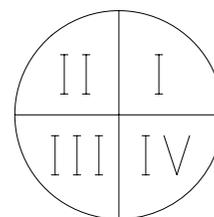
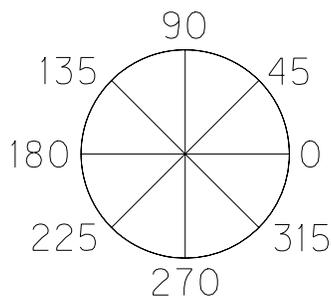
Figure 5-10 Placement of Dimension Text



5.0 Typical Sections

Table5-3 Slope Angles

<i>Slope</i>	<i>Decimal Degrees</i>			
	<i>Quadrant I</i>	<i>Quadrant II</i>	<i>Quadrant III</i>	<i>Quadrant IV</i>
0.01	0.5729	179.4271	180.5729	359.4271
0.02	1.1458	178.8542	181.1458	358.8542
0.025	1.4321	178.5679	181.4321	358.5679
0.03	1.7184	178.2816	181.7184	358.2816
0.04	2.2906	177.7094	182.2906	357.7094
0.05	2.8624	177.1376	182.8624	357.1376
0.06	3.4336	176.5664	183.4336	356.5664
1:20	2.8624	177.1376	182.8624	357.1376
1:10	5.7106	174.2894	185.7106	354.2894
1:8	7.125	172.875	187.125	352.875
1:6	9.4623	170.5377	189.4623	350.5377
1:5	11.3099	168.6901	191.3099	348.6901
1:4	14.0362	165.9638	194.0362	345.9638
1:3	18.4349	161.5651	198.4349	341.5651
1:2.5	21.8014	158.1986	201.8014	338.1986
1:2	26.5651	153.4349	206.5651	333.4349
1:1.5	33.6901	146.3099	213.6901	326.3099
1:1.25	38.6598	141.3402	218.6598	321.3402
1:1	45.0000	135.0000	225.0000	315.0000
2:1	63.4349	116.5651	243.4349	296.5651
3:1	71.5651	108.4349	251.5651	288.4349
4:1	75.9638	104.0362	255.9638	284.0362
5:1	78.6901	101.3099	258.9601	281.3099
6:1	80.5377	99.4623	260.5377	279.4623
8:1	82.875	97.125	262.875	277.125
10:1	84.2894	95.7106	264.2894	275.7106



5.0 Typical Sections

5.2.3 Format (Cont'd)

Generally, the scale is double that of the original, but can be altered to provide maximum clarity.

