

**COMPLETION OF PLANS**

**CHAPTER 700**

## **701 COMPLETION OF PLANS**

All plans shall be prepared in MicroStation CADD format in accordance with the Department's "CADD Manual."

A complete set of plans shall consist of some or all of the following sheets. Certain sheets can be combined or eliminated depending on the scope of the project. Furthermore, additional sheets may be required to sufficiently describe construction activities.

- Title Sheet (s)
- Index Plan and Profile Sheet(s)
- Detailed Estimate Sheet(s)
- Typical Cross Sections, Miscellaneous Details, Drainage Details and Intersection Grading Sheet(s)
- Plan Sheet(s)
- Profile Sheet(s)
- Structure Sheet(s)
- Traffic Sheet(s)
- Maintenance and Protection of Traffic Sheet(s)
- Turfing Sheet(s)
- Railroad Sheet(s)
- Sedimentation and Erosion Control Sheet(s)
- Cross Section Sheet(s)
- Utility Sheet(s)
- Standard Drawing Sheet(s)

Each sheet shall show in the lower right hand corner the town, project number, the year in which the project is to be advertised, sheet number, total sheets and the name of the highway. An electronic plan border reference file is available from the Department.

Sheets shall be numbered consecutively in the approximate order shown above with the plan sheet immediately succeeded by the profile sheet of corresponding stations.

Utility informational sheets and Standard Drawing sheets will have their own separate numbering system based on alphabet lettering and special designated numbering.

A statement "THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED" shall appear on sheets containing estimated quantities, such as detailed estimate sheets, and bridge sheets showing estimated quantities. The statement also applies to boring sheets and certain bridge substructure sheets. It is not to be utilized on all construction drawings.

## **702 TITLE SHEET**

The first sheet of a set of plans is the Title Sheet. The title sheet shall show the project location on a State map located in the upper left-hand corner. An enlarged map showing the project location shall be shown in the upper right-hand corner. It may be digitized from a town map, providing it is of a magnitude that conveniently shows all town roads in the project area. State and Federal project numbers, as well as beginning and ending stations, shall also be noted on this location map.

The title sheet shall show (as a minimum) the following:

- Descriptive title of project
- Beginning and ending stations
- Town in which project is located
- Length of project to one millimeter
- Design scales used
- State and Federal project numbers
- Note stating responsibilities for future maintenance
- Standard specifications that shall govern construction
- Datum on which elevations are based
- Assumed design speed

- Highway classification
- Design year ADT and DDHV
- Descriptive “List of Drawings” with sheet numbers (including Utility information sheets)
- A listing of all Standard Sheets applicable to the project
- Designing company’s name, including signature of an officer and a Connecticut Seal with Professional Engineer’s number
- FHWA approval block with date

### **703 INDEX PLAN AND PROFILE**

An index plan plotted to a scale of 1:2500 and an index profile plotted to a horizontal scale of 1:2500 and a vertical scale of 1:250, shall be prepared for any design project requiring three or more 1:500 scale plan sheets.

The index plan shall show existing survey coordinates, roads, houses, street and property lines, railroads, streams, channel encroachment lines, bridges, box culverts, pipe culverts 1220 mm or larger in diameter, town lines and other important topographical features. These features will be subdued in comparison to the proposed new design.

The proposed design shall be more prominent in delineation over the existing features. As a minimum, the proposed new design shall show the following:

- Proposed baselines and centerlines showing roadway names with stations listed at 100 m intervals
- Stations at PC, PT, PCC, and at crossroads listing equalities
- List of baseline/centerline radii
- Bearing of baseline/centerline tangents
- All proposed roadway edges
- Bridges, listing stations and lengths
- State and Federal project numbers
- Beginning and ending stations with coordinates
- Soil test boring locations and numbers
- Boxed outline of 1:500 scale plan sheets with respective sheet numbers
- River/channel work with stationing

- Local sensitive areas, including wetlands

The index profile shall show 100 m stations horizontally and 10 m elevations vertically. It shall depict the existing groundlines for each roadway. The proposed construction shall show the gradeline, percentage of grades on tangents, station and elevation of PVC, PVT, PVI, the length of vertical curves, bridges, box culverts, and beginning and ending stations with elevations.

