

## Chapter 10

### Roadway Plan and Roadway Plan-Profile

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## Chapter 10

# Roadway Plan and Roadway Plan-Profile

### 10.1 General

The roadway plan sheet shows the project's complete horizontal alignment. The plan-profile sheet shows the project's complete horizontal and vertical alignments. Various roadway elements such as pavement width, medians, paved shoulders, curbs, drainage elements, tapers, turn provisions, and intersecting roadways, are also shown on these sheets.

Roadway plan and roadway plan-profile sheets shall be prepared on standard formatted sheets that are contained in the FDOT Engineering/CADD Systems Software. Plotting should typically be done at a horizontal scale of 1" = 40' or 1" = 50' for urban jobs. For rural jobs, the scale should typically be from 1" = 100' or 1" = 200' horizontally, depending on the project specific details.

If a project layout sheet is not included in the plans set, provision shall be made on the first plan-profile sheet to show applicable general notes. Refer to **Exhibit 10-1** for a list of general notes.

## 10.2 Roadway Plan Portion

### 10.2.1 Centerline

The baseline survey and/or centerline of construction should be centered in the plan portion of the sheet, with stationing running from left to right. For resurfacing projects, simple projects, or sections of a project without a profile view, “stacking” multiple plans on one sheet is generally permitted if clarity and legibility are maintained. When multiple plan views are shown on a plan sheet, they shall be stacked from top to bottom. When alignment includes horizontal curves, the centerline should be positioned on the sheet to avoid breaks or match lines (except at the beginning or end of the sheet).

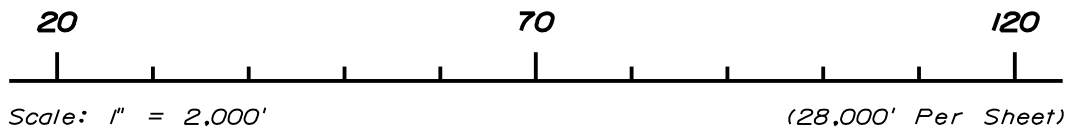
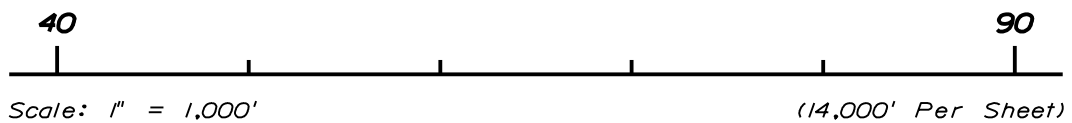
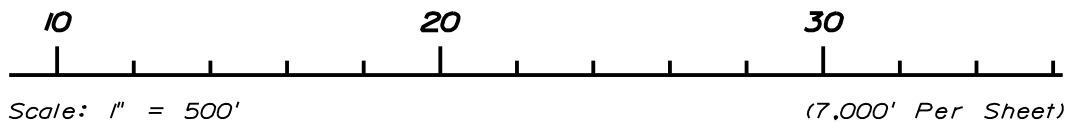
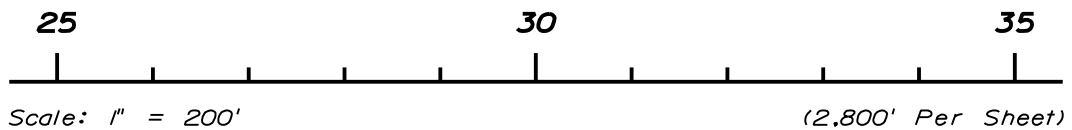
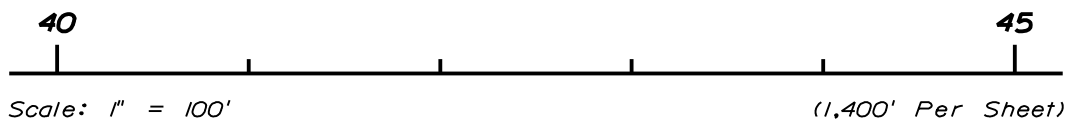
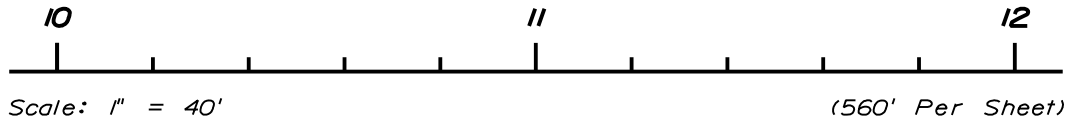
A "tick" mark shall be placed on the upper side of the centerline at every station. In addition, intermediate ticks shall be placed as shown in **Figure 10.1**. Intermediate ticks should be about half the length of those at each station.

