

CHAPTER 3 – DRAINAGE PLAN REQUIREMENTS

Table of Contents

SECTION 3.01 – INTRODUCTION ..... 1

SECTION 3.02 – GENERAL INFORMATION ..... 2

SECTION 3.03 – PRELIMINARY PLANS ..... 3

    3.03.1 TITLE SHEET ..... 3

    3.03.2 TYPICAL SECTIONS SHEET ..... 3

    3.03.3 DETAIL SHEET ..... 3

    3.03.4 RIGHT-OF-WAY ACQUISITION TABLE AND PROPERTY MAP SHEET ..... 3

    3.03.5 PRESENT LAYOUT SHEET ..... 3

    3.03.6 R.O.W. DETAILS SHEET ..... 4

    3.03.7 PROPOSED LAYOUT SHEET ..... 4

    3.03.8 PROPOSED PROFILE SHEET ..... 5

    3.03.9 RAMP PROFILE SHEET ..... 5

    3.03.10 SIDE ROAD PROFILE SHEET ..... 6

    3.03.11 PRIVATE DRIVE, BUSINESS, AND FIELD ENTRNACE PROFILE SHEETS 6

    3.03.12 DRAINAGE MAP SHEET ..... 6

    3.03.13 CULVERT SECTIONS SHEET ..... 6

    3.03.14 ROADWAY CROSS SECTIONS SHEETS ..... 7

    3.03.15 SIDE ROAD CROSS SECTIONS SHEETS ..... 7

SECTION 3.04 – RIGHT-OF-WAY PLANS ..... 8

    3.04.1 TITLE SHEET ..... 8

    3.04.2 PROJECTS COMMITMENT ..... 8

    3.04.3 TYPICAL SECTIONS SHEET ..... 8

    3.04.4 TABULATED QUANTITIES SHEET ..... 8

    3.04.5 DETAILS SHEET ..... 8

    3.04.6 PROPERTY MAP AND RIGHT-OF-WAY ACQUISITION TABLE SHEET ..... 8

    3.04.7 PRESENT LAYOUT SHEET ..... 8

    3.04.8 R.O.W. DETAILS SHEET ..... 9

    3.04.9 PROPOSED LAYOUT SHEET ..... 9

    3.04.10 PROPOSED PROFILE SHEET ..... 9

    3.04.11 RAMP PROFILE SHEET ..... 9

3.04.12 SIDE ROAD PROFILE SHEET ..... 9

3.04.13 PRIVATE DRIVE, BUSINESS, AND FIELD ENTRANCE PROFILE SHEETS 9

3.04.14 DRAINAGE MAP SHEET..... 9

3.04.15 CULVERT SECTIONS SHEET ..... 9

3.04.16 EROSION PREVENTION & SEDIMENT CONTROL PLANS SHEETS ..... 10

3.04.17 CROSS SECTIONS SHEETS..... 10

SECTION 3.05 – CONSTRUCTION PLANS..... 11

3.05.1 TITLE SHEET ..... 11

3.05.2 ROADWAY INDEX AND STANDARD ROADWAY DRAWINGS SHEET ..... 11

3.04.3 PROJECTS COMMITMENT ..... 11

3.05.4 ESTIMATED ROADWAY QUANTITIES SHEET..... 11

3.05.5 ESTIMATED BOX BRIDGE QUANTITIES SHEET ..... 11

3.05.6 TYPICAL SECTIONS SHEET ..... 11

3.05.7 GENERAL NOTES SHEET..... 11

3.05.8 SPECIAL NOTES SHEET..... 12

3.05.9 TABULATED QUANTITIES SHEET..... 12

3.05.10 DETAIL SHEET ..... 12

3.05.11 PROPERTY MAP AND RIGHT-OF-WAY ACQUISITION TABLE SHEET .... 12

3.05.12 PRESENT LAYOUT SHEET ..... 12

3.05.13 R.O.W. DETAILS SHEET ..... 12

3.05.14 PROPOSED LAYOUT SHEET ..... 12

3.05.15 PROPOSED PROFILE SHEET ..... 12

3.05.16 RAMP PROFILE SHEET ..... 12

3.05.17 SIDE ROAD PROFILE SHEET ..... 12

3.05.18 PRIVATE DRIVE, BUSINESS, AND FIELD ENTRANCE PROFILE SHEET 12

3.05.19 DRAINAGE MAP SHEET..... 13

3.05.20 CULVERT SECTIONS SHEET ..... 13

3.05.21 EROSION PREVENTION AND SEDIMENT CONTROL PLAN SHEETS .... 13

3.05.22 CROSS SECTIONS SHEET ..... 13

3.05.23 TRAFFIC CONTROL PLANS SHEETS ..... 13

SECTION 3.06 – DRAINAGE DESIGN RECORDS ..... 14

3.06.1 OVERVIEW..... 14

3.06.1.1 INTRODUCTION.....	14
3.06.1.2 DEFINITION.....	14
3.06.1.3 PURPOSE .....	14
3.06.1.4 TYPES .....	15
3.06.1.5 SCHEDULING .....	16
3.06.1.6 RESPONSIBILITY.....	16
3.06.2 PROCEDURES.....	16
3.06.2.1 INTRODUCTION.....	16
3.06.2.2 PRACTICES .....	17
3.06.3 DOCUMENTATION COMPONENTS.....	17
3.06.3.1 ASSEMBLY.....	17
3.06.3.2 HYDROLOGY .....	18
3.06.3.3 ROADSIDE DITCHES AND STREAMS.....	18
3.06.3.4 CULVERTS.....	19
3.06.3.5 STORM DRAINAGE SYSTEM.....	19
3.06.3.6 STORM WATER STORAGE FACILITIES.....	19
3.06.3.7 DESIGN RECORDS EXCLUSIONS .....	20
3.06.3.8 SEQUENCE OF DESIGN RECORDS COMPONENTS.....	20
SECTION 3.07 – APPENDIX .....	1
3.07.1 FIGURES AND TABLES.....	1
3.07.2 REFERENCES .....	48
3.07.3 ABBREVIATIONS .....	49

**SECTION 3.01 – INTRODUCTION**

This chapter discusses the various components of drainage design required to be included on the plans and in the design records. The requirements for each phase of the plan submittal process (Preliminary, Right-of-Way, and Construction) are discussed separately herein. The Preliminary plans contain information for use up to and including the public hearing, including preliminary design data for cross culverts, ditches, and channels which will impact the general location of the proposed right-of-way and easements. The Right-of-Way plans include all completed drainage design information in order to accurately delineate and describe proposed right-of-way and easements necessary for acquisition of the required property. The Construction plans contain all tabulated drainage quantities for the project in addition to the information included in the Right-of-Way plans.

**SECTION 3.02 – GENERAL INFORMATION**

All current Tennessee Department of Transportation (TDOT) drafting standards (including standard symbols for drainage related items) are to be utilized in developing the plans. The format of notes and general sheet layout for drainage design is presented in later sections of this chapter on the sample drawings.

Sheets in the plans where drainage related information is normally shown include:

- Title Sheet
- Roadway Index and Standard Roadway Drawings Sheets
- Estimated Roadway Quantities Sheets
- Estimated Box Bridge Quantities Sheet
- Typical Sections Sheets
- General Notes Sheets
- Special Notes Sheets
- Tabulated Quantities Sheets
- Property Map and Right-of-Way Acquisition Table Sheet
- Present Layout Sheets
- Proposed Layout Sheets
- Profile sheets
- Side Road and Ramp Profile Sheets
- Private Drive, Business, and Field Entrance Ramp Profile Sheets
- Drainage Map Sheets
- Culvert Cross Sections Sheets
- EPSC Sheets
- Traffic Control Sheets

Other sheets may contain drainage related information in certain cases.

The following sections contain information which is to be shown on appropriate sheets within the design plans. The Appendix at the end of this chapter contains samples of portions of the sheets.

**SECTION 3.03 – PRELIMINARY PLANS**

During the Preliminary Plans phase, all cross drains are designed and preliminary design is performed on other drainage components so that the profile grade of: the proposed roadway improvement, the preliminary right-of-way, and the easement requirements can be established. This information is necessary to develop the plans to a level adequate to be used in the public hearing. The following presents the drainage information required to be shown on the respective sheets in the preliminary plans.

**3.03.1 TITLE SHEET**

The Title Sheet shows the bridge length and box bridge length along with the roadway length and project length under the location map. (See [Figure 3A-1A: Example of Title Sheet](#) and [Figure 3A-1B: Example of Project and Bridge Lengths on Title Sheet](#))

**3.03.2 TYPICAL SECTIONS SHEET**

The Typical Sections Sheet shows typical road sections and includes details of the standard template ditches in cut sections and underdrains. Information concerning side slopes, ditch stabilization, and rounding is shown on this sheet. Curb and gutter details and transition details are shown. Special ditch information is shown if there is adequate space, otherwise special ditch information is shown on the Details Sheet (see Section 3.03.3). This information includes station range, location left or right of centerline, bottom width, top width, material, and minimum depth. [Figure 3A-2A: Example of Typical Sections \(Divided Median\)](#) is a sample of a portion of a Typical Sections or Details Sheet showing proposed template ditches. These sheets also show curbs and gutters in curbed streets. [Figure 3A-2B: Example of Typical Sections \(Curb and Gutter\)](#) is a sample of a portion of a Typical Sections or Details Sheet showing a curb and gutter section.

**3.03.3 DETAIL SHEET**

If there is not adequate space on the Typical Sections Sheets, details of channel changes, ditch modifications, and special ditches are shown on the Detail Sheets. Such details include station range, location left or right of centerline, bottom width, top width, material, and minimum depth. Special details are shown for any component of the plans that are not covered in the standard drawings. (See [Figure 3A-3: Example of Special Ditch Details](#))

**3.03.4 RIGHT-OF-WAY ACQUISITION TABLE AND PROPERTY MAP SHEET**

If there are any drainage easements, they are shown in the Right-of-Way Acquisition Table. The area of the easement is shown under the drainage easement column in the line corresponding to its tract number. On the property map, all existing and proposed drainage easements are labeled and delineated with linework and patterning. All existing and proposed environmental features are similarly shown. (See [Figure 3A-4: Example of Property Map Sheet](#) and [Figure 3A-5: Example of Right of Way Acquisition Table](#))

**3.03.5 PRESENT LAYOUT SHEET**

The Present Layout Sheet indicates existing conditions in the area of the proposed road. All existing wetlands, wet weather conveyances, streams, seeps, receiving water, and ponds are shown and labeled. If wetlands are present, and there are no environmental mitigation plans

sheets, the area is delineated and patterned and the wetland impact table is shown. If there are environmental mitigation plans sheets, then the wetland delineation, patterning, and impact table are also shown on those sheets. All existing drainage structures are shown and labeled such as bridges, culverts, pipes, and storm sewer components. All existing drainage easements are delineated with linework but are not labeled. Any existing drainage features which are to be plugged and abandoned shall be clearly labeled Plugged/Abandoned.

Also, some of the features of the proposed road are shown. All proposed bridges are labeled and their begin and end stations flagged. All cross drains are labeled with type, pipe diameter, length, and inlet and outlet elevations shown. Additionally, an arrow is shown indicating direction of water flow. [Figure 3A-6A: Example of Present Layout Sheet w/ Pipe Culvert](#) and [Figure 3A-6B: Example of Pipe Culvert as Shown on Present Layout](#) are samples of a portion of a Present Layout Sheet showing a proposed pipe culvert. [Figure 3A-7A: Example of Present Layout w/ Box Culvert](#) and [Figure 3A-7B: Example of Box Culvert as Shown on Present Layout](#) are samples showing a proposed box culvert. [Figure 3A-8: Example of Box Bridge on Present Layout](#) is a sample showing a proposed box bridge. [Figure 3A-9: Example of Bridge on Present Layout](#) shows a proposed bridge as it appears on the Present Layout sheet.

### 3.03.6 R.O.W. DETAILS SHEET

The Right-of-Way Details Sheet shows all existing and proposed permanent drainage easements labeled, delineated with linework, patterned, and have bearings and distances called out. Also, all existing and proposed environmental features are similarly shown. (See [Figure 3A-10A: Example of Right of Way Details Sheet](#) and [Figure 3A-10B: Example of Drainage Easement as Shown on Right of Way Details Sheet](#))

### 3.03.7 PROPOSED LAYOUT SHEET

In the Proposed Layout Sheet, all existing wetlands, wet weather conveyances, streams, seeps, receiving water, and ponds are shown and labeled. Also, all proposed drainage structures and components are shown.

Proposed bridges are labeled and their begin and end stations flagged. Bridge end drains are labeled. At bridge ends, riprap apron shapes are delineated, patterned, and labeled with riprap class. Proposed channel changes are labeled and begin and end stations are flagged. The proposed cross drains and side drains are shown with station, skew, offset, and inlet and outlet elevations, pipe culvert type, length, diameter, endwall type and treatment type. End treatments such as riprap, endwalls, and dissipaters are shown and labeled. Dimensions of riprap aprons are labeled with length, width, and depth defined. Proposed curb and gutter are shown and labeled including begin and end stations with offsets from centerline. Proposed drainage systems such as catch basins, culverts, pipes, manholes, junction boxes, and endwalls are shown and labeled with appropriate text. This includes: structure codes and types, grate/inlet/outlet elevations, flow direction of pipe, pipe diameter and length, endwall type, and riprap class. This information can be placed in table format. All special ditches are shown with a flow line and labeled with the type of lining and width. Begin and end stations are flagged. Transitions or tie-in points for drainage systems such as curb and gutter and extensions of existing pipes and boxes shall be labeled by station and offset. Portions of the existing features that these proposed features tie-in to will also be shown. (See [Figure 3A-11A](#) through [Figure 3A-17](#))

Culverts under median openings are shown in the plan view with the structure number of the end treatment, type of end treatment, and invert elevation at the end of the end treatments. The profile shows the graphical location of the culvert along with the structure number and type of end treatment. The top number in the circle labeling the drainage structure denotes the

structure number specific to the project. The bottom designation denotes the type of structure used. [Figure 3A-17: Example of Median Culvert \(Proposed Layout and Profile View\)](#) is a sample of a portion of a Proposed Layout Sheet with a median culvert

Special ditches required which are not standard template ditches are shown in the plan view along with the type of ditch and specified lining with begin and end station labeled. The profile shows the special ditch slope and elevations at break points along with the station of the break point. [Figure 3A-16: Example of Special Ditch and Side Drain on Proposed Layout](#) is a sample of a portion of a Proposed Layout Sheet with a special ditch. Template ditches are not shown on the Proposed Layout Sheets.

Storm sewer systems are shown in the plan view along with the pipe sizes, structure numbers, type of structure, grate elevation and invert elevations of each structure. [Figure 3A-13A: Example of Proposed Layout w/ Storm Drain](#) shows a portion of a Proposed Layout Sheet with a storm sewer system in the plan view.

### 3.03.8 PROPOSED PROFILE SHEET

In the Proposed Profile Sheet, all existing drainage structures such as bridges, culverts, catch basins, manholes, and pipes that are to be removed or replaced are labeled “To Be Removed” or “To Be Replaced.” All existing bridges, pipes, culverts, and storm sewers are shown and labeled with their hydraulic data. Their types, diameters, skew angles, lengths, and structure codes are shown.

The Proposed Profile Sheet also shows: the graphical location and size of all proposed cross culverts and drains, the proposed road centerline station at each culvert or drain, the size, type of end treatment, and pertinent hydrologic and hydraulic design data. All proposed storm sewer components are shown and labeled with appropriate structure code, type, and grate/inlet/outlet elevations. Storm sewer pipes are labeled with pipe diameter, flow direction, and grade in percent. All proposed bridges are shown with linework, hydraulic data, and riprap shapes drawn, patterned, with class labeled. Proposed bridges also have their begin and end stations flagged. Channel changes, independent ditches, and special ditches are shown with begin and end stations labeled, and all breakpoint stations labeled with station and elevation. Channel changes, independent ditches, and special ditches also have their grades labeled in percent and their ditch type shown, such as V-ditch or Trap-ditch. [Figure 3A-19: Example of Pipe Culvert on Proposed Profile](#) is a sample of a portion of a Proposed Profile Layout Sheet showing a proposed pipe culvert. [Figure 3A-20A: Example of Box Culvert as Shown on Proposed Profile](#) and [Figure 3A-20B: Example of Box Culvert Data as Shown on Proposed Profile](#) show a proposed box culvert. [Figure 3A-21A: Example of Box Bridge on Proposed Profile](#) and [Figure 3A-21B: Example of Box Bridge Drainage Data on Proposed Profile](#) show a proposed box bridge. The box bridge requires additional hydraulic design data and quantities for pay items shown in the profile. Examples of Special Ditch and Storm Sewer are shown on [Figure 3A-22A: Example of Special Ditch as Shown on Proposed Profile](#) and [Figure 3A-22B: Example of Storm Drainage as Shown on Proposed Profile](#), respectively.

### 3.03.9 RAMP PROFILE SHEET

The Ramp Profile Sheet contains the same information as the Proposed Profile Sheet (See [Figure 3A-23: Example of Ramp Profile](#))



### 3.03.10 SIDE ROAD PROFILE SHEET

The Side Road Profile Sheet contains the same data as required in the Proposed Profile Sheet. (See [Figure 3A-24A: Example of Side Road Profile Sheet](#) and [Figure 3A-24B: Drainage Structure and Data on Side Road Profile](#))

### 3.03.11 PRIVATE DRIVE, BUSINESS, AND FIELD ENTRNACE PROFILE SHEETS

These sheets show information about the culvert(s) and other structures under the drive. Any existing structure that is to be removed or replaced is labeled Plugged/Abandoned. Proposed side drain pipes or culverts will be shown and their lengths and diameters labeled. Invert elevations are not shown. (See [Figure 3A-25A: Example of Private Drive, Business and Field Entrance Profile Sheet](#) and [Figure 3A-25B: Side Drain on Private Drive Profile](#))

### 3.03.12 DRAINAGE MAP SHEET

The Drainage Map Sheet shows the approximate limits and flow arrows of drainage areas along with basic hydrologic design data. Each drainage area that drains to an existing structure or outfall is delineated with linework and its total area, usually in acres, is labeled. The location and sizes of the existing cross drains and culverts are shown and their information is entered into the Drainage Data for Drainage Map cell. This cell organizes data about the structure, such as: station, type of structure, inlet and outlet elevations, skew angle, direction of flow, drainage area, existing terrain type (flat/rolling/hilly/mountains), percent impervious area, storm discharge, and discharge velocity. Existing bridges are drawn and labeled with bridge identification numbers, structure type, lengths, widths, and drainage areas. Other pertinent drainage features such as existing natural features such as streams, springs, seeps, ponds, and wetlands are shown and labeled.

The Drainage Map Sheet is a relatively small-scale map showing very general drainage features. It is not intended to be used for detailed drainage design. (See [Figure 3A-26A: Example of Drainage Map Sheet](#) and [Figure 3A-26B: Example of Drainage Data on Drainage Map Sheet](#))

### 3.03.13 CULVERT SECTIONS SHEET

The Culvert Sections Sheet shows a profile of the cross culverts on the project. All proposed cross drains and proposed cross drain extensions in the Proposed Layout Sheets will have a culvert cross section shown on the Culvert Cross Sections Sheet. Features shown include the proposed pipe, endwalls, riprap end treatment, diameter, pipe type, flow direction, and grade in percent. All hydraulic data listed in the Pipe Culvert Profile Data cell shall be listed. Connections to existing or proposed drainage structures are shown and labeled including structure name, type (catch basin, junction box, manhole, etc.), and invert elevations.