The index plan and profile may be on separate sheets or on a combination sheet according to the complexity and length of the project. The important consideration is for a clear presentation.

#### **704 DETAILED ESTIMATE SHEET**

The Consulting Engineer shall complete a tabulation of all items and quantities that appear in the Proposal Estimate, locating each item by station, noting where it is applied on the project. The contract item quantities shall be listed in 150 m increments.

Grading quantities shall be tabulated under the heading of earthwork. They shall be listed in 150 m increments under the appropriate heading of earth, rock or borrow. The earthwork summary shall consider earth shrinkage, rock swell, unsuitable material, pervious structure backfill, bedding material and borrow requirements, all in accordance with the applicable subsections under Section 200 (Earthwork) of the Standard Specifications.

Drainage items and quantities shall be tabulated under the separate heading of Drainage. Pipe culverts, catch basins, under-drains and related items shall be listed by station and drainage run, totaled to agree with the Proposal Estimate.

Guide railing and fencing requirements shall be tabulated by station and shown under a separate listing. They shall be listed in 150 m increments.

Pavement and other roadway items shall be listed under the Miscellaneous heading with appropriate station locations. They shall be listed in 150 m increments.

Bridges, other structures, curbing, traffic signals and light standard requirements shall all be shown under their own listing. They shall be listed in 150 m increments excepting bridges and structures which shall be listed by Bridge Number/Structure Number.

Every item and quantity listed in the Proposal Estimate must be accounted for on the Detailed Estimate Sheet and accurately located by station.

When necessary, more than one Detailed Estimate Sheet shall be used in a set of plans.

## **705 TYPICAL CROSS SECTIONS**

Project typical cross sections shall be drawn to show the typical lane configuration and pavement structure at various locations throughout the project.

The Typical Cross Sections shall provide a clear concise visual picture showing dimensions, elevations and notes that are unique to that section of the project, allowing only one interpretation by the State's contractor.

Typical sections are not required to be drawn to any specific scale. The prime importance is clarity and preciseness of the information detailing the "picture." To this end, a legend shall be noted on the first typical sheet providing detailed information.

A roadway Typical Cross Section shall be drawn for each roadway and shall show a normal as well as a superelevated section in cut and fill condition. Partial roadway sections shall be drawn for any deviations from normal. They may show a change in roadway pavement requirements, roadway or shoulder width deviations, sidewalk, guide railing, concrete barrier, slope conditions or any other conditions unique to the project.

Typical Cross Sections shall depict the proposed pavement and shoulder composition, median, slopes, curbs, point of application of grade and superelevation, guide rail and other critical controls.

## **706 MISCELLANEOUS DETAILS**

Any construction activity or contract item used on the project that is not detailed in the Standard Drawings or elsewhere in the contract plans shall be detailed by the Consulting Engineer on a Miscellaneous Detail sheet.

Guide rail, curbing, special pavement requirements, sidewalk treatment and other such miscellaneous details shall be drawn on these sheets.

## **707 DRAINAGE DETAILS**

All drainage items, including structures, ditches, channels or a series of items constituting a completed drainage structure, not shown on a Standard Drawing, must be shown and detailed on a drainage sheet.

The details do not need to be drawn to a particular scale but must be of a size clearly indicating all information without a cluttered effect. All pertinent dimensions and notes must clearly be shown on the detail. Stations and/or a description must be noted stating where the detail applies on the project.

## **708 INTERSECTION GRADING PLANS**

Roadway intersection grading plans shall be drawn to a suitable scale on a separate sheet.