- **Placement**

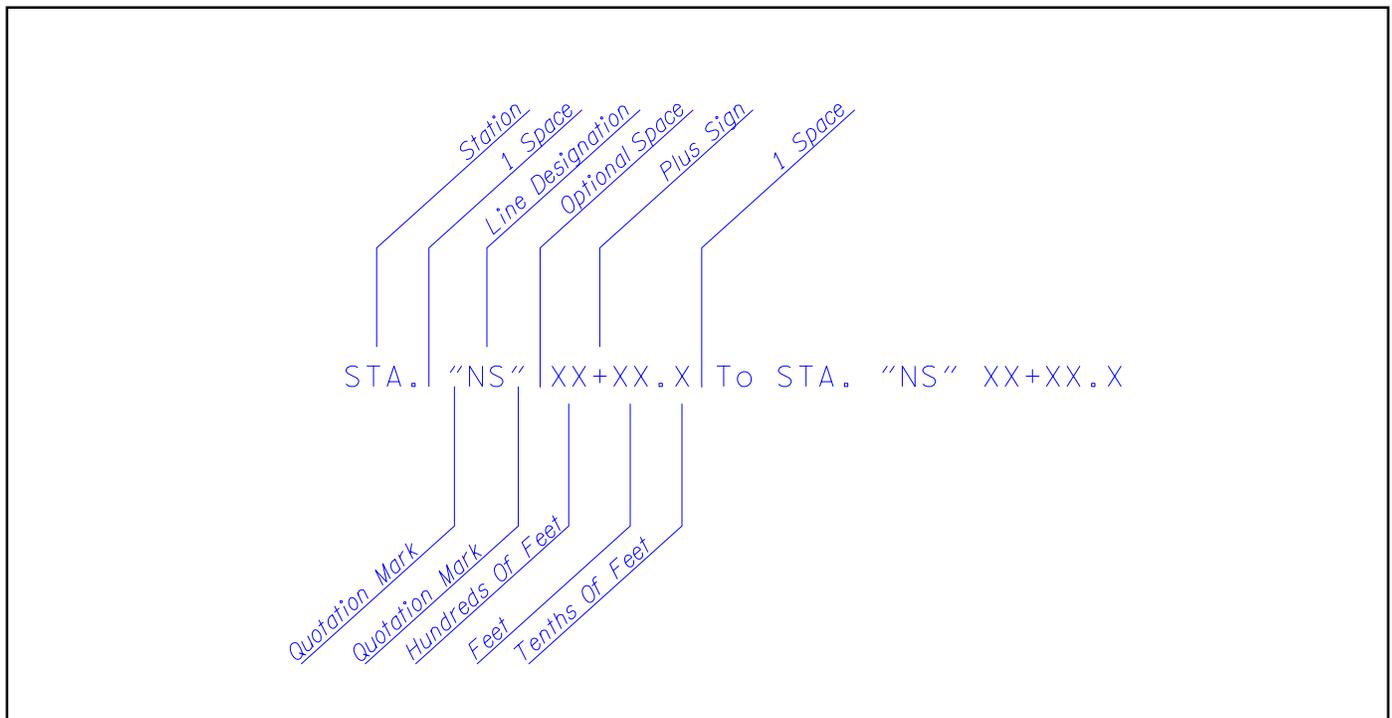
Inserts may be placed in any convenient location on the same sheet and general vicinity.

Note: For text font and size information, see Section 2.2, Volume 1 and Section 5, Volume 2.

Definitions

- **Partial Sections** — Partial Sections are used to illustrate any changes or variations of the typical section within the range of the given stations.
- **Stacking** — A term used to describe the placement of partial sections above the relative typical section on a plan sheets.
- **Insert** — The term used to describe a portion of a typical section or drawing which has been enlarged to clarify an aspect of construction.
- **Separate Partial** — A partial section which relates to more than one typical section, but it has its own title.
- **Typical Sections** — Stationing and notes which may be placed in any convenient location on a sheet with related typical sections. They may also be placed on a separate sheet (e.g., vehicle turnout, fallout area, parking lane, etc.).
- **Supplementary Typical Sections** — Additional sections necessary for clarification of other aspects of roadway construction, such as speed change lanes, interchange ramps, detours, method of feathering, treatment at bridge ends, etc. (some of these are shown as details, not in typical sections).

Figure 5-11 Station Format



5.0 Typical Sections

Figure 5-12 Station Examples

Align the word "To" with the centerline of the typical section

STA. "D"88+00 To STA. "D"88+00

Stationing

Note: For standard font, size, color, and weight, see Section 5, Volume 2

STA. "D"88+00 To STA. "D"95+00
 "D"95+00 To "D"97+00 (Structure)
 "D"97+00 To "D"99+00