Station numbers should be placed close to tick marks for scales up to and including 1" = 50' and outside the R/W lines for smaller scales.

In cases where the construction centerline does not coincide with the survey baseline, the construction centerline shall be identified with complete alignment data and ties to the survey baseline. However, the construction centerline need not be shown when it is uniformly offset from the survey baseline for the entire length of the project, and is shown on the typical sections. All station equations shall be included. These include equations occurring on the survey baseline and those equating the survey baseline and construction centerline.

A north arrow and scale shall be shown at a point of maximum visibility, preferably in the upper right portion of the plan view.

**Figure 10.1 Centerline Station Numbering and Tick Marks**



## 10.2.2 Horizontal Curves

PC and PT points of horizontal curves shall be indicated by small circles. Short radial lines shall be drawn from these points and identified. PI's shall be noted by the use of a small triangle with a short section of tangent on either side. Care must be taken in the clipping of plan sheets to properly orient the horizontal curves within the plan view. In cases where the curve extends over more than one sheet, the curve data shall be repeated on each sheet showing the curve.

Complete curve data shall be shown for each horizontal curve using the following format:

### **CURVE DATA**

- PI (Station)
- $\Delta$  (Delta Angle with Direction)
- D (Degree of Curve)
- T (Tangent Length)
- L (Length of Curve)
- R (Radius Length)
- PC (Station)
- PT (Station)
- e (Superelevation Rate)

### 10.2.3 Existing Topography

All existing topography shall be shown. Existing roads, streets, drives, buildings, underground and overhead utilities, walls, curbs, pavements, fences, railroads, bridges, drainage structures and similar items shall be plotted and labeled. Streams, ponds, lakes, wooded areas, ditches and all other physical features shall also be shown.

All existing utilities shall be shown on the plan and noted by an appropriate symbol (see the ***Design Standards, Index 002*** and the FDOT Engineering/CADD Systems Software for standard symbols). The line voltage for all overhead electrical power lines shall be shown on the plans. If the type of utility is unknown it should be labeled as such. Existing gasoline storage tanks within limits of topographical survey shall be located and illustrated.

## 10.2.4 Reference Data

Bearings, in the direction of stationing, shall be shown for all tangent sections.

Station equivalencies, angles with mainline centerline and/or bearings in the direction of stationing of the crossroad shall be shown for all roads and streets intersecting or crossing the project.

All the survey reference points shall be shown (if layout sheet is not included in plans set) at locations removed from the centerline.

If section lines or city limits are encountered within the limits of the project, the intersection shall be tied by station and angle/bearings to the baseline of survey.

## 10.2.5 Construction and Project Limits

Proposed construction and project limits shall be indicated in the plans. The limits to be flagged and stationed are:

1. Begin and end of project, and begin and end of construction where construction limits are other than project limits. If plans cover more than one project, the limits of each shall be clearly identified by station and Financial Project ID. Limits identification shall be shown both in plan and in profile.

It is the responsibility of the Engineer of Record (EOR) to set the project and construction limits. If the plans cover more than one project or are part of a corridor improvement, the project limits should be at the beginning of the full typical sections, with any construction (transitions, etc.) outside these limits being within the construction limits. Examples of types of work that may fall within construction limits but outside project limits are feathering, friction course, guardrail, drainage work and signing and marking work.

2. The limits of project breakdown necessary for separation of length and quantities for federal aid and non-federal aid projects.
3. The limits of each type of construction classification where more than one type is involved, such as, new construction, resurfacing, bridge work, widening, and milling.
4. The begin and end of exceptions and equations.

## 10.2.6 Drainage Structures and Bridges

Proposed cross drain pipes and box and three-sided culverts shall be indicated in the plan by a symbol and identified by a drainage structure number. Cross drain pipe sizes and lengths shall be shown. (Box and three-sided culvert lengths shall be shown on the drainage structure sheets).

Box and three-sided culverts (single or multiple) of 20 feet total span or more between inside faces of end supports, measured along the center of the roadway, shall be designated as bridge culverts and shall be identified by both a bridge number and a drainage structure number. The beginning and ending stations (outside wall to outside wall) shall be flagged.

Proposed bridges and approach slabs shall be shown by simple outline. Bridges shall be identified by bridge number and their beginning and ending stations noted by station flags. The beginning and ending stations of approach slabs shall be noted.

A short section of lateral ditch/outfall centerline shall be shown, when appropriate, on the roadway plan-profile sheet, together with a note referring to lateral ditch/outfall sheets for details.

The proposed drainage system is indicated by showing storm drain pipes with a single line, and the outline of inlets, manholes and junction boxes. The outline of structure bottoms may be shown at the designer's discretion. The pipe size and length between structures shall be given. Structure numbers shall be provided for inlets, manholes, junction boxes and special structures.