Roadway contour details through the intersection shall be shown. Depending on the percent of grade, contour intervals may vary from 0.05 m to 0.5 m intervals. Catch basins shall be shown at the appropriate low points and top of grate elevations noted.

## **709 SURVEY TIES - CURVE DATA**

Project centerline and baseline survey ties, coordinates, bench marks, bearings, distances and curve data shall be shown on the plan sheet where they apply.

On lengthy complicated projects consisting of three or more 1:500 scale plans, the basic survey data shall be shown on an index plan base map. In addition, a separate sketch showing details of the control points shall be shown on a separate control sheet or

curve data sheet. These sketches shall show details of the control point ties such as drill holes, pk-nails, telephone pole ties, tree ties, north arrows and all other pertinent points used to describe such control points.

Curve data sheets shall show the curve number, coordinates, stations, PC, PT, PI, Radius and other clarifying details.

## **710 SUBSURFACE BORING DATA**

Specific procedures for obtaining bridge and roadway borings are covered in the "Soils and Foundations Guide for Design by Consulting Engineers." Any boring not labeled as a bridge boring should be located on the roadway (1:2500 scale) index plans with plots of the borings on sheet(s) specifically set up for this information. A sample roadway borings sheet can be obtained from your Project Engineer.

The plotted borings should have elevations as well as stations and coordinates. Furthermore, any previous/existing subsurface data acknowledged and used in the design of the project should be shown on plans, with its vintage stated.

## **711 PLAN SHEETS**

Final design plan sheets will be submitted in accordance with the Department's CADD Manual (not available at time of printing).

Match marks on sheets shall be perpendicular to the centerline at an even 20 m station with no duplication of features on following sheets.

In heavily detailed urban areas where the amount of existing and proposed data detail on a single sheet would be cluttered or difficult to interpret, duplicate complementary plan sheets shall be prepared. These complementary sheets can show proposed design detail, or right of way detail, and exclude some or all existing topographic detail. However, suitable boxed-in notes cross referencing each sheet must be clearly marked to eliminate omission and confusion. The Consulting Engineer may request that the scale of the plan sheet be changed. The Department will advise the Consulting Engineer on a case-by-case basis.

Each plan sheet shall include a curbing tabulation block.



Each plan sheet shall also include top of frame and invert elevations for each storm drainage structure shown on the plan. Proposed drainage structures shall be identified by station and offset, left or right, of the baseline or centerline. The top of frame and all invert elevations shall be shown to the nearest 0.003 m. Depending on the complexity of the drainage design, this information can be included in a tabulation block or by leader lines from each structure.

The Consulting Engineer shall incorporate onto the final plans all Right of Way information. This information consists of, but is not necessarily limited to, proposed right-of-way lines with all pertinent dimensions, existing property lines, existing highway and street lines, property owners' names on each individual parcel, existing and proposed easements of all kinds, and proposed rights as to drainage, slope easements and incidental construction.

All pertinent property notes on construction drawings are to be worded in the present tense rather than future tense as is the case on Property Maps. For example, use "Required" rather than "To Be Acquired."

The Consulting Engineer may be assigned the preparation of Property Maps. It is important that information shown on Property Maps be promptly transferred to the construction drawings so updated prints of the drawings can be used in connection with appraisals or property negotiations.

Should discrepancies become evident between existing property lines as shown on construction drawings based upon the original survey and those shown on the Property Maps, the latter, being based upon actual title search information, shall take precedence, and the construction drawings shall be revised accordingly.

## **712 PROFILE SHEETS**

Stationing on the profile sheets shall duplicate stationing on corresponding plan sheets. The roadway profile shall be approximately in the center of the profile grid for full length of the sheets. It shall also be placed so that even 5 m of elevation coincides with the heavy solid horizontal lines and 20 m stations coincide with the heavy solid vertical line. The ground line shall be shown as a light solid line and the proposed grade shall be shown

as a heavy solid line. The points of curvature and tangency of vertical curves shall break the solid line with small circles. These points as well as PVI's, high points and low points shall be depicted by station and elevation. The gradient between vertical curves shall also be shown. Basic elevations shall be shown at 5 m intervals in the right and left margins of the sheet on the heavy horizontal lines. Horizontal 20 m stations shall be shown on the lower border.