Stationing with Station Note

Stationing note is shown within parenthesis

Station Equation is shown within brackets

STA. "D"88+00 THRU [EQUA. "D"89+21.25 Bk.=
 "D"95+63.32 Ah.] To STA. "D"97+00

Stationing with One Equation

The word "To" is not aligned with the centerline in this case

STA. "D"88+00 THRU [EQUA. "D"89+21.25 Bk.=
 "D"95+63.32 Ah.] To STA. "D"97+00
 "D"88+00 To STA. "D"88+00

Two Lines of Stationing with One Equation

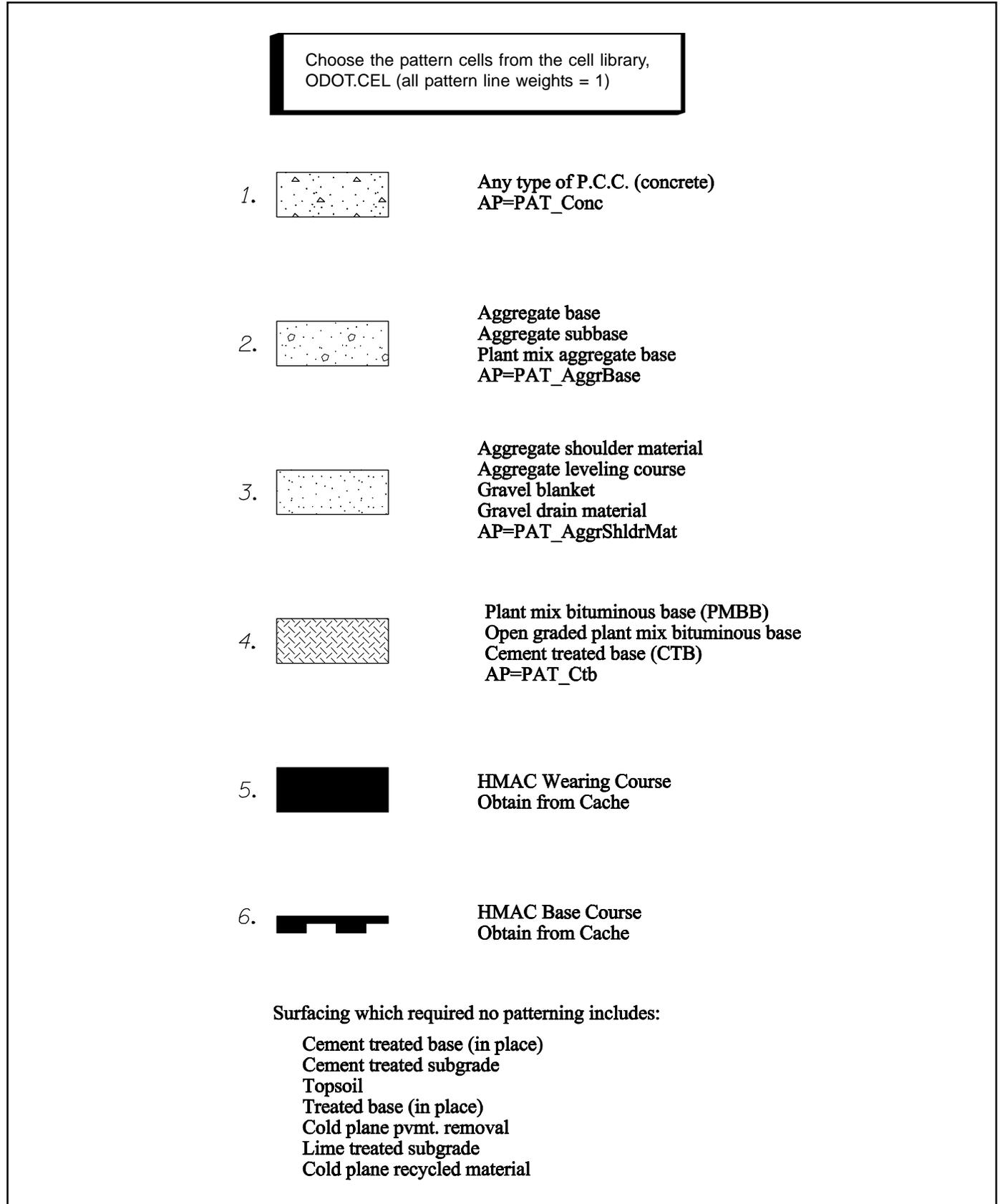
Note vertical alignment of second text line

STA. "D"88+000 THRU [EQUA. "D"88+000 Bk.=
 "D"88+000 Ah.] THRU [EQUA. "D"88+000 Bk.=
 "D"88+000 Ah.] TO STA. "D" 89+56.98
 "D"95+00 To STA. "D"97+00 (Structure)