All existing cross drains that are to remain in place and extended are to be shown as dashed lines. All proposed box or slab bridges shall be shown on the Culvert Cross Sections Sheet. All hydraulic data is shown in the box/slab bridge drainage data cell. This information includes station, structure type, skew angle, drainage area, design discharge, overtopping elevation, allowable headwater, design headwater, discharge velocity, inlet and outlet elevations, referenced standard drawing numbers, as well as itemized quantities. Also, for all box or slab bridges, the tabulation block is shown (Box Slab.xltx found in [C:\Users\Public\Office Standards\TDOT English Tab Quantities](#)). This tabulation block shows the quantities of concrete and reinforcing steel according to fill height and section length. Other structures and components

shown on the Culvert Cross Sections Sheet are energy dissipaters and riprap aprons. These are shown with dimensions. (See [Figure 3A-27](#) thru [Figure 3A-31](#))

### **3.03.14 ROADWAY CROSS SECTIONS SHEETS**

The roadway, or mainline, cross sections sheets show ditch treatments such as concrete, riprap, or turf mat with type or class of material labeled. Independent or special ditches are labeled as such. Their cut areas are included in the average end area numbers at each station displaying the ditch. Endwalls are shown and labeled. Dissipaters are shown and labeled. (See [Figure 3A-32: Example of Cross Section w/ Special Ditch](#))

### **3.03.15 SIDE ROAD CROSS SECTIONS SHEETS**

Everything that is shown on the roadway, or mainline, cross sections sheets are also shown on side road cross sections sheets.

**SECTION 3.04 – RIGHT-OF-WAY PLANS**

During the Right-of-Way Plans phase, all remaining detailed drainage design is completed on the project. This allows for the final determination of the limits of proposed right-of-way and required easements. The following presents the drainage information required to be shown on the respective sheets in the right-of-way plans.

**3.04.1 TITLE SHEET**

(Same as Preliminary Plans)

**3.04.2 PROJECTS COMMITMENT**

PPRM shall be checked prior to the Field Reviews and submittals. Should there be any commitments added after the Right of Way Submittal, then a revision shall be issued.

**3.04.3 TYPICAL SECTIONS SHEET**

(Same as Preliminary Plans)

**3.04.4 TABULATED QUANTITIES SHEET**

The Tabulated Quantities Sheets show tabulation blocks for many pay items. Tabulation for drainage type pay items include blocks for box culverts, slab bridges, catch basins, manholes, cross drains (arterials, collectors, endwalls, freeways, local roads), drop inlets, riprap basins, riprap ditches, side drains, side drain endwalls, special ditches, spring drains, storm drainage endwalls, storm drainage pipes, and storm drainage structures. These blocks show various information including: sheet number on which the item is found, station, location left or right, skew, diameter, end treatment, referenced standard roadway drawings, width, length, depth, grate elevation, offset distance, type, drainage code, and quantities of associated materials such as riprap, geotextile fabric, concrete, or reinforcing steel. (See [Figure 3A-33: Example of Tabulated Quantities](#))

**3.04.5 DETAILS SHEET**

(Same as Preliminary Plans)

**3.04.6 PROPERTY MAP AND RIGHT-OF-WAY ACQUISITION TABLE SHEET**

(Same as Preliminary Plans)

**3.04.7 PRESENT LAYOUT SHEET**

Additional information shown on the Present Layout Sheet includes limits of detention systems, if needed. [Figure 3A-34: Example of Detention Basin on Present Layout Sheet](#) is a sample of a portion of a Present Layout Sheet with an area designated for a detention system.

**3.04.8 R.O.W. DETAILS SHEET**

(Same as Preliminary Plans)

**3.04.9 PROPOSED LAYOUT SHEET**

The cross culvert information shown on the Proposed Layout Sheet is the same as shown on the preliminary plans.

[Figure 3A-35: Example of Detention Basin on Proposed Layout Sheet](#) shows a portion of a Proposed Layout Sheet with a detention system in the plan view. A separate large-scale plan showing details of the detention system should be provided in the plans.

**3.04.10 PROPOSED PROFILE SHEET**

(Same as Preliminary Plans)

**3.04.11 RAMP PROFILE SHEET**

(Same as Preliminary Plans)

**3.04.12 SIDE ROAD PROFILE SHEET**

(Same as Preliminary Plans)

**3.04.13 PRIVATE DRIVE, BUSINESS, AND FIELD ENTRANCE PROFILE SHEETS**

(Same as Preliminary Plans)

**3.04.14 DRAINAGE MAP SHEET**

(Same as Preliminary Plans)

**3.04.15 CULVERT SECTIONS SHEET**

The Culvert Sections Sheet shows a profile of the cross culverts on the project. The existing and proposed grades along the centerline of the culvert are shown. The road centerline station where the culvert is located is shown along with the size and material of the culvert, invert elevations, skew angle (from the centerline of the proposed road, 90 degrees or less), type of end treatment, standard drawing numbers for the specified end treatment, and pertinent hydrologic and hydraulic design data. Invert elevations for pipe culverts are shown at the end of the end treatment. [Figure 3A-27A: Example of Culvert Section Sheet for Pipe Culvert](#) and [Figure 3A-27B: Example of Drainage Data for Pipe Culvert](#) are samples of a portion of a Culvert Sections Sheet showing a pipe culvert and drainage data. Box culvert and box bridge sections show the same information as pipe culverts along with additional hydraulic design data and pay item quantities for the culvert and end treatment. A box bridge is defined as a box culvert with a total width greater than 20 feet. [Figure 3A-28A: Example of Box Culvert Section](#) and [Figure 3A-28B: Example of Drainage Data for Box Culvert Section](#) are samples of a portion of a Culvert Sections Sheet showing a box culvert and drainage data. [Figure 3A-29A: Example of Box Bridge Section](#) and

[Figure 3A-29B: Example of Drainage Data for Box Bridge Section](#) are samples of a portion of a Culvert Sections Sheet showing a box bridge and drainage data.

### 3.04.16 EROSION PREVENTION & SEDIMENT CONTROL PLANS SHEETS

#### 1. Clearing and Grubbing Stage

All existing natural features such as streams, springs, seeps, ponds, and wetlands are shown and labeled. All existing drainage structures and components are also shown. Existing bridges, with linework and text is shown including drainage area and type of terrain labeled. Existing pipes and culverts are shown with linework, drainage areas, and type of terrain labeled. Proposed energy dissipaters for culverts are shown and labeled with type (riprap or concrete) and dimensions. Proposed drainage easement linework and patterning is shown. Proposed sediment basins are shown only if they will be permanent. Each storm water outfall is labeled with outfall number, drainage area in acres, and slope in percent (average slope of the drainage area). A table can be used on each sheet to show these items. Any temporary culverts under haul roads are also shown with their lengths and diameters labeled. (See [Figure 3A-36: Example of EPSC Sheet – Clearing and Grubbing Stage](#))

#### 2. Intermediate Grading Stage

Everything that was shown in the Clearing and Grubbing Stage is also shown in the Intermediate Grading Stage. Additionally, only proposed features and components that are to be constructed during this phase are shown. Cross drains, side drains, and endwalls are shown and labeled with information including station, skew angle, offset distance, inlet and outlet elevations, type, and diameter. For proposed extensions of existing features or components to remain in place, the existing feature or component is shown with dashed linework and labeled. Also shown are proposed special ditches with flow direction and lining type such as riprap or turf mat. Stream diversions and relocations are also shown. Wetlands are delineated, patterned, and labeled and the Wetland Impact table is shown. The new proposed contours may have created new outfalls. In this case, do not re-use an outfall number. Each specific outfall is labeled with a unique number. (See [Figure 3A-37: Example of EPSC Sheet – Intermediate Stage](#))

#### 3. Final Construction Stage

Everything that was shown in the Intermediate Grading Stage is also shown in the Final Construction Stage. Additionally, all proposed features and components that are to be constructed during this phase are also shown, including proposed bridge linework. (See [Figure 3A-38: Example of EPSC Sheet – Final Stage](#))

### 3.04.17 CROSS SECTIONS SHEETS

The Cross Sections Sheet includes information for both standard template ditches and special ditches. [Figure 3A-39: Example of Cross Section with Template Ditch and Special Ditch](#) is a sample of a portion of a Cross Sections Sheet showing both types of ditches. [Figure 3A-40: Example of Cross Section with Detention Basin](#) is a sample of a portion of a Cross Sections Sheet showing a detention basin.

**SECTION 3.05 – CONSTRUCTION PLANS**

The preparation of the Construction Plans involves the tabulation of bid quantities for the project. All drainage design should have previously been completed during the preparation of the Right-of-Way plans. The following presents the drainage information required to be shown on the respective sheets in the construction plans.

**3.05.1 TITLE SHEET**

(Same as Preliminary and ROW Plans)

**3.05.2 ROADWAY INDEX AND STANDARD ROADWAY DRAWINGS SHEET**

This Sheet shows all the Standard Roadway Drawings for all proposed construction including those relating to drainage components and structures that will be needed for the project such as pipe culverts, flumes, endwalls, catch basins, junction boxes, manholes, spring drain boxes, slotted drains, trench drains, and curbs and gutters. (See [Figure 3A-41: Example of Standard Drawings](#))

**3.04.3 PROJECTS COMMITMENT**

(Same as Right-of-Way Plans)

**3.05.4 ESTIMATED ROADWAY QUANTITIES SHEET**

(Same as Right-of-Way Plans)

**3.05.5 ESTIMATED BOX BRIDGE QUANTITIES SHEET**

The Estimated Box Bridge Quantities Sheet shows a block with all pay items for box or slab bridges that are needed for the project. The quantities block shows the item numbers, item description, unit of measure, numerical quantity for each pay item, and the unit price. (See [Figure 3A-43: Example of Box Bridge Quantities](#))

**3.05.6 TYPICAL SECTIONS SHEET**

The drainage related features for the roadway typical sections will be the same as shown on the Preliminary plans and Right-of-Way. In addition, special ditch details and tabulations are included if space permits, otherwise show on Details Sheet. (See [Figure 3A-2A: Example of Typical Sections \(Divided Median\)](#) and [Figure 3A-2B: Example of Typical Section \(Curb and Gutter\)](#))

**3.05.7 GENERAL NOTES SHEET**

The General Notes Sheet will include any general notes selected from the Roadway Design Guidelines Section 6, General and Special Notes, that are applicable to the project. These notes are grouped under such headings as Grading, Drainage, and Riprap. (See [Figure 3A-44: Example of General Notes](#))

**3.05.8 SPECIAL NOTES SHEET**

The Special Notes Sheet will include any special notes selected from the Roadway Design Guidelines Section 6, General and Special Notes, that are applicable to the project. These notes are grouped under such headings as Grading, Excavation, Drainage, and Riprap (See [Figure 3A-45: Example of Special Notes](#)).

**3.05.9 TABULATED QUANTITIES SHEET**

(Same as Right-of-Way Plans)

**3.05.10 DETAIL SHEET**

(Same as Right-of-Way Plans)

**3.05.11 PROPERTY MAP AND RIGHT-OF-WAY ACQUISITION TABLE SHEET**

(Same as Right-of-Way Plans)

**3.05.12 PRESENT LAYOUT SHEET**

(Same as Right-of-Way Plans)

**3.05.13 R.O.W. DETAILS SHEET**

(Same as Right-of-Way Plans)

**3.05.14 PROPOSED LAYOUT SHEET**

(Same as Right-of-Way Plans)

**3.05.15 PROPOSED PROFILE SHEET**

(Same as Right-of-Way Plans)

**3.05.16 RAMP PROFILE SHEET**

(Same as Right-of-Way Plans)

**3.05.17 SIDE ROAD PROFILE SHEET**

(Same as Right-of-Way Plans)

**3.05.18 PRIVATE DRIVE, BUSINESS, AND FIELD ENTRANCE PROFILE SHEET**

(Same as Right-of-Way Plans)

**3.05.19 DRAINAGE MAP SHEET**

(Same as Right-of-Way Plans)

**3.05.20 CULVERT SECTIONS SHEET**

(Same as Right-of-Way Plans)

**3.05.21 EROSION PREVENTION AND SEDIMENT CONTROL PLAN SHEETS**

(Same as Right-of-Way Plans)

**3.05.22 CROSS SECTIONS SHEET**

(Same as Right-of-Way Plans)

**3.05.23 TRAFFIC CONTROL PLANS SHEETS**

The traffic control phases correspond to the EPSC stages. For all traffic control phases, all natural drainage features such as streams, springs, seeps, ponds, and wetlands are shown and labeled. All proposed drainage structures and features that are to be constructed during the particular traffic control phase are to be shown. These include catch basins, manholes, storm sewers, junction boxes, cross drains, side drains, and bridges. Additionally, proposed side drains under private drives or field entrances will be labeled with length and diameter. If any proposed drainage structure that is to extend an existing structure, that existing structure is shown with dashed linework. (See [Figure 3A-46: Example of Phase I Traffic Control, Showing Box Culvert](#) and [Figure 3A-47: Example of Phase II Traffic Control, Showing Box Culvert](#))



**SECTION 3.06 – DRAINAGE DESIGN RECORDS**

**3.06.1 OVERVIEW**

**3.06.1.1 INTRODUCTION**

An important part of the design or analysis of any hydraulic facility is the documentation. Appropriate documentation of the design of any hydraulic facility is essential because of:

- The importance of public safety
- Justification of expenditure of public funds
- Future reference by engineers (when improvements, changes, or rehabilitations are made to the highway facilities)
- Information leading to the development of defense in matters of litigation
- Public information

Frequently, it is necessary to refer to plans, specifications and analysis long after the actual construction has been completed. Documentation permits evaluation of the performance of structures after flood events to determine if the structures performed as anticipated or to establish the cause of unexpected behavior, if such is the case. In the event of a failure, it is essential that contributing factors be identified in order that recurring damage can be avoided.

**3.06.1.2 DEFINITION**

The definition of hydrologic and hydraulic documentation as used in this chapter is the compilation and preservation of the design and related details as well as all pertinent information on which the design and decisions were based.

**3.06.1.3 PURPOSE**

This purpose of the drainage documentation is to support the development of plans and to serve as a diary of the drainage design process for TDOT projects. This portion of the manual focuses on the documentation of the findings obtained in using the other chapters of this manual, and thus designers should be familiar with all the hydrologic and hydraulic design procedures associated with these chapters. In this portion of the manual, TDOT's system for organizing the documentation of hydraulic designs is presented. The documentation will provide as complete a history of the drainage design process as is practical.

The major purpose of providing good documentation is to define the design procedure that was used and to show how the final design and decisions were arrived at. Often there is expressed the myth that avoiding documentation will prevent or limit litigation losses as it supposedly precludes providing the plaintiff with incriminating evidence. This is seldom if ever the case and documentation should be viewed as the record of reasonable and prudent design analysis based on the best available technology. Thus, good documentation can provide the following:

- Protection for TDOT by proving that reasonable and prudent actions were, in fact, taken
- Identifying the situation at the time of design
- Documenting that rationally accepted procedures and analysis were used at the time of the design which were commensurate with the perceived site importance and flood hazard

- A continuous site history to facilitate future reconstruction
- File data necessary to quickly evaluate any future site problems that might occur during the facilities service life
- Expediting plan development by clearly providing the reasons and rationale for specific design decisions

**3.06.1.4 TYPES**

There are three basic types of documentation which will be considered: preconstruction, design, and construction/operation.

1. Preconstruction documentation includes the following if available:
  - a. Aerial photographs
  - b. Contour mapping
  - c. Watershed map or plan including:
    - Flow directions
    - Watershed boundaries
    - Watershed areas
    - Natural storage areas
  - d. Surveyed data reduced to include:
    - Existing hydraulic facilities
    - Existing controls
    - Profiles - roadway, channel, driveways
    - Cross sections - roadway, channels, faces of structures
  - e. Flood insurance studies and maps by FEMA
  - f. National Resource Conservation Service soil maps (if used during design)
  - g. Field reconnaissance report(s) which may include:
    - Video cassette recordings
    - Audio tape recordings
    - Still camera photographs
    - Movie camera films
    - Written analysis of findings with sketches
  - h. Reports from other agencies (local, State or Federal), TDOT personnel, newspapers, and abutting property owners.
  
2. Design documentation includes all the information used to justify the design, including:
  - a. Reports from other agencies
  - b. Hydrological report
  - c. Hydraulic report
  - d. Approvals
  
3. Construction or operation documentation includes:
  - a. Plans
  - b. Revisions
  - c. Record drawings
  - d. Photographs
  - e. Record of operation during flooding events, complaints and resolutions

It is important to prepare and maintain, in a permanent file, the record drawings and plans for every drainage structure to document subsurface foundation elements such as footing types and elevations, pile types and (driven) tip elevations, etc. There may be other information which should be included or may become evident as the design or investigation develops. This additional information may also be incorporated at the discretion of the designer.

### **3.06.1.5 SCHEDULING**

Documentation shall not be considered as occurring at specific times during the design or as the final step in the process which could be long after the final design is completed. Documentation should rather be an ongoing process and part of each step in the hydrologic and hydraulic analysis and design process. This will increase the accuracy of the documentation, provide data for future steps in the plan development process, and provide consistency in the design even when different designers are involved at different times of the plan development process. The drainage design records and documentation will be assembled appropriately for permanent storage. The notebook will be retained by the designer.

### **3.06.1.6 RESPONSIBILITY**

The designer will be responsible for determining what hydrologic analyses, hydraulic design, and related information will be documented during the plan development process. These hydrologic analyses, hydraulic designs, related information, and procedures are covered in depth in the remainder of this manual. The designer will determine that complete documentation has been achieved during the plan development process which will include the final drainage design.

## **3.06.2 PROCEDURES**

### **3.06.2.1 INTRODUCTION**

A complete hydrologic and hydraulic design and analysis documentation file for each waterway encroachment or crossings will be developed. Where applicable this file will include such items as:

1. Identification and location of the facility
2. Photographs (ground and aerial)
3. Hydrology investigations
4. Drainage area maps, vicinity maps and topographic maps
5. Contour maps
6. Interviews (local residents, adjacent property owners and maintenance forces)
7. Newspaper clippings
8. Design notes and correspondence relating to design decisions
9. History of performance of existing structure(s)
10. Assumptions

The documentation file will contain design/analysis data and information which influenced the facility design.

**3.06.2.2 PRACTICES**

The following are the Department's practices related to documentation of hydrologic and hydraulic designs and analyses.

1. Hydrologic and hydraulic data, preliminary calculations and analyses and all related information used in developing conclusions and recommendations related to drainage requirements, including estimates of structure size and location, will be compiled in a documentation file.
2. The designer will document all design assumptions and selected criteria including the decisions related thereto.
3. The amount of detail of documentation for each design or analysis will be commensurate with the risk and the importance of the facility.
4. Documentation will be organized to be as concise and complete as practicable so that knowledgeable designers can understand years hence what was done by predecessors.
5. In cases where there are potential unknown design factors, this should be stated in the design assumptions.
6. Provide all related references in the documentation file to include such things as publishes data and reports, memos and letters and interviews. Include dates and signatures where appropriate.
7. Documentation will be organized to logically lead the reader from past history through the problem background, into the findings and through the performance.
8. A summary at the beginning of the documentation will provide an outline of the documentation file to assist users in finding detailed information.