## 10.2.7 Plan Layout

1. Right of way lines shall be shown. Right of way shall be dimensioned only if the applicable typical section shows a varying dimension from the baseline or centerline. Dimensions of the R/W line shall be from the centerline or baseline, if survey and construction lines are parallel; otherwise it shall be dimensioned from the construction centerline.
2. The showing of detailed information regarding median openings or intersections should be avoided when they are of a type that can be detailed and grouped on a separate sheet. When this is the case, median openings and intersections shall be identified by station location.

3. At locations along the alignment where traveled way dimensions change, or begin to change, the station and dimensions of the traveled way shall be shown.
4. Curb, curb and gutter, traffic separators, sidewalks, curb ramps, retaining walls, etc. shall be shown. Driveways shall be shown as required by **Volume 1, Section 1.8**.
5. Stations of return points shall be shown in tabular form or shown on the plan, unless shown on an intersection detail sheet. Offsets shall also be shown, if not governed by a typical.
6. Station of radius points of traffic separator or median curb at median openings shall be shown in the plan. Elevation of these points shall also be shown if not shown in the intersection details sheet or unobtainable in plans.
7. Control radii for traffic turns that set median nose locations shall be indicated, unless shown on the intersection detail sheet.
8. Station of end of curb and gutter at side street intersections (when end is not at a return point) shall be shown with proposed gutter grade elevation of these points.
9. Limits of pavement and grading at side street intersections shall be indicated.
10. When incidental construction extends beyond the right of way lines, construction easements or license agreements may be required and should be shown on the plan sheets.
11. Limits of wetlands shall be shown based on permit or regulatory requirements.
12. All utilities shall be shown in the plan. All major utilities that have been field verified (see *Quality Level "A" locates*, **Volume 1, Chapter 5**) shall be labeled in accordance with the following symbol:

$V_{vh}$  = Verified Vertical Elevation and Horizontal Location

Projects with minor utility work or impacts may include these features on the roadway plan or plan-profile sheets.

13. All traffic monitoring sites on or within one-half mile of the project shall be identified with the following notation:

Traffic Monitoring Site Number (XXXX)

Roadway Identifying Number (RCI Section #) Milepost (XX.XXX)

Site includes vehicle detectors in roadway and pedestal, pole or base mounted cabinet, buried cable, and solar power unit on right of way.

Inquiries about monitoring sites should be addressed to the Traffic Data Section Manager of the Transportation Statistics Section, Office of Planning.

## 10.3 Roadway Profile Portion

### 10.3.1 General Data

Preformatted plan-profile sheets are located in the FDOT Engineering/CADD Systems Software. The grid portion of each sheet is used for plotting the project profile. The standard grid pattern for the profile portion of the sheet is five lines per inch, both in the horizontal and vertical. This will accommodate most scales. An optional grid with four lines per inch is available. This sheet may be used if approved by the district.

The horizontal scale for the profile portion of the sheet shall be the same as that used for the plan portion. Station limits of the profile shall correspond to those of the plan portion of each sheet. Station numbers shall be placed across the bottom of the sheet just above the title block. Intervals for profile stations shall be the same as those in the plan view.

Vertical elevation datum selected shall be such that the profile will not crowd either the upper or lower limits of the profile format. A general guideline is the vertical scale should be 10% of the horizontal grid. Elevation datum shall be shown on both the left and right sides of the sheet in the space provided adjacent to the grid.

The existing ground line profile shall be shown and labeled. Existing ground line elevations shall be noted vertically, just above the station numbers at each end of the sheet only.

All high water elevations affecting base clearance or roadway grades shall be shown and labeled.

Benchmark data shall normally be given just below the upper margin of the profile portion. However, if space permits, it may be placed in the plan portion just above the upper profile margin at the appropriate corresponding station. Refer to **Exhibit PP-2** for correct format.

Station equations and exceptions shall be shown. Begin and end stations of project, construction, bridge and bridge culverts shall also be shown.

## 10.3.2 Vertical Alignment

The proposed profile grade shall be shown and labeled. Vertical curve PC's and PT's shall be indicated by small circles and PI's by a small triangle with short sections of tangent shown on each side. Percents of grade to 3 significant decimal places shall be shown on the tangent line (trailing zeros need not be shown). Vertical lines shall be extended from the PC and PT points and a dimension line placed between these lines indicating the length of the vertical curve. The PC and PT stations and elevations shall be indicated on the vertical lines.

For vertical curves, the profile grade elevations shall be given on even stations and at appropriate intervals. The elevations shall be placed between the dimension line and the grade line. The curve length, dimension lines and the profile grade elevations shall be placed above the grade line for sag vertical curves and below the grade line for crest vertical curves. The dimensions and elevations shall be placed reasonably near the grade line whenever possible. The PI station and elevation shall be noted, lettered vertically above the PI symbol for crest curves and below for sag curves.