Stationing with Two Equation

5.0 Typical Sections

Figure 5-13 Patterns



5.0 Typical Sections

Figure 5-14 Match Lines

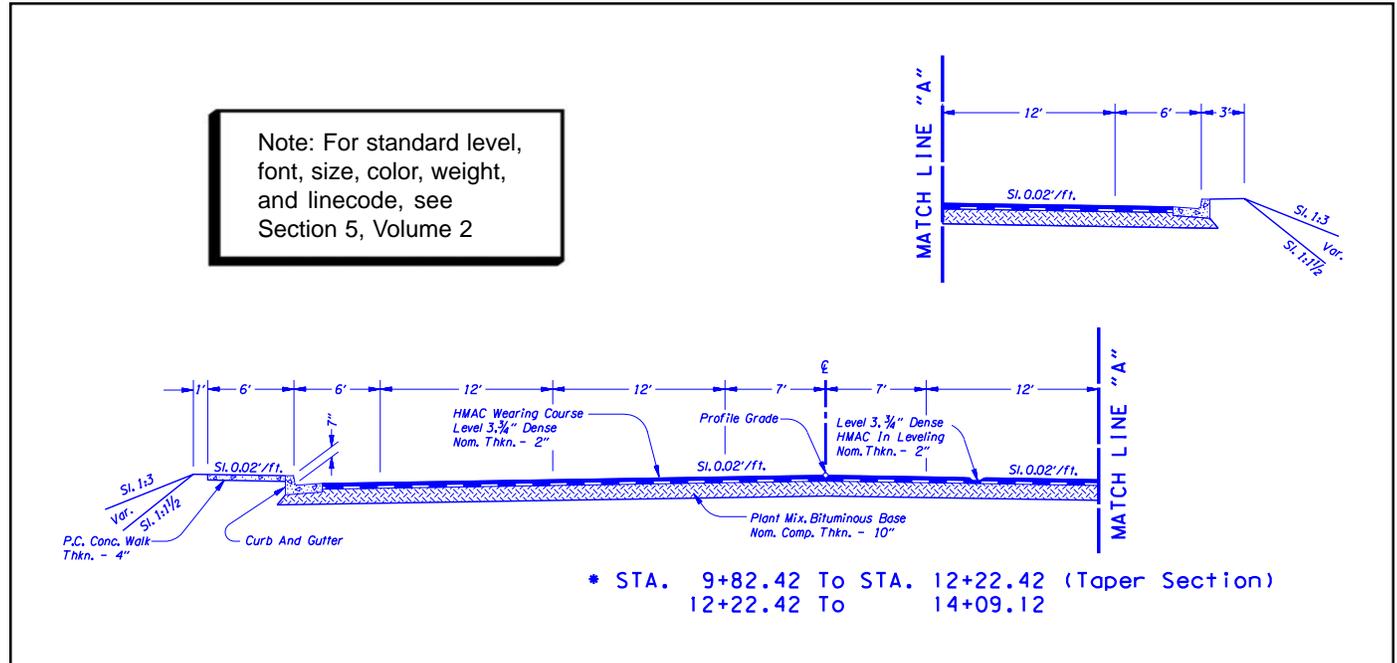
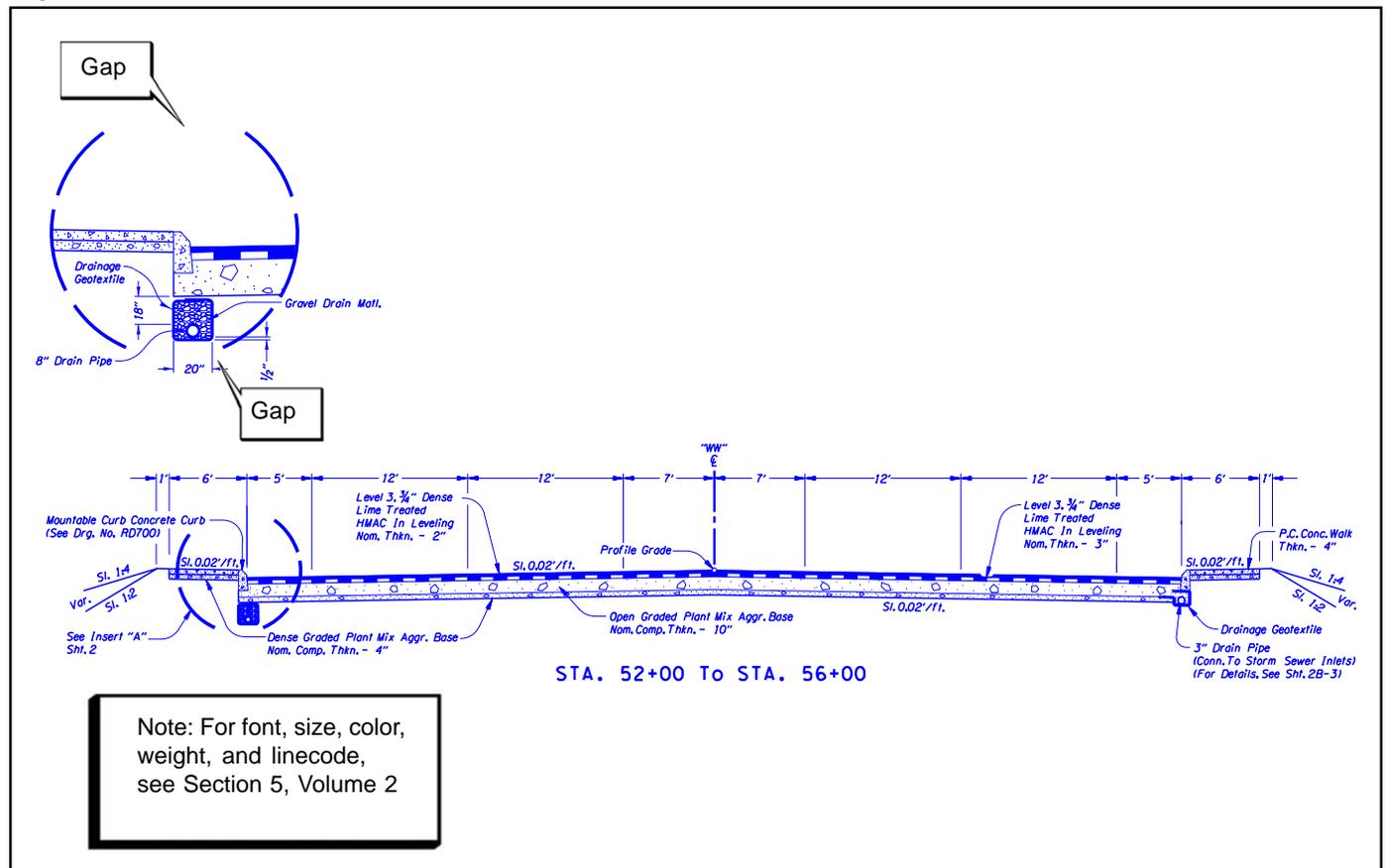