**3.06.3 DOCUMENTATION COMPONENTS****3.06.3.1 ASSEMBLY**

The following sections discuss the items that will be included in the drainage design records. The intent is not to limit the data to only those items listed, but rather to establish a minimum requirement consistent with the hydraulic design procedures as outlined in TDOT manuals. If circumstances are such that the drainage facility is sized by other than normal procedures or if the size of the facility is governed by factors other than hydrologic or hydraulic factors, a narrative summary detailing the design basis will be included in the records. Additionally, the designer will include in the documentation items that are not listed below, but still may be useful in understanding the analysis, design, findings and final recommendations.

The design records should be assembled in a manner that will allow the various components to be found as readily as possible.

1. Each section of the drainage records that contains computations will start with all assumptions used by the designer(s).

2. Copies of reports, meetings, or correspondence regarding the drainage design will be included in the design records.
3. All pages larger than 8 1/2 x 11 inches will be neatly folded and labeled to allow the contents of the page and its station(s) to be identified without unfolding the page. The quantity of folded pages should be kept to a minimum.
4. Computer calculations require both the input files and the computer output.
5. Sheets that contain manual calculations, non-departmental forms, and any other material which support the hydraulic results should be included.
6. Drainage items designed or analyzed should be identified such that they may be readily found in the construction plans.

All hand calculations should be initialed and dated by the designer. Computer inputs and outputs should be initialed by the person entering the data and running the computer program. Such initialing may be construed as a check of the computer output to be a reasonable result. Appropriate quality control procedures should be documented by the designer.

### **3.06.3.2 HYDROLOGY**

Detailed requirements are presented in Chapter 4 of this Manual. To aid in assembling the design records, these categories should be reviewed for inclusion:

1. List all assumptions used in the design or analysis
2. Maps or data used to delineate drainage areas
3. How methods for design or analysis were selected
4. Criteria selected for design or analysis
5. Findings of analysis or design

### **3.06.3.3 ROADSIDE DITCHES AND STREAMS**

All channels on the project shall be analyzed hydraulically. This includes roadway cut ditches, surface ditches, special ditches, interceptor ditches, inlet and outlet ditches, and channels. Detailed requirements are presented in Chapter 5 of this Manual. To aid in assembling the design records, these categories should be reviewed for inclusion:

1. Cross section(s) used in the design water surface determinations and their locations
2. Roughness coefficient assignments ("n" values)
3. Information on the method used for design water surface determinations
4. Observed high water, dates and discharges
5. Channel velocity measurements or estimates and locations
6. Design or analysis of materials proposed for the channel bed and banks
7. Energy dissipation calculations and designs
8. Copies of all computer analyses

**3.06.3.4 CULVERTS**

Documentation should be provided indicating the amount of runoff estimated for each structure. When the estimation indicates a flow greater than 500 cfs, TDOT's Structures Hydraulics Section performs the design. Copies of correspondence informing TDOT's Structures Hydraulics Section of these structures will be included. For structures receiving less than or equal to 500 cfs, detailed design and documentation requirements are presented in Chapter 6 of this Manual. To aid in assembling the design records these categories should be reviewed for inclusion:

1. Allowable headwater elevation and basis for its selection
2. Roughness coefficient assignments ("n" values)
3. Observed high water, dates and discharges
4. Calculated headwater elevations, outlet velocities, and scour (if applicable) and any historical floods
5. Type of culvert entrance condition and whether outlet or inlet control
6. Culvert outlet appurtenances and energy dissipation calculations and designs (if applicable)
7. Copies of all computer analyses
8. Potential flood hazard to adjacent properties

**3.06.3.5 STORM DRAINAGE SYSTEM**

Detailed requirements for storm drainage systems are presented in Chapter 7 of this Manual. To aid in assembling the design records these categories should be reviewed for inclusion:

1. Computations for inlets and pipes, including hydraulic grade lines
2. Copies of storm sewer computation sheets or computer analyses
3. Complete drainage area map (addresses inlet spacing)
4. Design frequency
5. Information concerning outfalls, existing storm drains, and other design considerations including connecting structures
6. Calculations for any special drainage details
7. A schematic indicating the storm drainage system layout with design information

**3.06.3.6 STORM WATER STORAGE FACILITIES**

Detailed requirements for storm water detention and/or retention design are presented in Chapter 8 of this Manual. To aid in assembling the design records these categories should be reviewed for inclusion:

1. Computations indicating the hydraulic design of the system, including routing the specified storms through the detention/retention system
2. Design frequencies
3. Sketches and/or reduced scale plans showing the layout and dimensions of the pond(s)
4. Information concerning the discharge pipe(s) or weir(s), including energy dissipation calculations and design
5. Copies of all computer analyses

### 3.06.3.7 DESIGN RECORDS EXCLUSIONS

To clarify the information included in the design records and to reduce the overall size, several specific items should **not** be included:

1. Full set of plans
2. Full size present and proposed layout sheets
3. Intermediate computer runs (input and output files)

### 3.06.3.8 SEQUENCE OF DESIGN RECORDS COMPONENTS

The following order should be followed by the designer when assembling the drainage design records:

1. Reports and Correspondence
2. Hydrology
3. Roadside Ditches and Streams
4. Culverts
5. Storm Sewers/Inlet Spacing
6. Special Drainage Structures
7. Stormwater Storage Facilities (Detention/Retention)

Photographs can be included in an appendix or in the section in which they are referenced.

SECTION 3.07 – APPENDIX

3.07.1 FIGURES AND TABLES

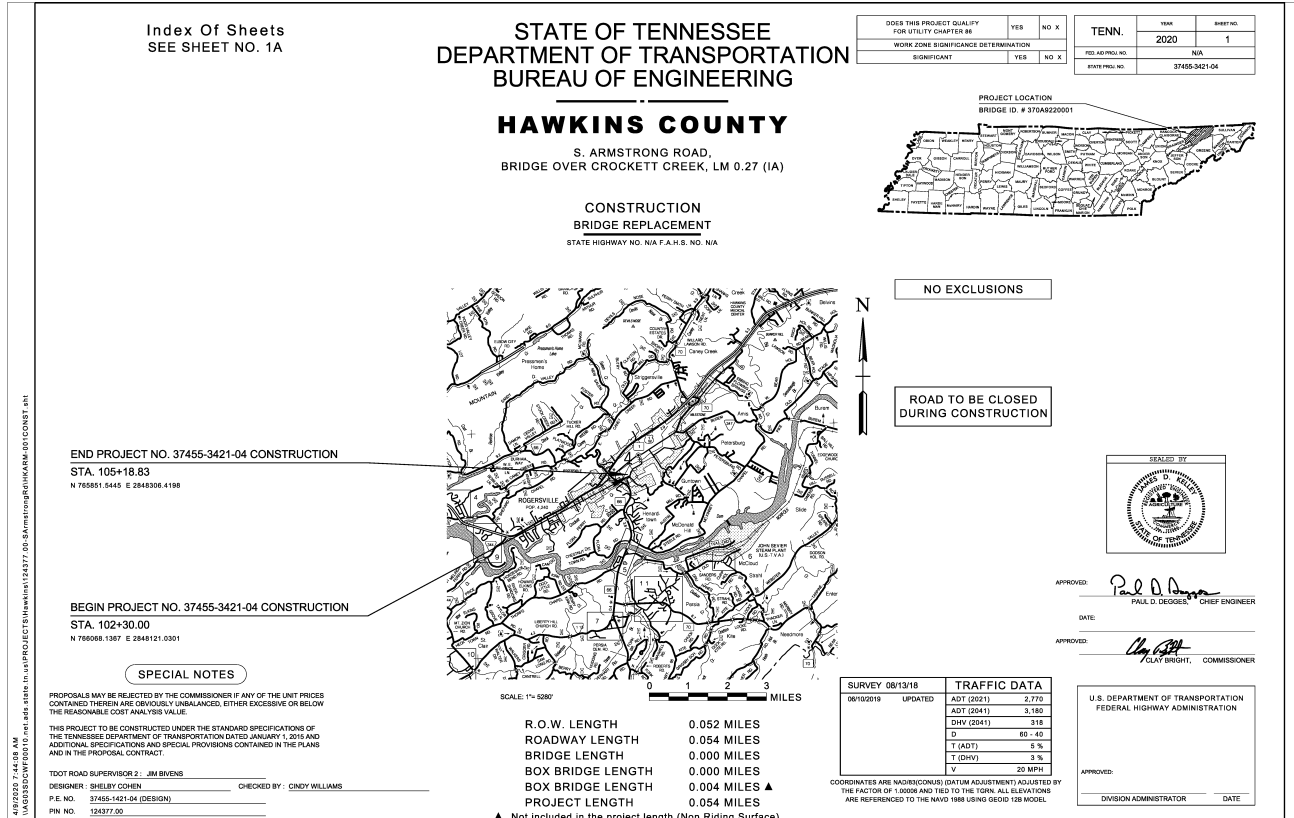


Figure 3A-1A  
Example of Title Sheet

R.O.W. LENGTH	___ MILES
ROADWAY LENGTH	___ MILES
BRIDGE LENGTH	___ MILES
BOX BRIDGE LENGTH	___ MILES
BOX BRIDGE LENGTH	___ MILES ▲
PROJECT LENGTH	___ MILES

▲ Not included in the project length (Non Riding Surface).

Figure 3A-1B  
Template of Project and Bridge Lengths on Title Sheet



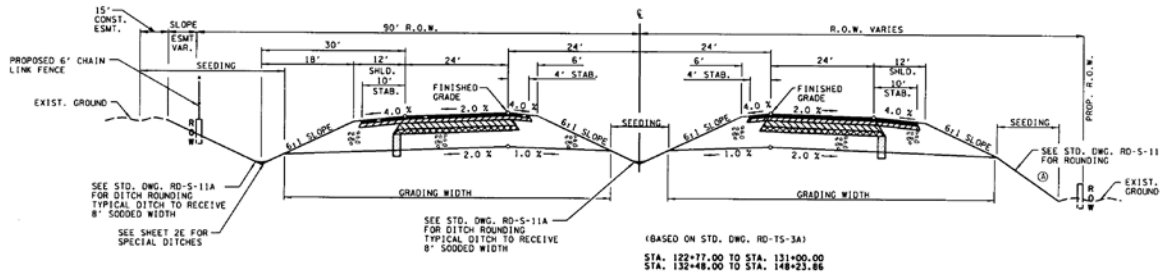
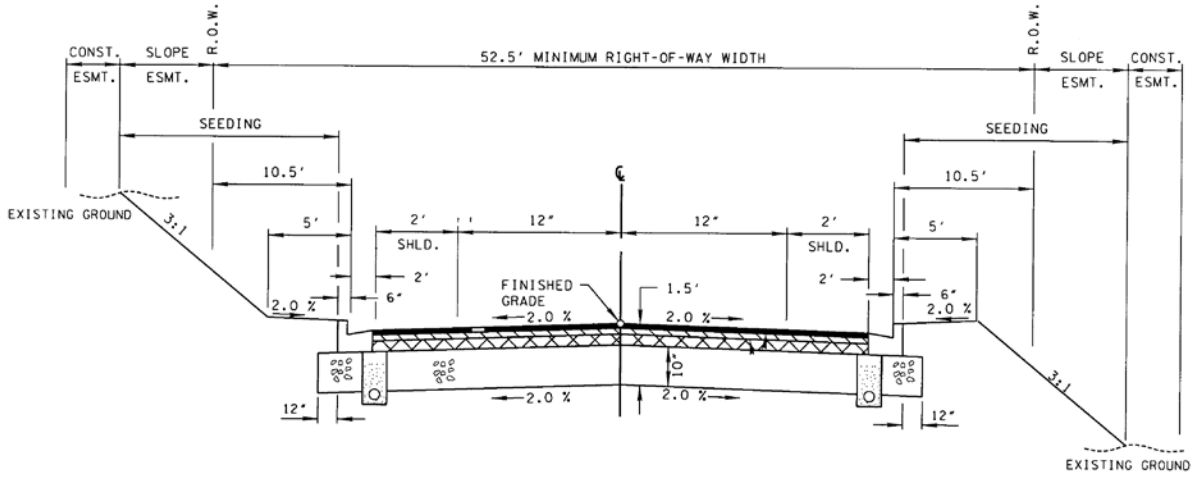


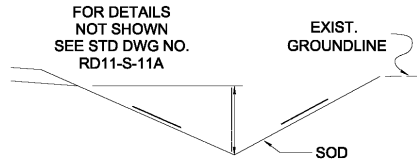
Figure 3A-2A  
Example of Typical Sections (Divided Median)



TANGENT SECTION  
(BASED ON STD. DWG. RDO1-TS-7A)

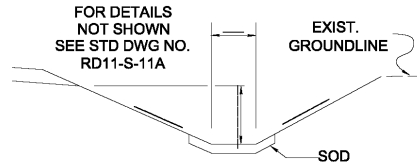
STA. 10+20 TO STA. 10+51

Figure 3A-2B  
Example of Typical Sections (Curb and Gutter)



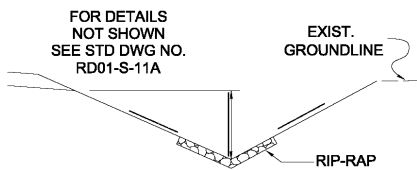
FOR DETAILS NOT SHOWN SEE STD DWG NO. RD11-S-11A

PROP. SP. "V" BOTTOM SODDED DITCH  
RIGHT STA. \_\_\_\_ TO STA. \_\_\_\_



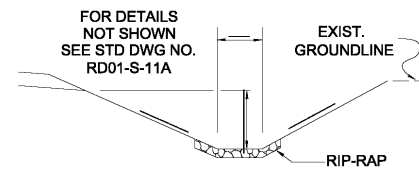
FOR DETAILS NOT SHOWN SEE STD DWG NO. RD11-S-11A

PROP. SP. FLAT BOTTOM SODDED DITCH  
RIGHT STA. \_\_\_\_ TO STA. \_\_\_\_



FOR DETAILS NOT SHOWN SEE STD DWG NO. RD01-S-11A

PROP. SP. "V" BOTTOM RIP-RAP DITCH  
RIGHT STA. \_\_\_\_ TO STA. \_\_\_\_



FOR DETAILS NOT SHOWN SEE STD DWG NO. RD01-S-11A

PROP. SP. FLAT BOTTOM RIP-RAP DITCH  
RIGHT STA. \_\_\_\_ TO STA. \_\_\_\_

SPECIAL DITCHES							
ROAD	STATION		SLOPE			LINING	DETAIL NUMBER
	FROM	TO	FORE (H:V)	BOTTOM WIDTH (F.T.)	BACK (H:V)		
SR 109 (RT)	142+00	144+10	3:1	-	3:1	CL-A1	4
SR 109 (RT)	144+10	148+80	3:1	2	3:1	SOD	2
SR 109 (LT)	147+13	147+26	2:1	12	2:1	CL-C	8
SR 109 (LT)	147+60	156+20	3:1	-	3:1	CL-A1	4
SR 109 (RT)	148+85	148+85	3:1	12	3:1	SOD	3
SR 109 (RT)	168+65	170+00	3:1	-	2:1	CL-A1	6
SR 109 (RT)	170+00	174+75	3:1	-	2:1	SOD	5
SR 109 (LT)	171+39	171+88	3:1	8	3:1	CL-B	7
SR 109 (LT)	171+90	172+80	3:1	2	3:1	CL-B	7
SR 109 (RT)	175+90	175+90	2:1	12	2:1	SOD	3
SR 109 (RT)	189+00	190+20	3:1	-	3:1	SOD	1
SR 109 (LT)	189+20	190+30	3:1	-	3:1	SOD	1
SR 109 (LT)	195+80	198+90	3:1	3	3:1	SOD	2

Figure 3A-3  
Example of Special Ditch Details

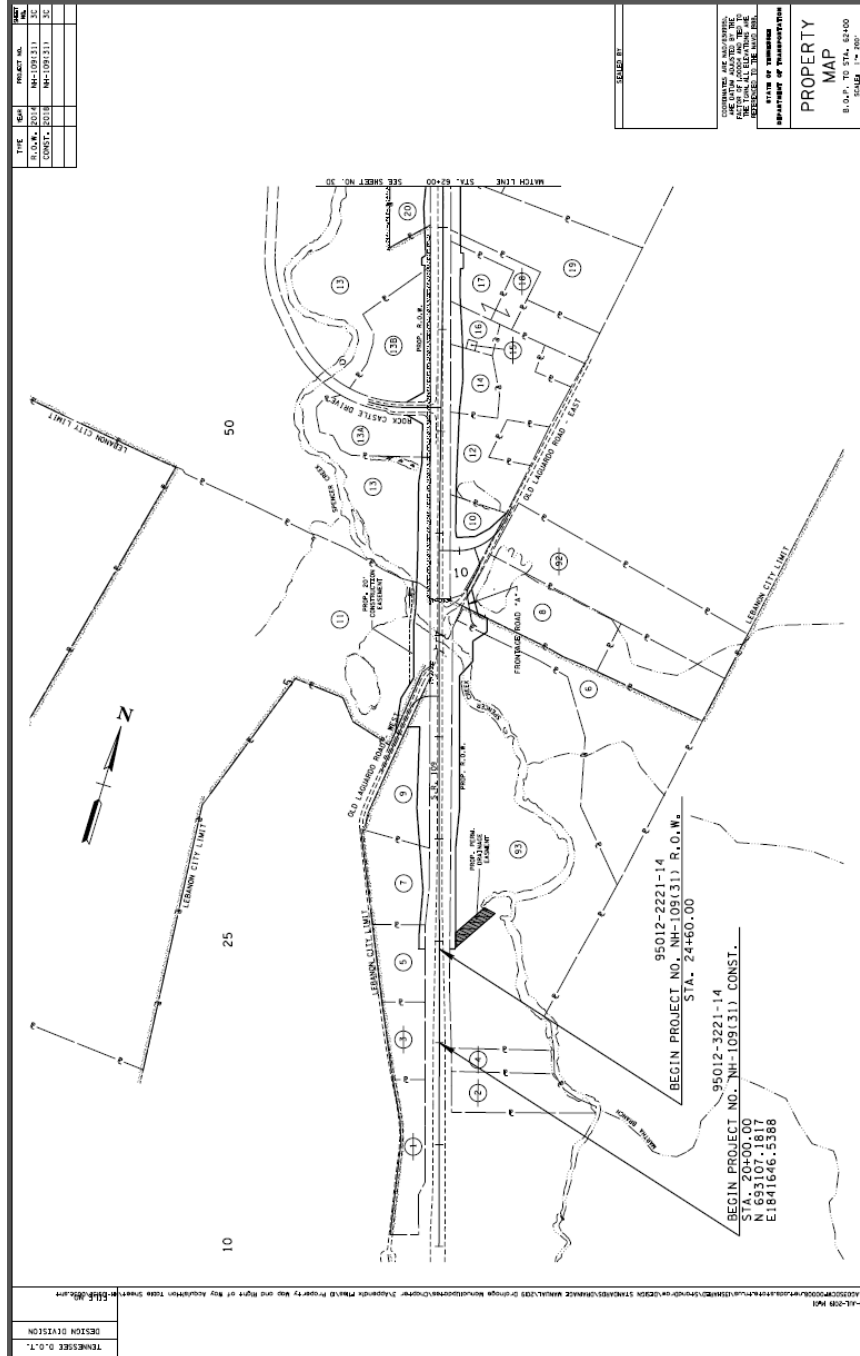


Figure 3A-4  
Example of Property Map Sheet

TYPE		YEAR	PROJECT NO.	SHEET NO.
R.O.W.		2020	BR24H1185	1A

TRACT NO.	PROPERTY OWNERS	COUNTY RECORDS			TOTAL AREA (ACRES)			AREA TO BE ACQUIRED (ACRES)			AREA REMAINING (ACRES)			EASEMENT (ACRES)	
		TAX MAP NO.	PARCEL NO.	DEED DOCUMENT REFERENCE	LEFT	RIGHT	TOTAL	LEFT	RIGHT	TOTAL	LEFT	RIGHT	PERMANENT DRAINAGE	CONSTRUCTION SLOPE (I)	
16	LIABILITY COMPANY	09L	202.00	1187	4.156	0.431	4.587	726 S.F.	352 S.F.	1078 S.F.	4.711	2.423		0.353 AC	
17	PATRICIA WYN. NIXON AND WIFE KRISTINA SHERRES NIXON	09L	202.00	1111	0.876	0.816	1.692	544 S.F.	1941 S.F.	2485 S.F.	2.773				
19	TRUSTEE A. CARSON AS TRUSTEE OF THE BRUCE A. CARSON LIVING TRUST VIA DATED MAY 4, 2017	09L	202.00	1095	0.749	0.749	1.498	544 S.F.	544 S.F.	1088 S.F.	2.727				
20	HIGHLAND APARTMENTS, LLC	09L	202.00	369	0.441	0.441	0.882	2205 S.F.	2205 S.F.	4410 S.F.	3.389			2432	
23	ALAN D. STRACHN AND BARBARA ANN STRACHN KEEMER	1001	202.00	1214	10.811	10.811	21.622	3560 S.F.	3560 S.F.	7120 S.F.	9.520				
24	LETTI OF CHRENSVILLE NEWCASTLE PLANNING AND SEDIMENT FILTER/AG FOR TRACT 20	1384F	154.00	1110	10.310	10.310	20.620	4240 S.F.	4240 S.F.	8480 S.F.	10.213				
		<b>ACQUISITION TOTALS (ACRES)</b>			30.310	30.310	60.620								