Bridges shall be shown indicating beginning and ending stations, elevation and length. Existing drainage shall be shown in dashed line; proposed new drainage shall be shown in a solid heavier line. Depth of subbase shall be specified and shown along the bottom of the sheet. Proposed walls and foundations shall be shown with elevations.

### **713 STRUCTURE SHEETS**

Sheets showing the detailed design of bridges, box culverts, retaining walls or other roadway structures shall be prepared in accordance with the Department's "Bridge Design Manual."

The plans for individual bridges and retaining walls shall be prepared as "self contained" sets. The details shall be drawn to scale and presented on sheets specific to the various components of the structure. For example, there will be a general plan, a foundation plan, an abutment plan, pier plans, framing plans, etc.

### **714 TRAFFIC PLANS**

Traffic design requirements shall be shown on the 1:500 scale project plans wherever possible. In instances where numerous detailed traffic requirements are needed, separate sheets shall be included.

#### **714.01 PAVEMENT MARKING PLANS**

On minor projects, pavement marking details can be shown on the 1:500 scale plans or the Traffic Signal Plans.

On major projects, separate 1:2500 scale drawings detailing a legend, dimensions and notes shall be prepared by the Consulting Engineer. Separate enlarged details shall be made to supplement and clarify the small scale plans.

#### **714.02      SIGNAL PLANS**

Traffic signals and intersectional traffic movement volumes and turning movements shall be shown on a separate traffic signal plan sheet in accordance with the Department's "Manual on Traffic Control Signal Design." All required phasing, timing and needed details will be tabulated in a box form to provide clarity for construction. Blank traffic control signal plan sheets (electronic files) will be supplied to the Consulting Engineer by the Project Engineer upon request.

Sketches showing details of each intersection, with pavement markings, and other needed information, will be drawn on this sheet. Arrows designating movements and symbols in the legend shall be provided for explanations and clarity.

#### **714.03      SIGNING PLANS**

The Consulting Engineer shall coordinate signing requirements with the Department. They shall be responsible for determining exact locations of the proposed signing in conjunction with the Department. All signing details and locations shall be included in the project plans and documents.

#### **714.04      ILLUMINATION PLANS**

Project illumination requirements shall be coordinated by the Consulting Engineer through the Department. If so determined, the Consulting Engineer shall design illumination and show all details on Illumination Plan Sheets.

#### **715      DETOUR PLANS**

Roadway detour details shall be clearly shown on the project plan sheets, index plan sheets, stage construction plan sheets or on separate detail sheets.

Detours utilizing town roads must be coordinated by the Department through the involved towns. Hence, the Consulting Engineer shall alert the Department if it is proposed to utilize town roads for detours.

The Department will arrange meetings with towns and write agreements for town road detours. The Consulting Engineer will be responsible for all design requirements for the inclusion of detours into the project documents.

## **716 STAGE CONSTRUCTION PLANS**

When applicable, the Consulting Engineer shall detail the project stage construction on separate sheets. These will be made to a suitable scale. All notes, dimensions and intent shall clearly be shown whereby only one interpretation can be made by the Contractor.

Method of removal of temporary roads and bridges will also be clearly stipulated.

## **717 TURFING PLAN**

The base sheet index plan plotted to a scale of 1:2500 shall be used to prepare the turfing plan. This plan sheet shall show beginning and ending stations and the project number.

A legend will be made on the first sheet. The legend, with appropriate symbols, shall specify where the following apply:

1. Furnishing and placing topsoil
2. Turf establishment
3. Sodding

On smaller projects, the turfing requirements may be detailed on a typical cross section sheet and/or on the 1:500 scale plan sheets.