Figure 5-15 Insert



5.0 Typical Sections

Figure 5-16 Simple Taper

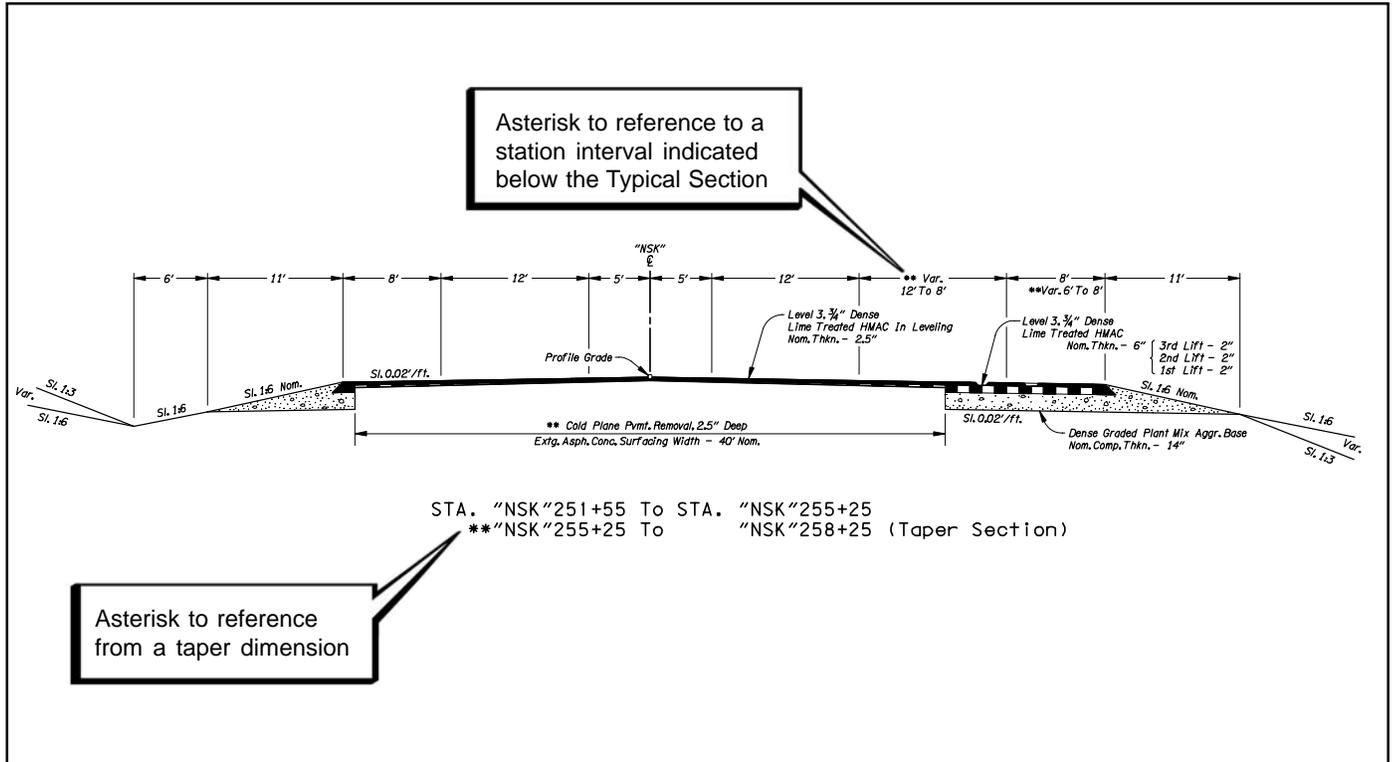


Figure 5-17 Complex Taper Table

STA. To	STA.	"SL"	"SR"
100+99	101+50	10'	12' To 6'
101+50	103+60	10'	6'
103+60	103+87	10' To 1'	1'
103+87	104+15	1'	1'
104+15	104+45	1' To 6'	8'
104+45	104+75	6'	8'
104+75	105+03	8'	8'
105+03	105+65	8'	8' To 10'
105+65	106+65	8'	10' To 12'
107+40	108+60	8' To 14'	16' To 10'
108+60	109+25	14'	8' To 6'
109+25	109+60	10'	6' To 4'
109+60	110+80	10'	4'
110+80	111+18	4'	4' To 6'
111+18	111+70	4'	6'
"C" 36+39	"C" 38+00	12'	14'

The terms "SL" and "SR" are used to indicate shoulder tapers occurring left and right. "SWL" and "SWR" are used to indicate sidewalk tapers left and right.

5.0 Typical Sections

5.3 Checklist

The typical section sheets that are included in the contract plan documents should show any or all of the following:

- Plan sheet, including sheet title, sheet number and “V” number
- Notes in the lower right corner
- Reference to standard drawings
- Signature block (first Typical Section sheet only)
- Engineer’s stamp (first Typical Section sheet only)
- Bridge details checked (only when a structure is shown)
- Right-of-way map number (first sheet only, or “No R/W Map” when there is no impact to the R/W as a result of the project)
- Insert with “blowup” to show more detail (only when necessary)
- Stacked sections (when necessary)
- Tables to clearly indicate tapers in lanes, curbs, etc.