1 CONSTRUCTION EASEMENTS NEEDED FOR MAINT. ROAD FOR TRACT 19 AND SEDIMENT FILTER/AG FOR TRACT 20

DISTURBED AREA	
IN BETWEEN SLOPE LINES	3.06 (AC)
16 FOOT WIDE STRIP OUTSIDE SLOPE LINES	1.17 (AC)
TOTAL DISTURBED AREA	4.23 (AC)
TOTAL PROJECT AREA	4.52 (AC)

SEALED BY
-----------

STATE OF TENNESSEE TRANSPORTATION
--------------------------------------

RIGHT-OF-WAY ACQUISITION TABLE
-----------------------------------

Figure 3A-5  
Example of Right of Way Acquisition Table

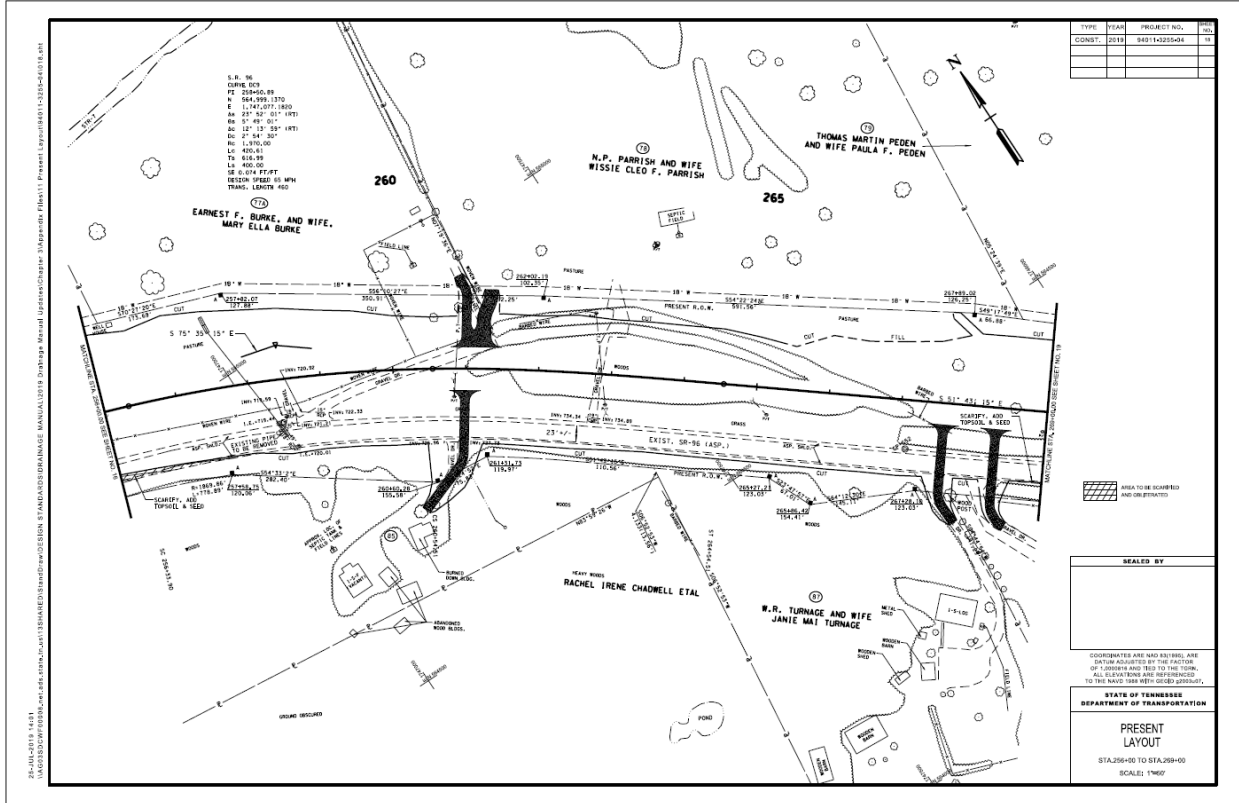


Figure 3A-6A  
Example of Present Layout Sheet w/ Pipe Culvert

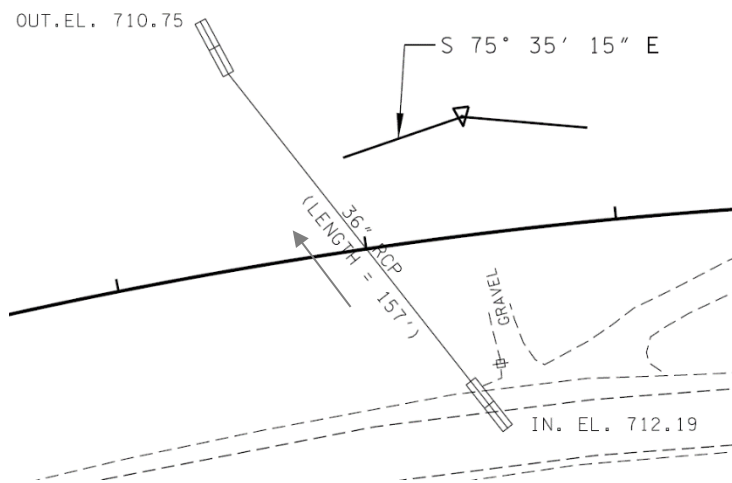


Figure 3A-6B  
Example of Pipe Culvert as Shown on Present Layout

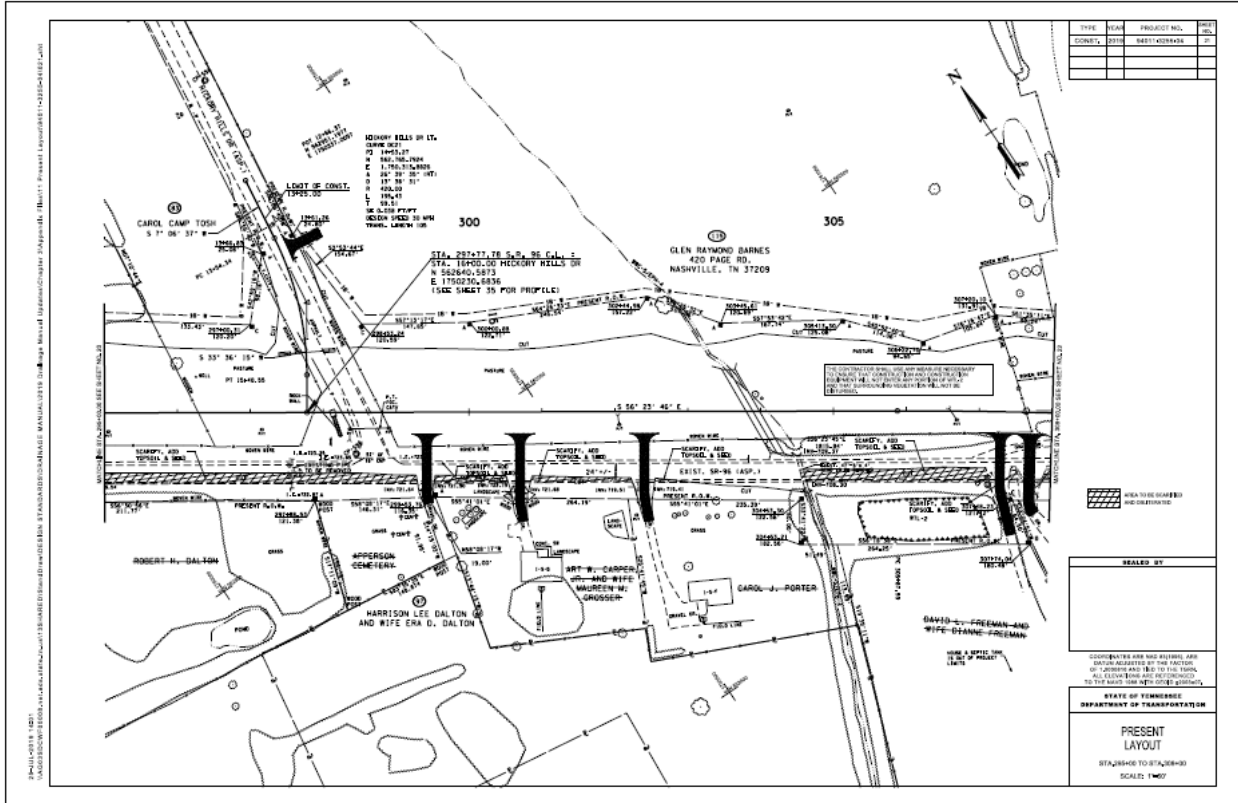


Figure 3A-7A  
Example of Present Layout w/ Box Culvert

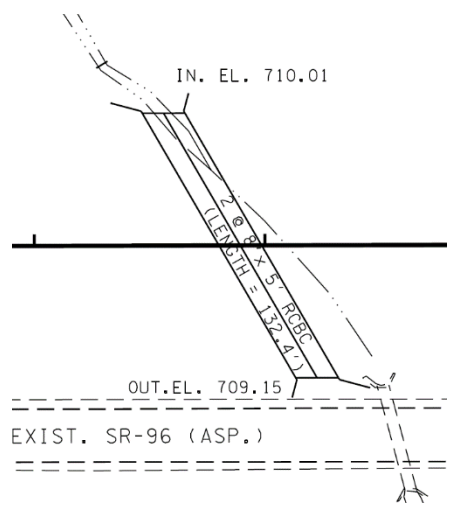


Figure 3A-7B  
Example of Box Culvert as Shown on Present Layout

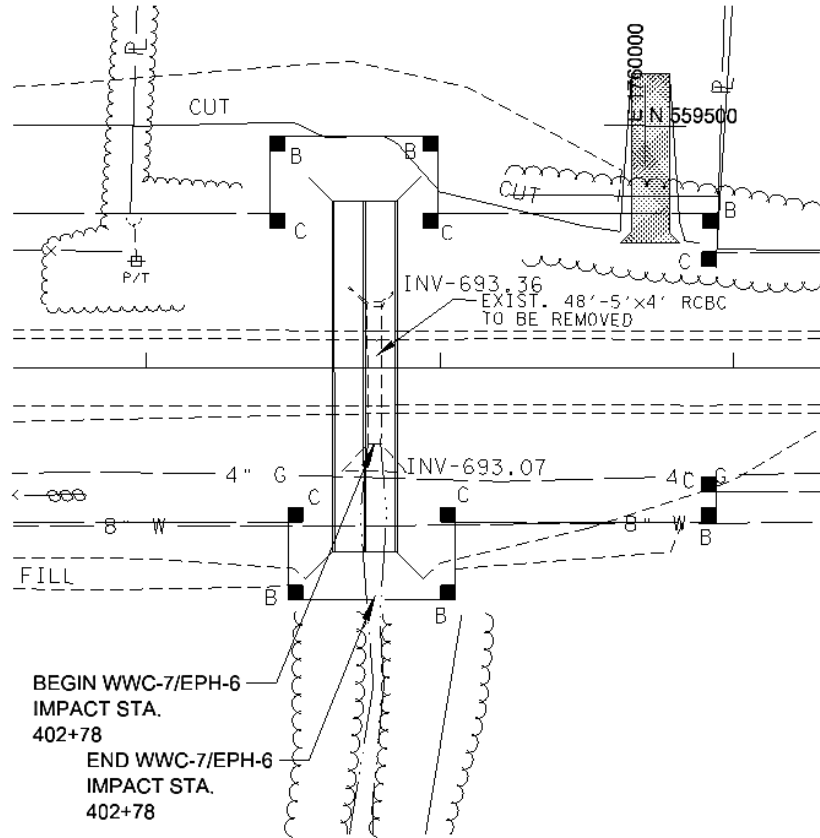


Figure 3A-8  
Example of Box Bridge on Present Layout

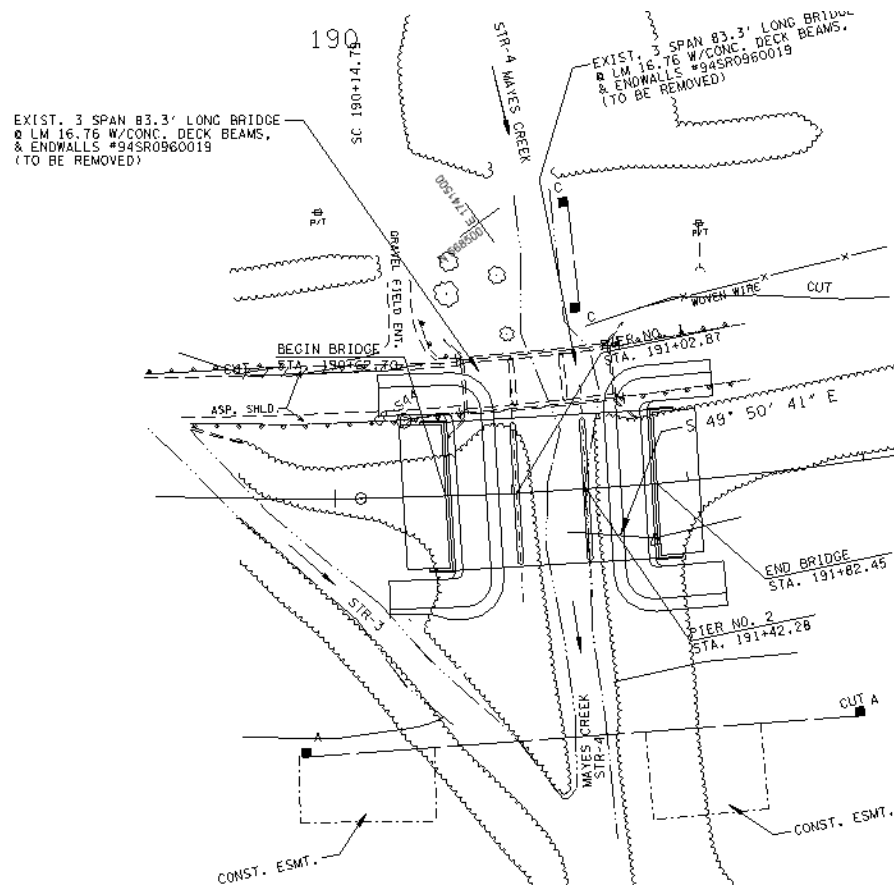


Figure 3A-9  
Example of Bridge on Present Layout



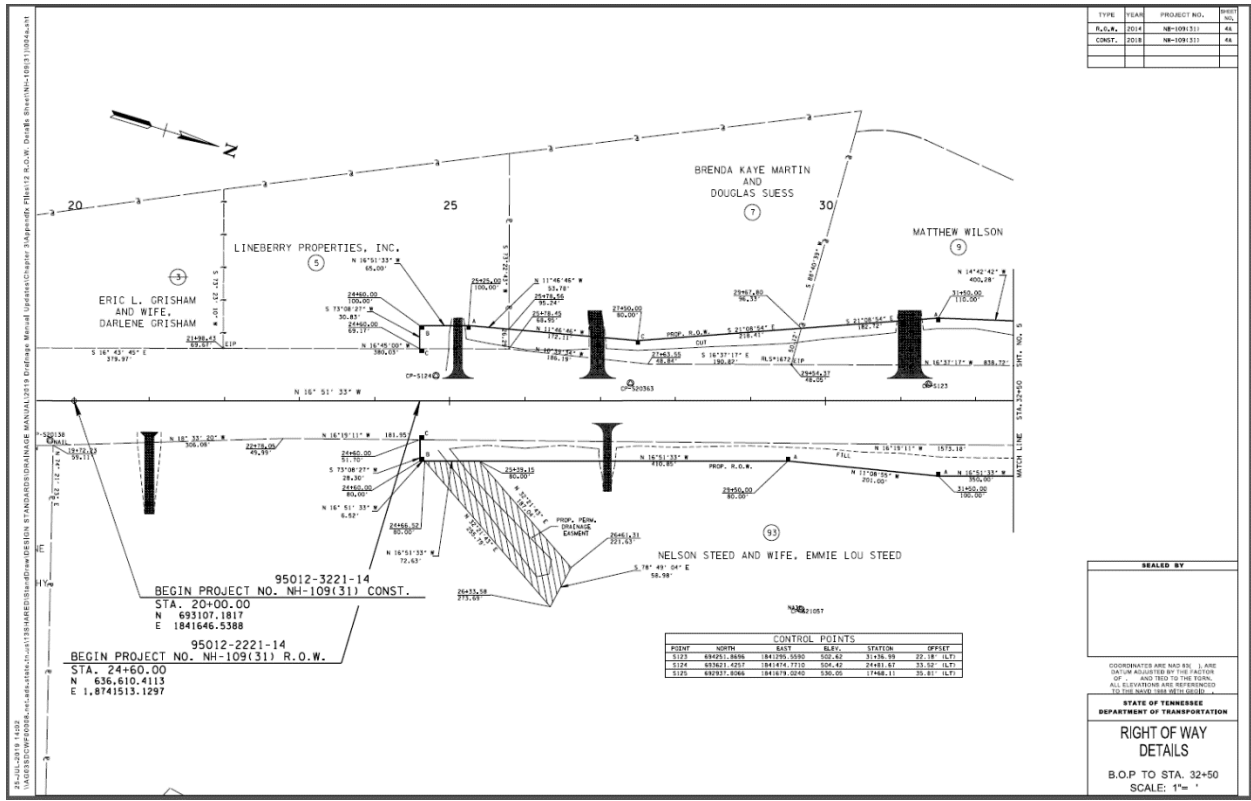


Figure 3A-10A  
Example of Right of Way Details Sheet

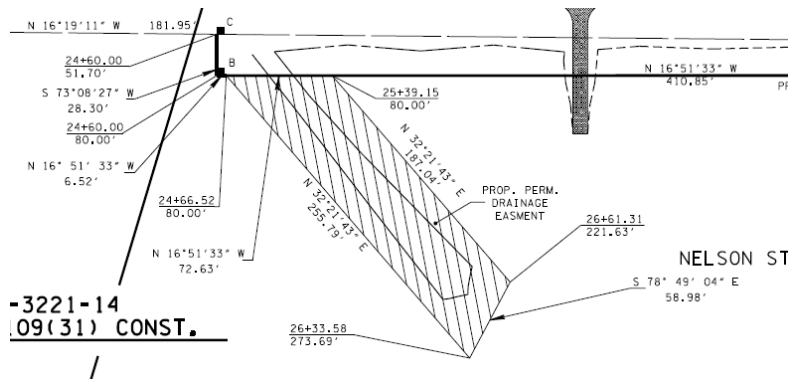


Figure 3A-10B  
Example of Drainage Easement as Shown on Right of Way Details Sheet