The profile grade elevation of the beginning and ending station of each sheet shall be shown vertically just above the grade line, except when the beginning or ending station on the sheet is on a vertical curve.

## 10.3.3 Grades

Percents of grades to 3 decimal places shall be indicated for each tangent section on every sheet (trailing zeros need not be shown). When two tangent grades intersect and no vertical curve is required the PI station and elevation shall be labeled vertically, using the same criteria as for vertical curves.

## 10.3.4 Superelevation and Special Profiles

For non-standard superelevated sections of the project, the begin and end superelevation stations should be indicated on the profile with a note:

"For Superelevation details see Special Profiles Sheet"

Other special profiles that cannot be clearly shown on the plan-profile sheets shall be referenced in a similar manner to non-standard superelevated sections. For additional information regarding special profiles see **Chapter 11** of this volume.

## 10.3.5 Other Profile Features

For rural construction projects, special ditches shall be indicated in the profile and labeled. Percent of ditch grade and a beginning or ending ditch PI with elevation and station plus shall be shown. For multi-lane divided projects, three special ditch grades (right and left roadway ditches and median ditch) sometimes occur at the same location. In such cases it may be advantageous to show the median ditch at a convenient location on the sheet with a separate elevation datum.

Uniform ditches of non-standard depth should be indicated by a dimension line in the lower portion of the grid and noted as a special ditch with location and depth, or they should be indicated by flagging the DPI's at each end with station elevation and side. Standard depth ditches are not shown.

Special gutter grades shall be shown in profile for cases where the gutter grades are not controlled by the typical section and no "special profiles" are included in the plans set.

Prolongations of gutter profile grades across street intersections shall be included on plan-profile sheets if an inlet is not provided before the intersection.

Storm drain pipes, inlets and manholes along the main line shall be shown. Pipes shall be noted by size. Proposed structures may be shown by structure number only. Flow line elevations shall be shown for all pipes entering and leaving the structure.

Proposed cross drain pipes and culverts shall be plotted. The section shall be shown at the correct location and elevation of the proposed structure crossing the centerline of construction. Cross drains shall be identified by structure number only.

Where the project overpasses a road or railroad, the cross section template of the road/railroad under the bridge shall be shown at the appropriate location in profile.

Except for transverse utilities, no underground utilities shall be shown in profile.

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## 10.4 General Notes for Roadway Plan and Roadway Plan-Profile Sheets

General notes are intended to be used to clarify design detail, construction practices or method for payment. General notes should be kept to a minimum. Only those notes that are job specific should be used. General notes should only be used to detail uniqueness and not to broaden or curtail requirements in the specifications. Notes that restate the standard specifications or standard indexes shall not be used. This will help to place proper emphasis on those notes that are job specific and avoid discrepancy of documents.

General notes for the project shall be placed on the left portion of the first plan-profile sheet if a project layout sheet is not included in the plans set, otherwise, they shall be included on the layout sheet. If the general notes for the project are numerous enough that putting them on the layout sheet (or the first plan sheet) becomes prohibitive, then a separate General Notes Sheet may be used (See **Exhibit GN-1**).

See **Exhibit 10-1** for a list of standard General Notes required.

### **Exhibit 10-1 General Notes for Roadway Plan and Roadway Plan-Profile Sheets**

1. (The bench mark datum used for the plans (NAVD 88 or other) shall be noted in the first General Note.)
2. Buildings to be removed by others, unless otherwise noted.
3. Existing drainage structures within construction limits shall (be removed/remain) unless otherwise noted.
4. (When there are no utility adjustment sheets in the plans, the notes shown in **Exhibit 20-1** shall be included here as part of the general notes).
5. (If there are no drainage structure sheets in the plans, the following notes shall be included in the general notes, if applicable):
  - a. Special attention is directed to the fact that portions of some drainage structures extend into the stabilized portion of the roadbed and extreme caution will be necessary in stabilization operations at these locations.
  - b. All drainage pipes have optional materials. The Optional Materials Tabulation Sheet(s) shows all materials allowed and indicates which material is plotted in the plans and used as the basis for pay quantities.
6. Any public land corner within the limits of construction is to be protected. If a corner monument is in danger of being destroyed and has not been properly referenced, the Engineer should notify the District Location Surveyor, without delay, by telephone.
7. Existing driveways within the limits of this project are to be replaced at the same location and width, unless otherwise shown in the plans.
8. (Any abbreviations used in the plans, that are not in **Index 001** of the **Design Standards**, shall be defined here as part of the general notes).