## **718 SEDIMENTATION AND EROSION CONTROL PLAN**

Sedimentation and erosion controls shall be shown on 1:500 scale plan sheets in the areas that they apply.

In certain instances, sedimentation basins or other sedimentation control devices shall be detailed on a separate sheet showing all pertinent dimensions and notes. Details do not need to be drawn to any particular scale but must be of a size clearly indicating all information without a cluttered effect.

## **719 CROSS SECTIONS**

Ground lines, house foundations, curbs and driveways, stations and datum elevation shall be shown for each cross section. The proposed centerline grade elevation and super-elevation (when applicable) shall be noted. Surface rock shall be indicated by cross hatching; substrata rock shall not be shown unless verified by soil borings. Templates showing the proposed roadway section, and structures shall be shown. The lines shall be sufficiently heavy to show clearly on reproducible half-size prints.

Some of the details shown on a typical cross section template may be eliminated on the actual cross sections. The eliminated details would include the intermediate limits of pavement and base courses, thereby showing only the bottom line of the roadway subbase course, the upper surface of the pavement and curbing, the shelf area to the hinge point and the side slopes. Also indicated by a "crow's foot" is the elevation of the centerline of the proposed roadway. The details of base courses, pavement, shoulders, curbs, railings, etc. will be shown on the typical section sheets. Although it will not be necessary to show the pavement and shoulder details on most cross section templates, there may be cases where special treatment of shoulder cross slopes is required. An example of this might be the shoulder area between mainline pavement and ramp pavement. In these instances, full shoulder and pavement detail should be shown.

## **720 UTILITY PLANS**

### **720.01 CONSTRUCTION WORK PERFORMED BY UTILITY COMPANY**

When public utility facilities are disturbed by the proposed project construction work, the utility owner is responsible to prepare design plans showing the reconstruction/relocation, and is responsible to perform the construction work with its own forces. The Consulting Engineer shall coordinate the Utility owner's design requirements with the Department's design as specified in Chapter 600 and elsewhere in this Manual.

The Consulting Engineer shall incorporate the Utility's design plans into the Final Contract Documents for the Contractor's information only. These sheets will follow the last sheet of the Department's design plans. They shall use a letter designation as a numbering sequence. Each utility will be designated a separate alphabet letter.

To avoid confusion by the State's Contractor, the Consulting Engineer will place a note on each Utility's plans stating that the work is to be performed by the named Utility Company.

If an aerial facility is involved, a note is to be made on the project plan sheets concerned, indicating the voltage and the minimum vertical clearance of wires or cables crossing over the roadways of the project.

Other applicable special utility requirements are to be noted and flagged on the Department's plans.

The Consulting Engineer shall not make any changes to a Utility's design plans. The utility design shall be the Utility Company's individual responsibility. Overall review and coordination shall be the Consulting Engineer's responsibility.

**720.02      CONSTRUCTION WORK INCLUDED IN THE DEPARTMENT'S PROJECT**

When approved by the Department, required utility relocation work shall be included in the Department's Final Contract Documents. The design shall be prepared by the involved utility owner unless specifically directed otherwise by the Department.

The design information, plans, special provisions and estimates shall be incorporated into the Department's Contract Documents by the Consulting Engineer and will be constructed by the State's Contractor. Where the work is minimal, it shall be shown on the Department's plan sheets. Where the work is of greater magnitude, separate utility sheets shall be added and consecutively numbered with the Department's plan sheets. All work will conform to the Department's requirements.

**721 STANDARD DRAWINGS**

The Consulting Engineer shall be familiar with the Department's Standard Drawings. Standard drawings needed on a project shall be identified in the List of Drawings on the title sheet. The standard drawings identified on the title sheet will be included in the Contract Plans by the Department.

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