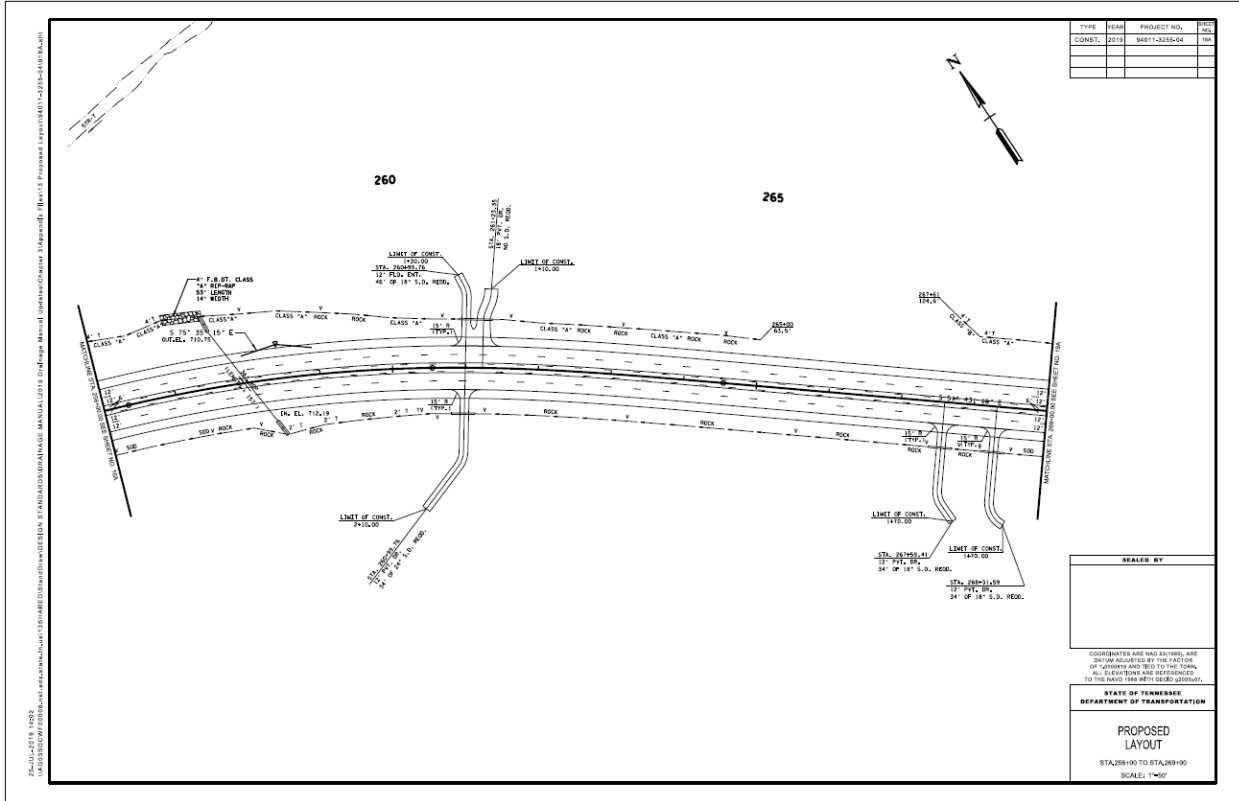


Figure 3A-11A  
Example of Proposed Layout w/ Pipe Culvert

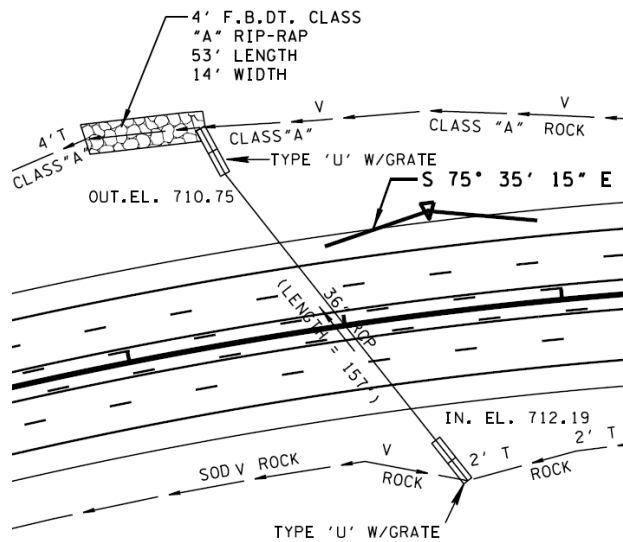


Figure 3A-11B  
Example of Pipe Culvert as shown on Proposed Layout

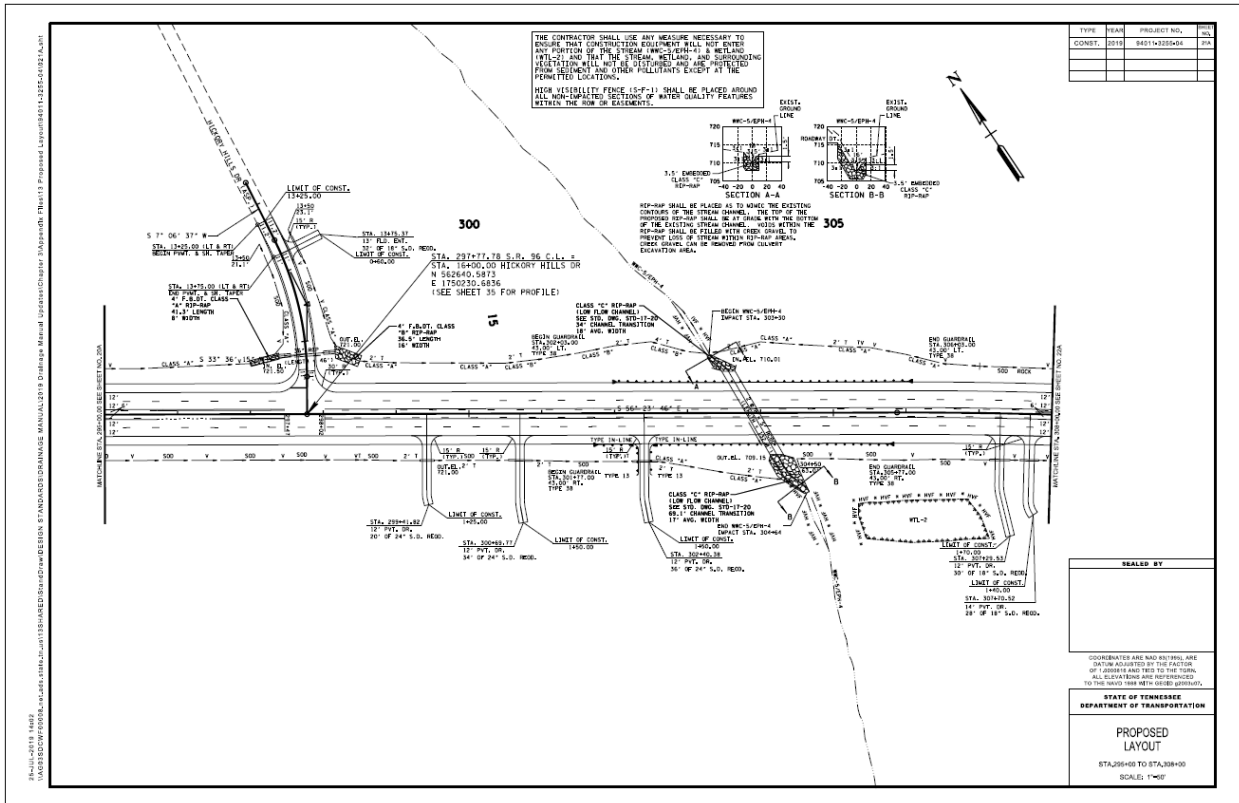


Figure 3A-12A  
Example of Proposed Layout w/ Box Culvert

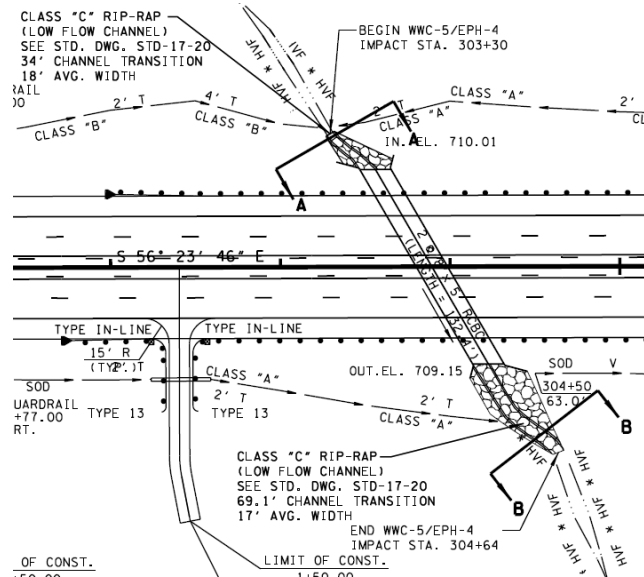


Figure 3A-12B  
Example of Box Culvert as shown on Proposed Layout

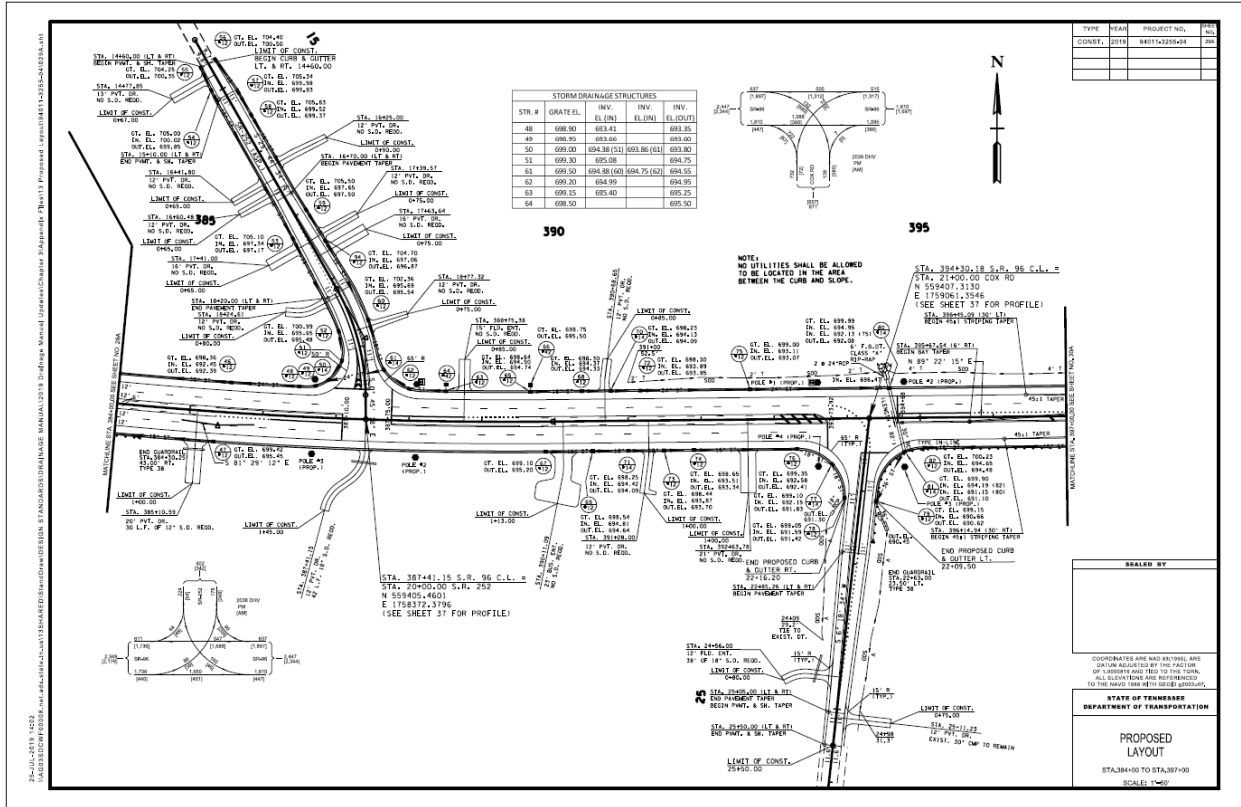


Figure 3A-13A  
Example of Proposed Layout w/ Storm Drainage

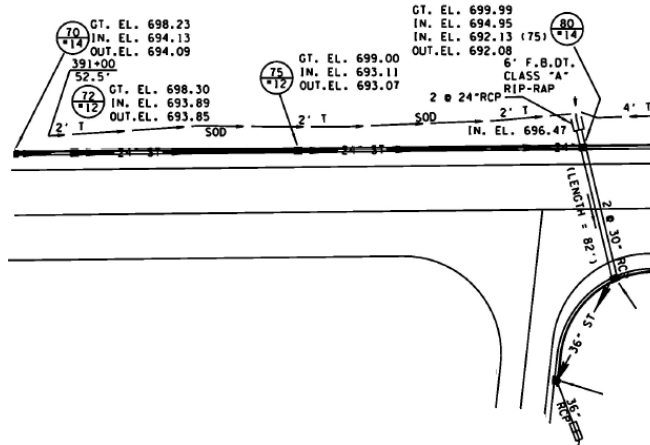


Figure 3A-13B  
Example of Storm Drainage Detail

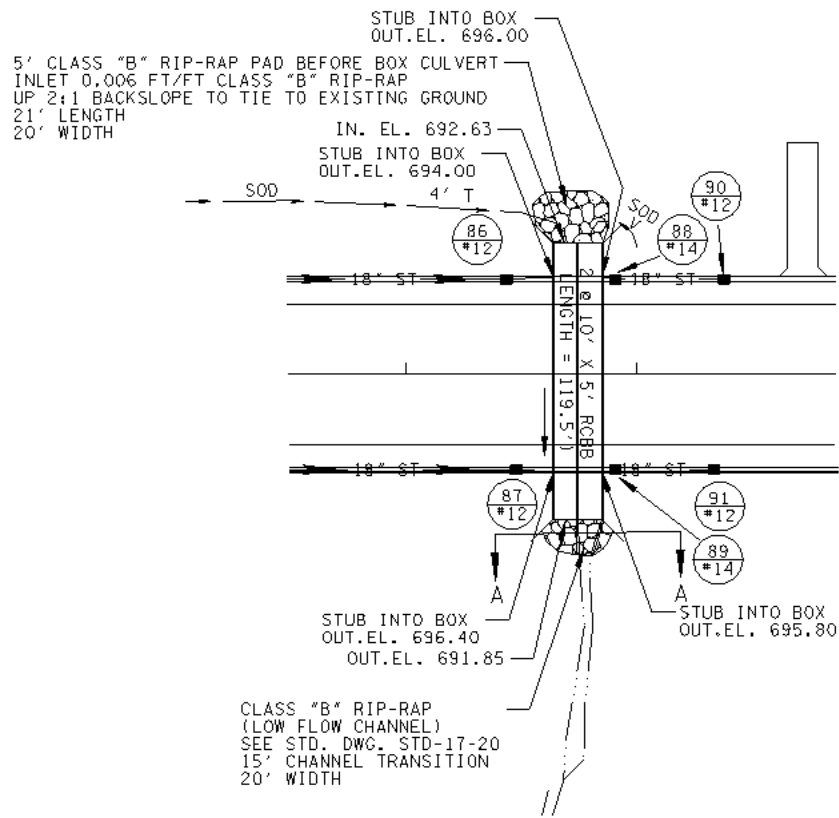


Figure 3A-14  
Example of Box Bridge on Proposed Layout



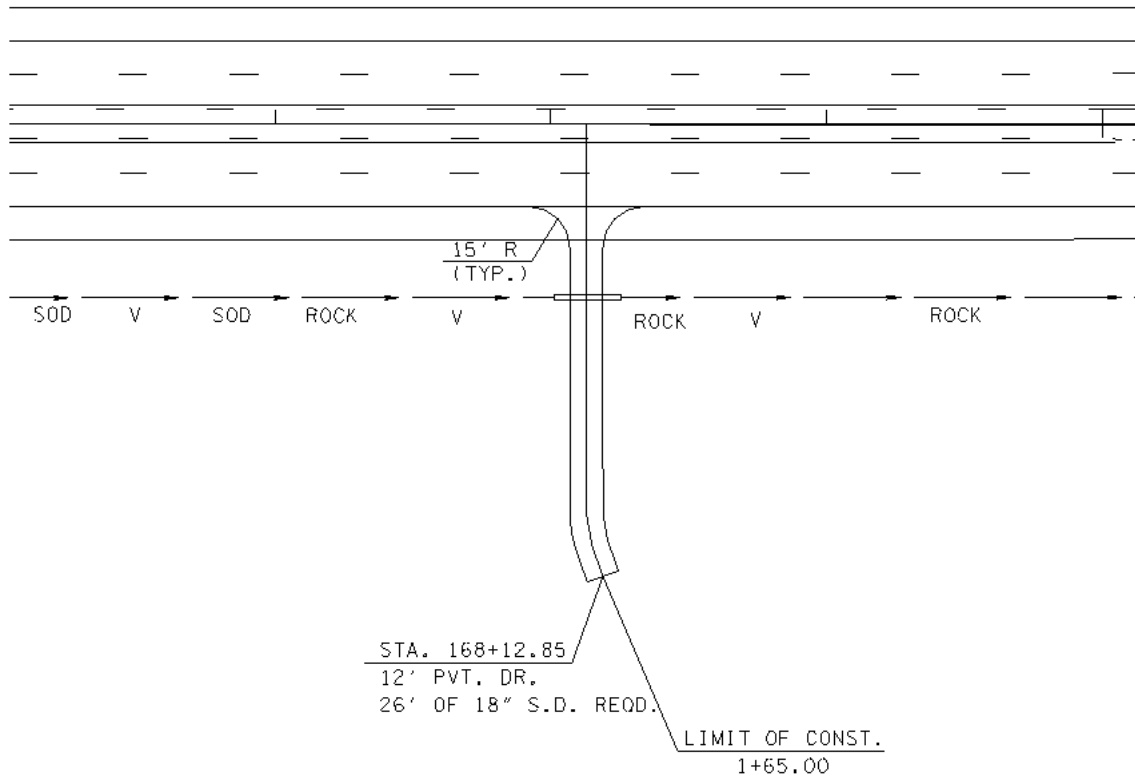


Figure 3A-16  
Example of Special Ditch and Side Drain on Proposed Layout

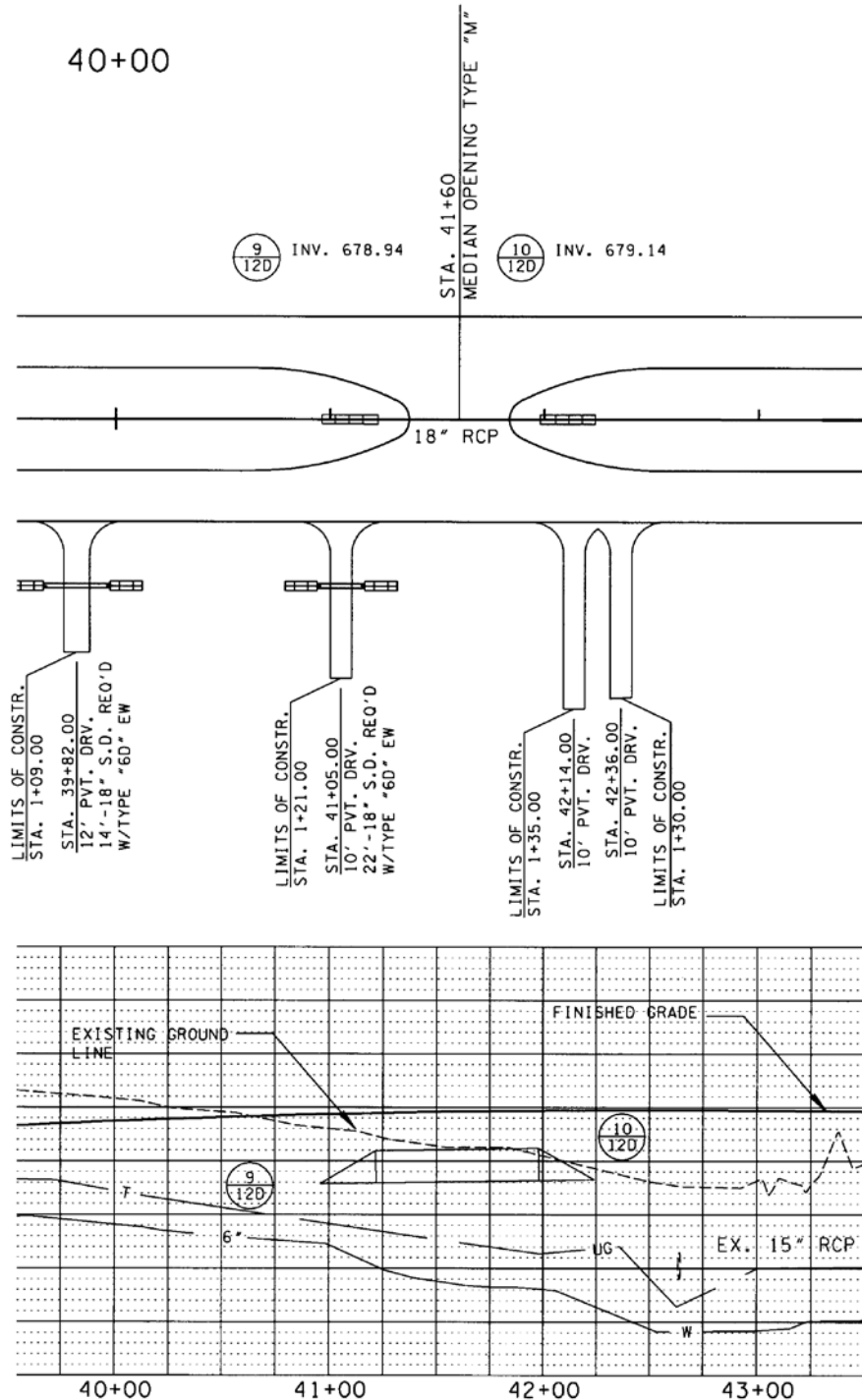


Figure 3A-17  
Example of Median Culvert (Proposed Layout and Profile View)





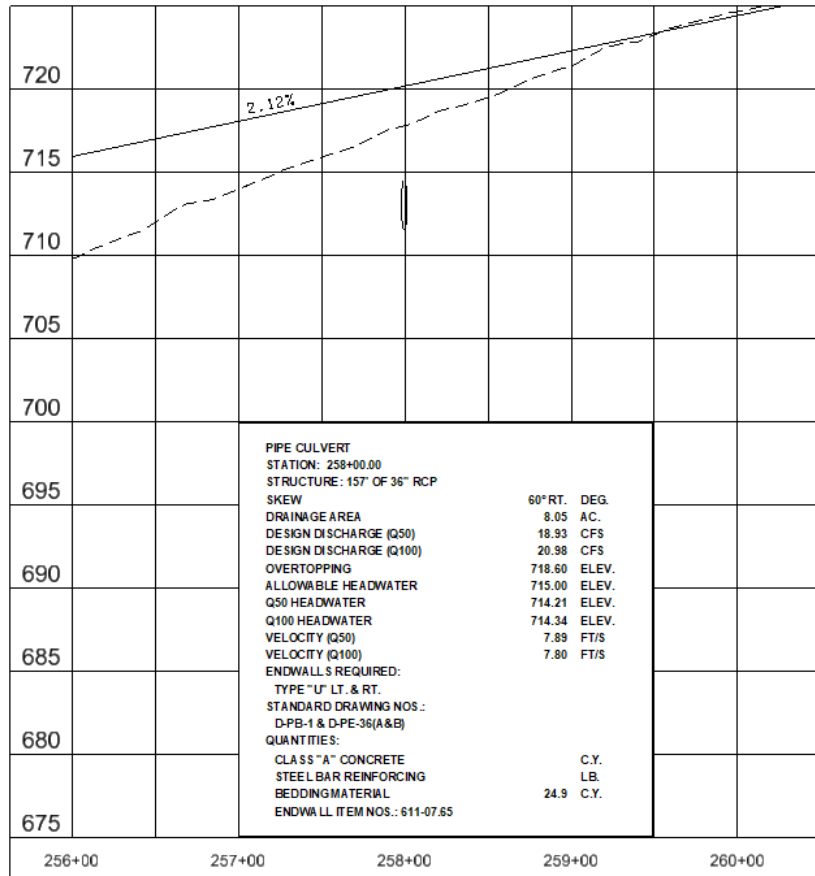


Figure 3A-19  
Example of Pipe Culvert on Proposed Profile

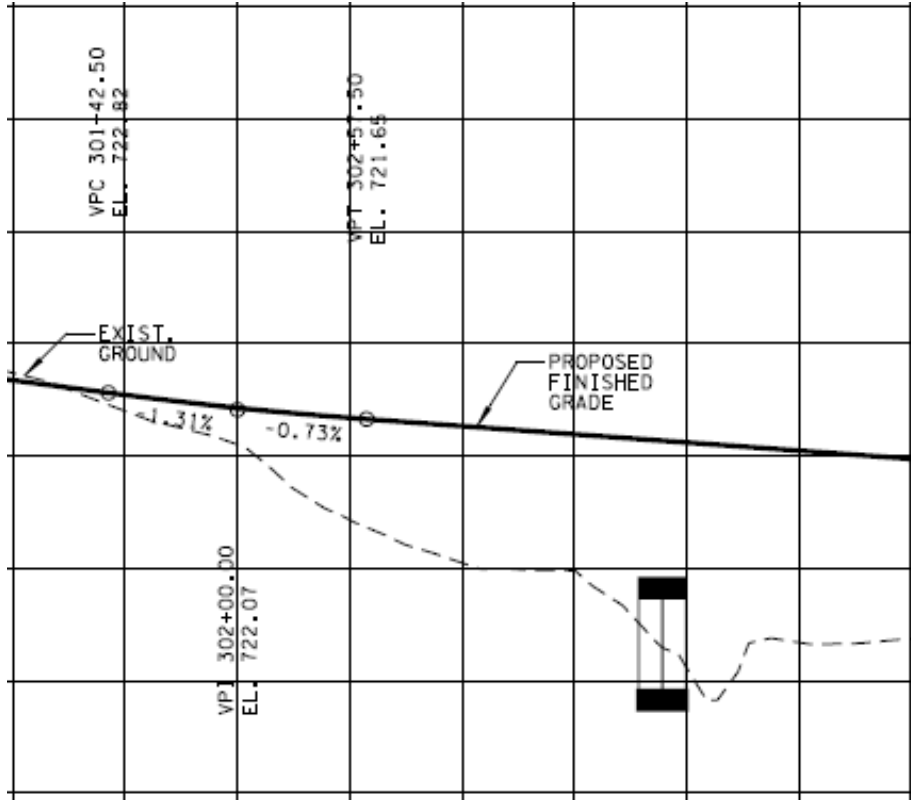


Figure 3A-20A  
Example of Box Culvert as Shown on Proposed Profile

<b>BOX CULVERT</b>		
STATION: 303+89.29		
STRUCTURE: 2 @ 8' X 5'		
60° SKEW CONCRETE BOX CULVERT		
DRAINAGE AREA	0.33	SQ. MI.
TOTAL DESIGN DISCHARGE (100 YR)-	597	CFS
DISCHARGE THRU THIS STRUCTURE-		CFS
100 YR BACKWATER	4.56	FT AT EL. 718.41
100 YR VELOCITY	10.63	FT/S
500 YR DISCHARGE (THIS STRUCTURE)	791	CFS AT EL. 721.19
INLET ELEVATION	710.01	ELEV.
OUTLET ELEVATION	709.15	ELEV.
<b>STANDARD DRAWING NUMBERS.:</b>		
STD-17-72		
<b>QUANTITIES:</b>		
CLASS "A" CONCRETE	229.0	C.Y.
STEEL BAR REINFORCING	48639.0	LB.
BACKFILL	877.0	TONS
FOUNDATION FILL MATERIAL	53.9	C.Y.

Figure 3A-20B  
Example of Box Culvert Data as Shown on Proposed Profile

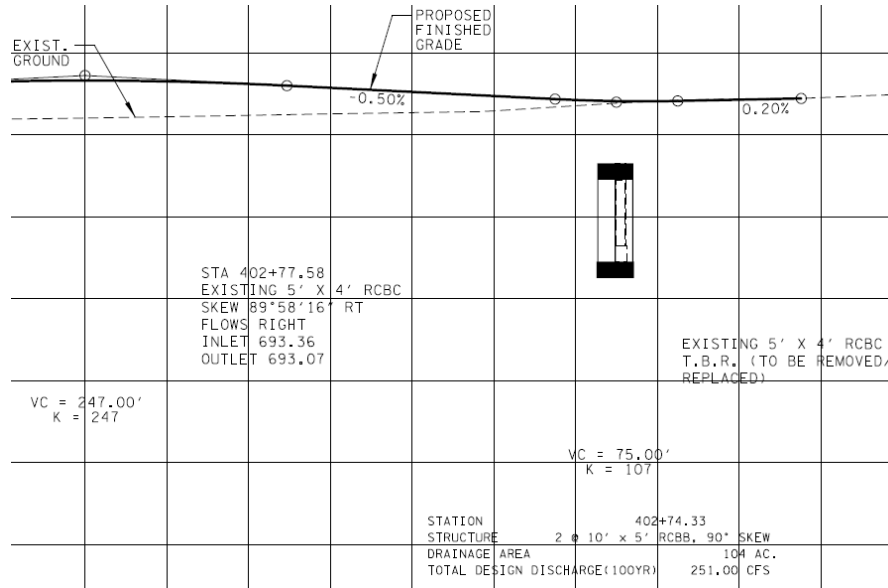


Figure 3A-21A  
Example of Box Bridge on Proposed Profile

<b>BOX BRIDGE</b>		
<b>STATION: 402+74.33</b>		
<b>STRUCTURE: 119.5' OF 2 @ 10' X 5' RCBB</b>		
<b>SKEW</b>	<b>89°57'46" RT.</b>	<b>DEG.</b>
<b>DRAINAGE AREA</b>	<b>131</b>	<b>ACRES</b>
<b>DESIGN DISCHARGE (Q50)</b>	<b>295.41</b>	<b>CFS</b>
<b>DESIGN DISCHARGE (Q100)</b>	<b>322.26</b>	<b>CFS</b>
<b>OVERTOPPING</b>	<b>701.50</b>	<b>ELEV.</b>
<b>ALLOWABLE HEADWATER</b>	<b>700.00</b>	<b>ELEV.</b>
<b>Q100 HEADWATER</b>	<b>696.98</b>	<b>ELEV.</b>
<b>Q500 HEADWATER</b>	<b>697.17</b>	<b>ELEV.</b>
<b>VELOCITY (Q50)</b>	<b>7.80</b>	<b>FT/S</b>
<b>VELOCITY (Q100)</b>	<b>8.00</b>	<b>FT/S</b>
<b>INLET</b>	<b>692.63</b>	<b>ELEV.</b>
<b>OUTLET</b>	<b>691.85</b>	<b>ELEV.</b>
<b>STANDARD DRAWING NOS.:</b>		
STD-17-74		
<b>QUANTITIES:</b>		
<b>CLASS "A" CONCRETE</b>	<b>270.6</b>	<b>C.Y.</b>
<b>STEEL BAR REINFORCING</b>	<b>48569.5</b>	<b>LB.</b>
<b>BACKFILL</b>	<b>837.3</b>	<b>TONS</b>
<b>FOUNDATION FILL MATERIAL</b>	<b>57.5</b>	<b>C.Y.</b>

Figure 3A-21B  
Example of Box Bridge Drainage Data on Proposed Profile

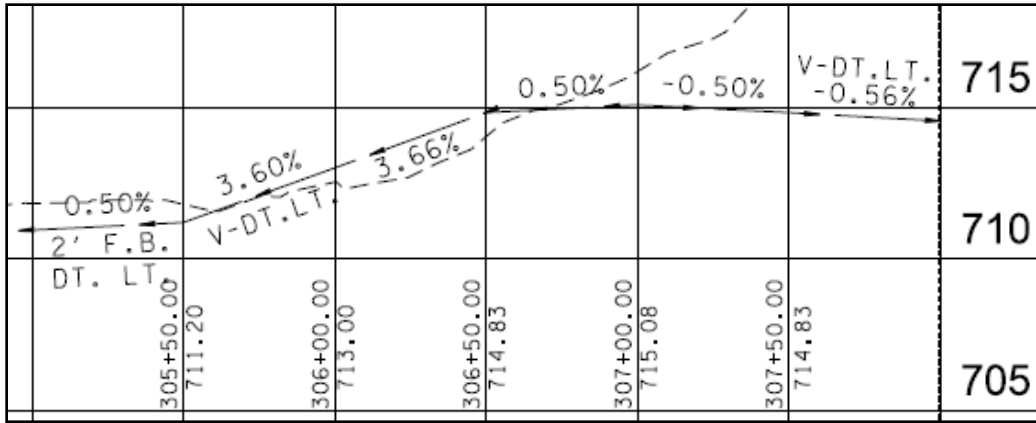


Figure 3A-22A  
Example of Special Ditch as shown on Proposed Profile

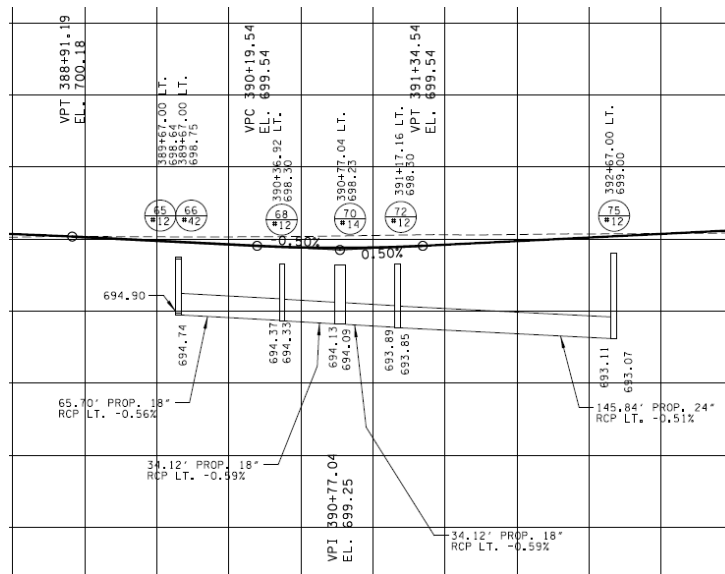
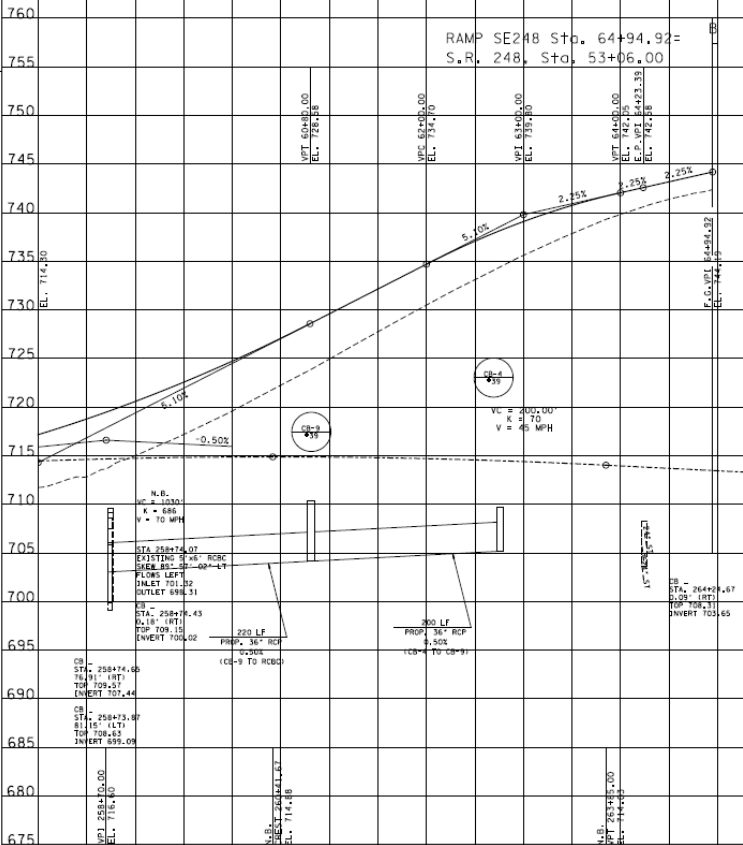


Figure 3A-22B  
Example of Storm Drainage as shown on Proposed Profile



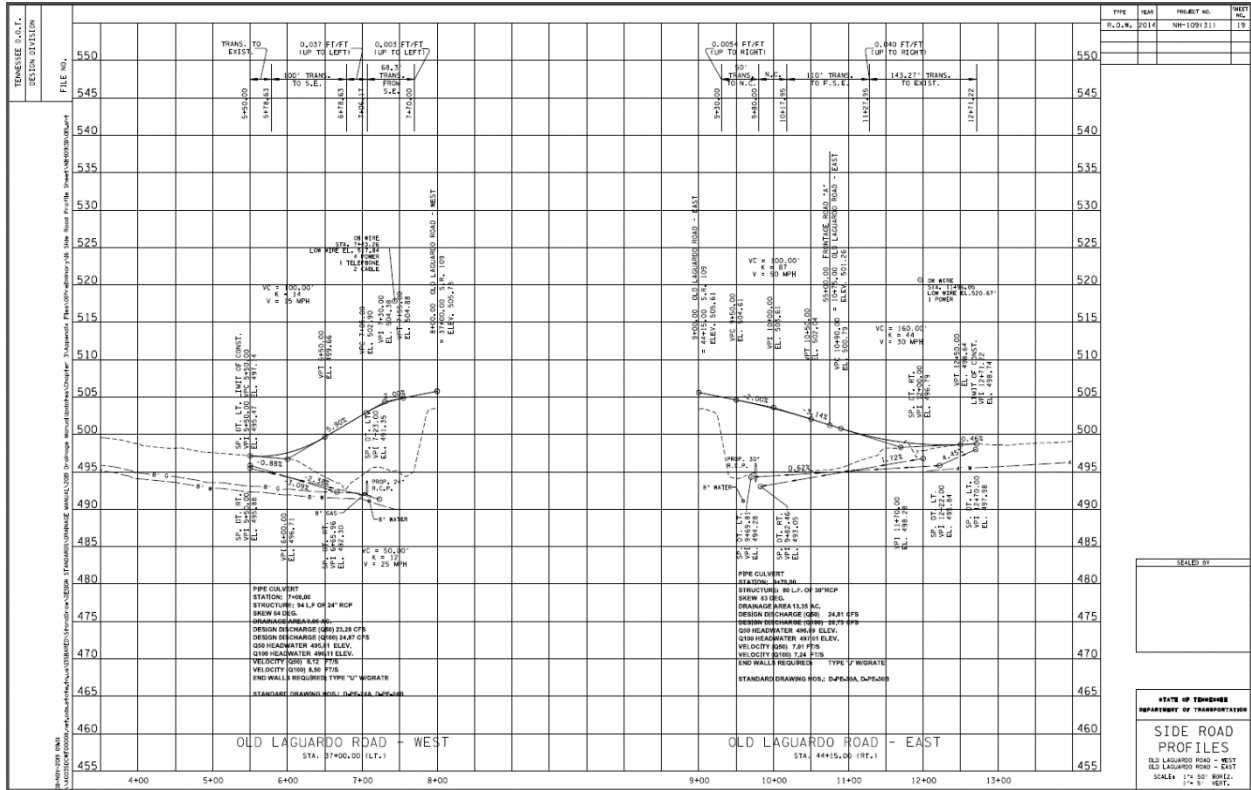


Figure 3A-24A  
Example of Side Road Profile Sheet

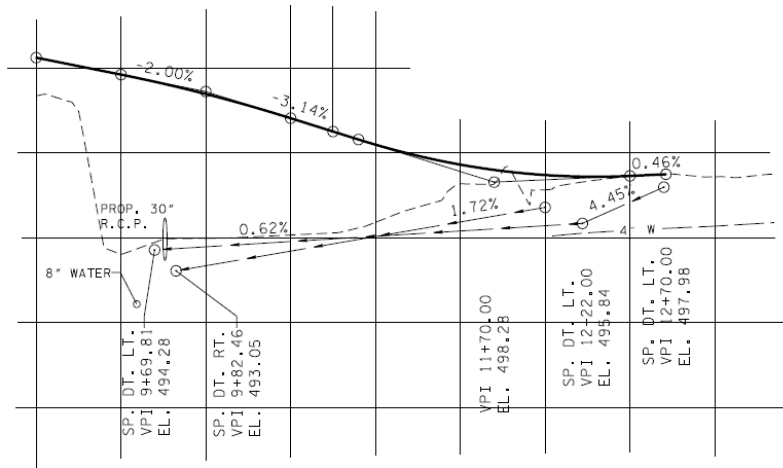


Figure 3A-24B  
Drainage Structure and Data on Side Road Profile

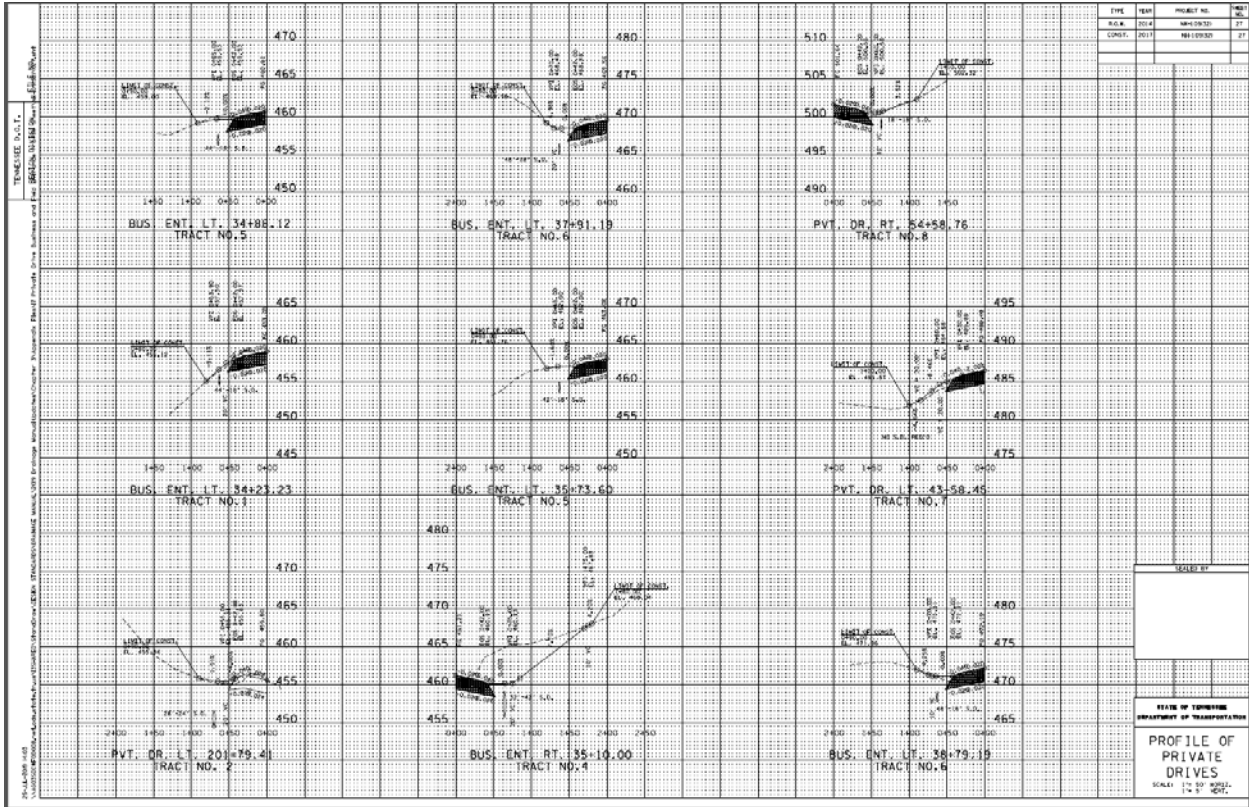


Figure 3A-25A  
Example of Private Drive, Business and Field Entrance Profile Sheet

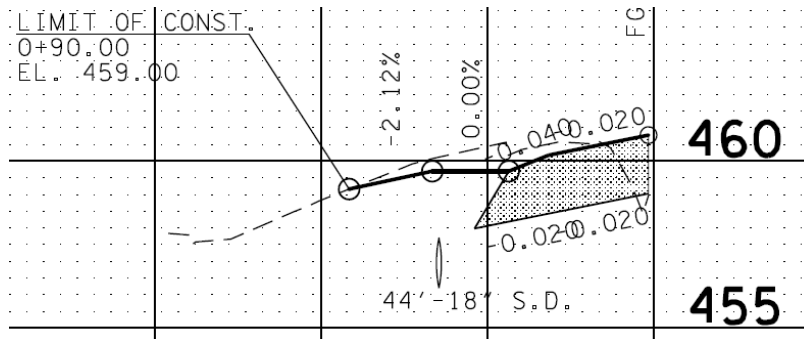


Figure 3A-25B  
Side Drain on Private Drive Profile





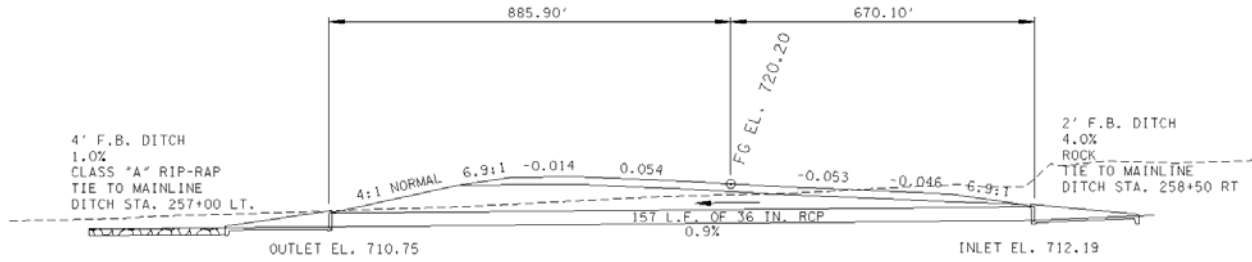


Figure 3A-27A  
Example of Culvert Section Sheet for Pipe Culvert

<b>PIPE CULVERT</b>	
STATION: 258+00.00	
STRUCTURE: 157' OF 36" RCP	
SKEW	60° RT. DEG.
DRAINAGE AREA	8.05 AC.
DESIGN DISCHARGE (Q50)	18.93 CFS
DESIGN DISCHARGE (Q100)	20.98 CFS
OVERTOPPING	718.60 ELEV.
ALLOWABLE HEADWATER	715.00 ELEV.
Q50 HEADWATER	714.21 ELEV.
Q100 HEADWATER	714.34 ELEV.
VELOCITY (Q50)	7.89 FT/S
VELOCITY (Q100)	7.80 FT/S
ENDWALLS REQUIRED:	
TYPE "U" LT. & RT.	
STANDARD DRAWING NOS.:	
D-PB-1 & D-PE-36(A&B)	
QUANTITIES:	
CLASS "A" CONCRETE	C.Y.
STEEL BAR REINFORCING	LB.
BEDDING MATERIAL	24.9 C.Y.
ENDWALL ITEM NOS.: 611-07.65	

Figure 3A-27B  
Example of Drainage Data for Pipe Culvert

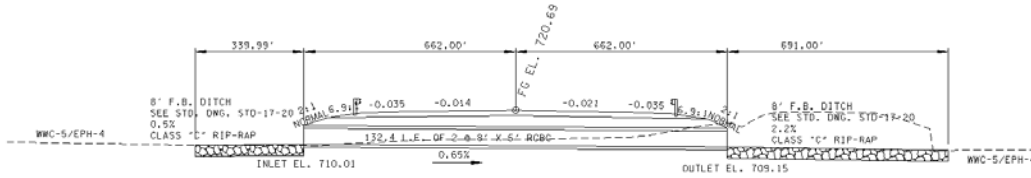


Figure 3A-28A  
Example of Box Culvert Section

**BOX CULVERT**

STATION: 103+97.33

STRUCTURE: 1 AT 18' X 5'

SKEW

DEG. 45 RT

DRAINAGE AREA

AC. 1312

DESIGN DISCHARGE (Q10)

733 CFS

DESIGN DISCHARGE (Q100)

1162 CFS

OVERTOPPING ELEV.

1242.62

VELOCITY (Q100)

8.15 FT/S

VELOCITY (Q10)

5.14 FT/S

INLET ELEVATION

1234.34

OUTLET ELEVATION

1234.04

STANDARD DRAWING NOS.: STD-17-1 THRU STD-1-6

STD-17-9 THRU STD-17-10, STD-17-13 THRU STD-17-20

STD-17-28 THRU STD-17-29, STD-17-125

**QUANTITIES:**

CLASS "A" CONCRETE

98 C.Y.

STEEL BAR REINFORCING

16286 LB.

BACKFILL

2596 TONS

FOUNDATION FILL MATERIAL

0 C.Y.

CLASS "B" RIP-RAP

138 TONS

Figure 3A-28B  
Example of Drainage Data for Box Culvert Section

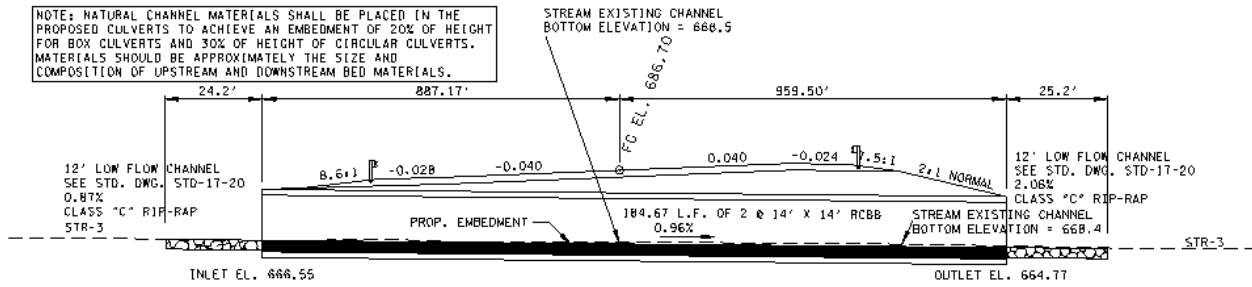


Figure 3A-29A  
Example of Box Bridge Section

**BOX BRIDGE**

**STATION: 189+54.77**

**STRUCTURE: 2 @ 14' X 14'**

**45° SKEW CONCRETE BOX BRIDGE**

<b>DRAINAGE AREA</b>	<b>12.88</b>	<b>SQ. MI.</b>
<b>TOTAL DESIGN DISCHARGE (100 YR)-</b>	<b>6939</b>	<b>CFS</b>
<b>DISCHARGE THRU THIS STRUCTURE-</b>	<b>1336</b>	<b>CFS</b>
<b>100 YR BACKWATER</b>	<b>2.23</b>	<b>FT AT EL. 676.94</b>
<b>100 YR VELOCITY</b>	<b>12.14</b>	<b>FT/S</b>
<b>500 YR DISCHARGE (THIS STRUCTURE)</b>	<b>1697</b>	<b>CFS AT EL. 678.28</b>
<b>INLET ELEVATION</b>	<b>667.55</b>	<b>ELEV.</b>
<b>OUTLET ELEVATION</b>	<b>664.77</b>	<b>ELEV.</b>

**STANDARD DRAWING NUMBERS.:**

STD-17-81

**QUANTITIES:**

<b>CLASS "A" CONCRETE</b>	<b>936.2</b>	<b>C.Y.</b>
<b>STEEL BAR REINFORCING</b>	<b>184923.0</b>	<b>LB.</b>
<b>BACKFILL</b>	<b>3770.0</b>	<b>TONS</b>
<b>FOUNDATION FILL MATERIAL</b>	<b>118.0</b>	<b>C.Y.</b>

Figure 3A-29B  
Example of Drainage Data for Box Bridge Section

<b>BOX \ SLAB TABULATION</b>					
STATION	STD. DWG.	NO. BARRELS	WIDTH	HEIGHT	LENGTH
189+54.77	STD. 17-81	2	14'	14'	184.7
FILL HEIGHT	CALCULATION FACTORS		SECTION LENGTH FT.	QUANTITY	
	CONCRETE. CY/FT	REINF. STEEL LB/FT		CONCRETE. C.Y.	REINF. STEEL LB.
2.99' TO 0.00'				0	0
4.99' TO 3.00'				0	0
9.99' TO 5.00'	4.55	935	184.7	840.39	172694.5
19.99 TO 10.00'				0	0
29.99 TO 20.00'				0	0
39.99 TO 30.00'				0	0
49.99 TO 40.00'				0	0
59.99 TO 50.00'				0	0
> 60.00'				0	0
SUB TOTALS			184.7	840.39	172694.5
<b>WINGWALL TABULATION</b>					
STD. DWG.	BOX/SLAB HEIGHT FT.	ST HEIGHT FT.	CURB HEIGHT FT.	TOTAL HEIGHT FT.	DESIGN HEIGHT FT.
STD-17-1 THRU STD-17-10 & STD-17-16 THRU STD-17-18	14	1.42	1	16.42	16.5
	WINGWALL STD. DWG.		FILL SLOPE	CONCRETE. C.Y.	REINF. STEEL LB.
	STD-17-14	45°	2:1	95.9	12228
<b>TOTAL QUANTITY</b>				<b>936.285</b>	<b>184922.5</b>

Figure 3A-30  
Example of Tabulation Block for Box Culvert or Bridge

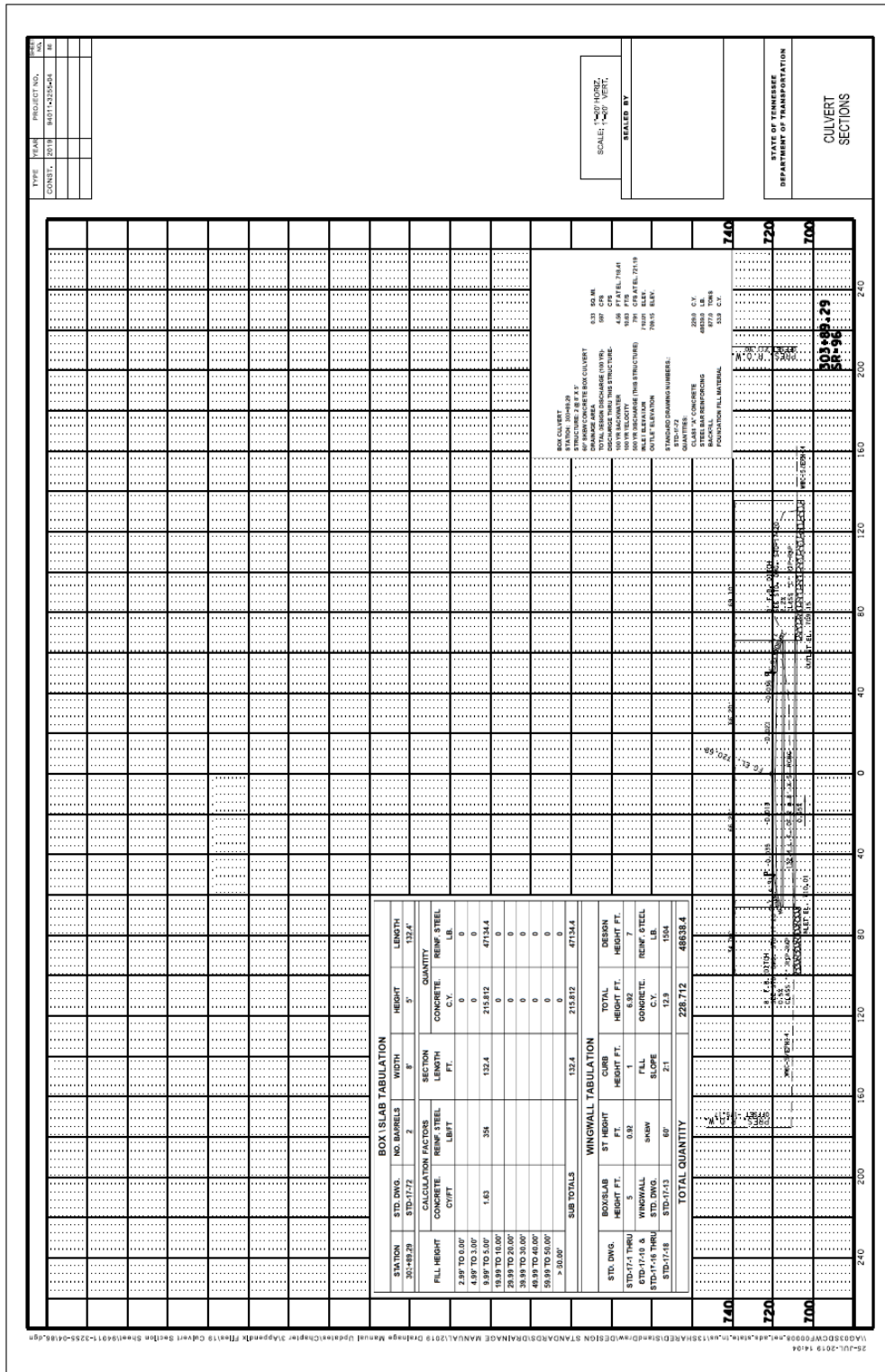


Figure 3A-31  
Example of Culvert Section Sheet for Box Culvert or Box or Slab Bridge

0

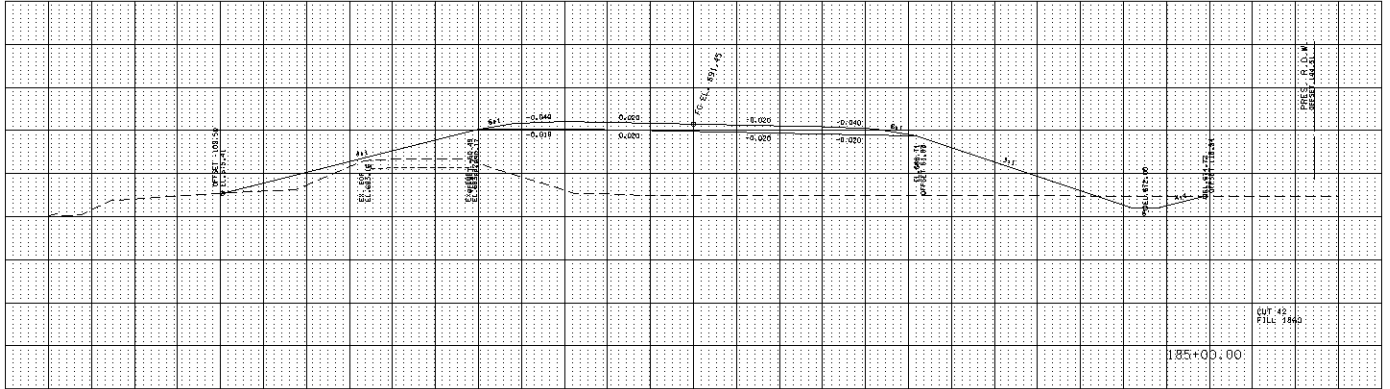


Figure 3A-32  
Example of Cross Section w/ Special Ditch

**CROSS DRAIN TABULATION**

STATION	SKEW	RCP CLASS III OR CMP 10 GA OR PVC OR SRFR OR HDPE OR PP		RCP CLASS IV OR PVC		RCP CLASS V		54" PIPE CULVERT (JACKED-IN PLACE)		42" PIPE CULVERT (JACKED-IN PLACE)		36" PIPE CULVERT (JACKED-IN PLACE)		30" PIPE CULVERT (JACKED-IN PLACE)		24" PIPE CULVERT (JACKED-IN PLACE)		END TREATMENT		REMARKS	
		16" 24" 30" 36" 42" 48" 54"	(L.F.)	18" 24" 30" 36" 42" 48" 54" 60"	(L.F.)	18" 24" 30" 36" 42" 48" 60"	(L.F.)	18" 24" 30" 36" 42" 48" 60"	(L.F.)	TYPE	DRAWING NO.	TYPE	DRAWING NO.	TYPE	DRAWING NO.	TYPE	DRAWING NO.	TYPE	DRAWING NO.		
115+06.36	70°32'27" RT																				
135+26.00	80°08'00" LT		138																		
165+25.44	61°44'09" LT						160														
204+06.00	50°		120																		
217+00.00	61°48'13" RT						92														
232+40	70°00'00" RT						202														
258+00	60°00'00" RT		157																		
269+61.80	89°30'21" RT		153																		
309+18	61°17'27" RT																				
309+18	61°17'27" RT		30																		
309+18	61°17'27" RT		26																		
384+00.29	78°50'28" RT		10																		
384+00.29	78°50'28" RT		164																		
TOTALS		0	168	434	213	103	362	92	0	0	0	0	0	0	0	0	0	0	0	0	0

**CATCH BASINS AND MANHOLES**

SHEET NO.	LOCATION	STATION	OFFSET (FT.)	DRAINAGE CODE	GRATE TOP ELEV.	STRUCTURE TYPE	INSIDE DIMENSIONS	DEPTH (FT.)	STANDARD DRAWING	PATTERNS													
										TYPE 1 S05	TYPE 12	TYPE 12	TYPE 12	TYPE 12	TYPE 12	TYPE 12	TYPE 14	TYPE 14	TYPE 14	TYPE 14	TYPE 42		
4A	59+48	88°14'00	42 LL	1	857.58	#1.25	48" x 36"	4.00	D-03-125	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01
4A	59+48	88°17'00	42 LL	2	852.17	#1.25	48" x 36"	4.00	D-03-125	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01
4A	59+48	88°17'00	42 RL	3	852.17	#1.25	48" x 36"	4.00	D-03-125	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01
5A	59+48	01°15'00	42 LL	4	818.07	#1.25	48" x 36"	4.00	D-03-125	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01
5A	59+48	01°15'00	42 RL	5	818.07	#1.25	48" x 36"	4.00	D-03-125	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01
5A	59+48	04°18'00	42 LL	6	824.01	#1.25	48" x 36"	8.18	D-03-125	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01
5A	59+48	04°18'00	42 RL	7	824.01	#1.25	48" x 36"	8.28	D-03-125	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01
5A	59+48	08°15'00	42 LL	8	818.03	#1.25	48" x 36"	4.83	D-03-125	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01
5A	59+48	08°15'00	42 RL	9	818.26	#1.25	48" x 36"	4.79	D-03-125	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01
5A	59+48	08°16'00	42 RL	10	813.77	#1.25	48" x 36"	17.02	D-03-125	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01
5A	59+48	07°16'00	42 RL	11	811.15	#1.25	48" x 36"	15.15	D-03-125	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01
5A	59+48	08°14'00	42 RL	12	809.35	#1.25	48" x 48"	14.55	D-03-125	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01
5A	59+48	111°27'72	54 S4 LL	13	N/A	#1.5-05	36" x 36"	3.13	D-501-5-1	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01
5A	59+48	208°108	63 S0 LL	14	804.68	#1.25	48" x 48"	4.38	D-03-125	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01
5A	59+48	234°11.80	0	14	N/A	#1.5-05	36" x 36"	3.13	D-501-5-1	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01	01-42.01

Figure 3A-33  
Example of Tabulated Quantities





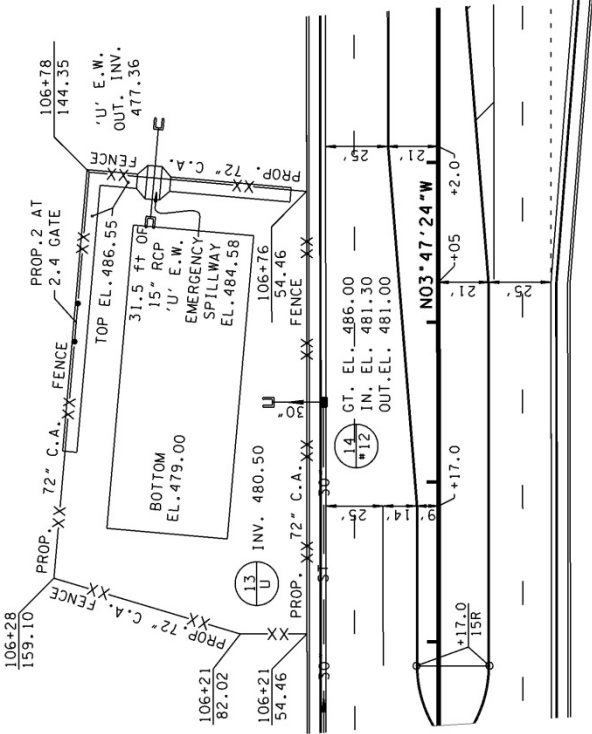


Figure 3A-35  
Example of Detention Basin on Proposed Layout Sheet

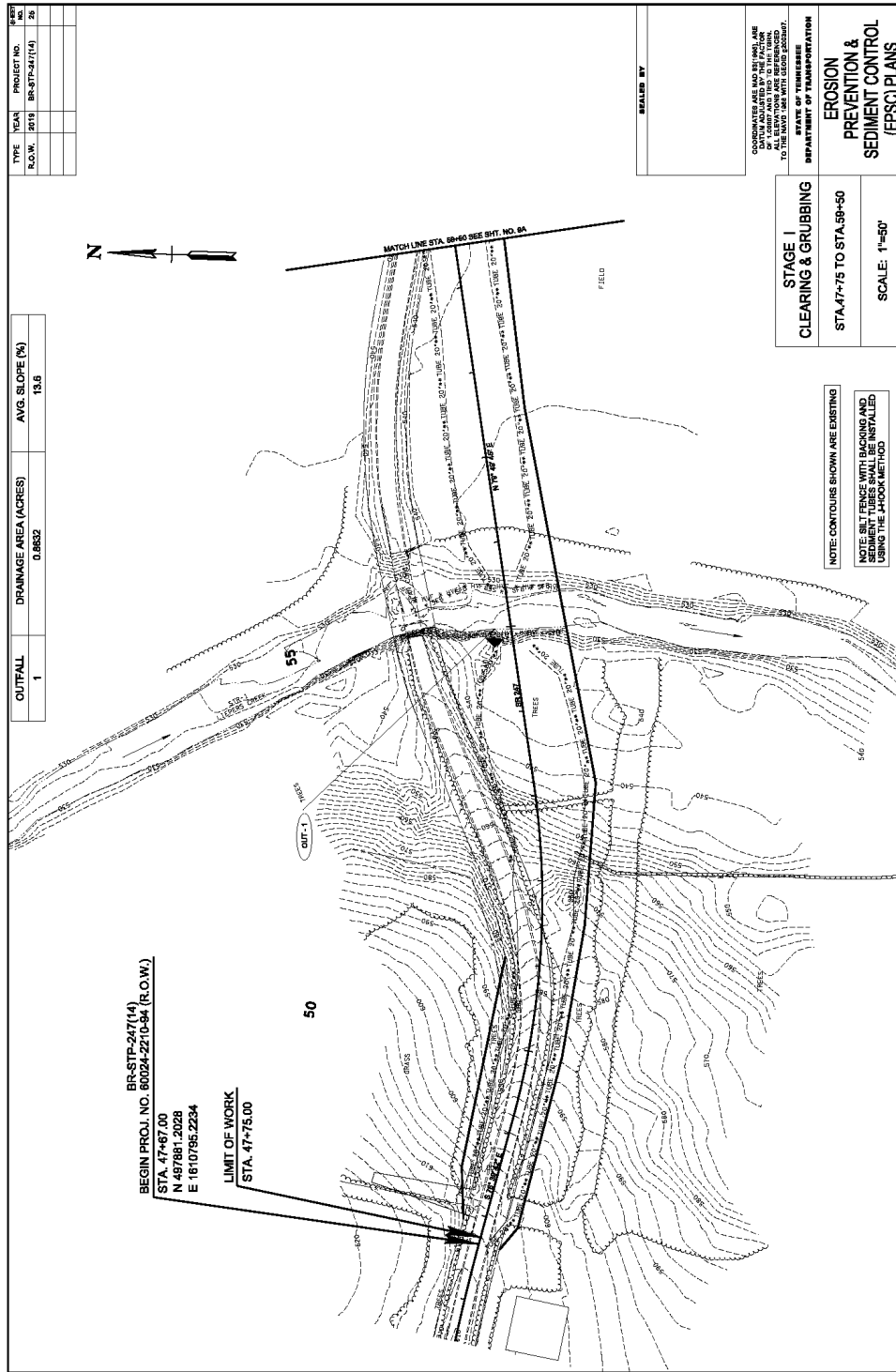


Figure 3A-36  
Example of EPSC Sheet – Clearing and Grubbing Stage





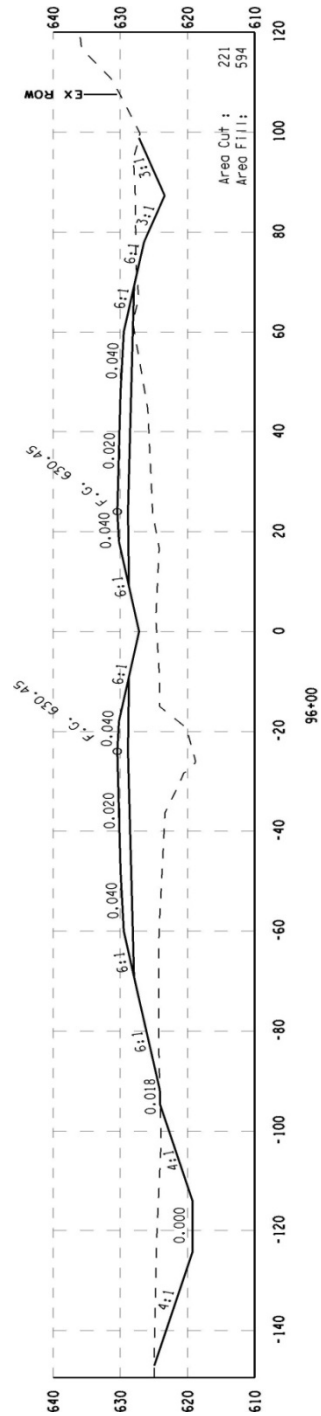


Figure 3A-39  
 Example of Cross Section with Template Ditch and Special Ditch

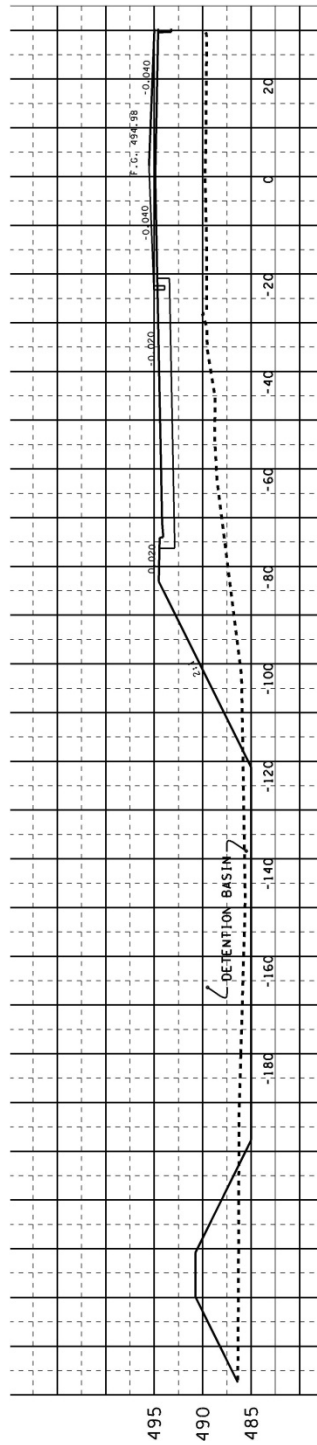


Figure 3A-40  
Example of Cross Section with Detention Basin

<b>DWG. NO.</b>	<b>REV.</b>	<b>DESCRIPTION</b>
<b>10-101.00 PIPE CULVERTS AND ENDWALLS</b>		
D-PB-1	06-28-19	STANDARD DETAILS FOR CONCRETE PIPE INSTALLATION
D-PE-18A	06-28-19	TYPE "U" CROSS DRAIN ENDWALL FOR 18" PIPE (FOR 3:1, 4:1 & 6:1 SLOPES)
D-PE-24A	06-28-19	TYPE "U" CROSS DRAIN ENDWALL FOR 24" PIPE (FOR 3:1, 4:1 & 6:1 SLOPES)
D-PE-24B	06-28-19	TYPE "U" CROSS DRAIN ENDWALL FOR 24" PIPE, BILL OF STEEL AND PRECAST NOTES
D-PE-30A	06-28-19	TYPE "U" CROSS DRAIN ENDWALL FOR 30" PIPE WITH STEEL PIPE GRATE (FOR 3:1, 4:1 & 6:1 SLOPES)
D-PE-30B	06-28-19	TYPE "U" CROSS DRAIN ENDWALL FOR 30" PIPE, BILL OF STEEL AND PRECAST NOTES
D-PE-36A	06-28-19	TYPE "U" CROSS DRAIN ENDWALL FOR 36" PIPE WITH STEEL PIPE GRATE (FOR 3:1, 4:1 & 6:1 SLOPES)
D-PE-36B	06-28-19	TYPE "U" CROSS DRAIN ENDWALL FOR 36" PIPE, BILL OF STEEL AND PRECAST NOTES
D-PE-42A	06-28-19	TYPE "U" CROSS DRAIN ENDWALL FOR 42" PIPE WITH STEEL PIPE GRATE (FOR 3:1, 4:1 & 6:1 SLOPES)
<b>10-102.00 CATCH BASINS AND MANHOLES</b>		
D-CB-12RB	05-15-18	STANDARD PRECAST 60" AND 72" CIRCULAR NO. 12 CATCH BASIN (FOR USE WITH 6" NONMOUNTABLE CURB)
D-CB-12RC	05-15-18	STANDARD PRECAST 84" THRU 120" CIRCULAR NO. 12 CATCH BASIN (FOR USE WITH 6" NONMOUNTABLE CURB)
D-CB-12S	05-15-18	STANDARD RECTANGULAR CONCRETE NO. 12 CATCH BASIN
D-CB-14P	05-15-18	STANDARD PRECAST RECTANGULAR CONCRETE NO. 14 CATCH BASIN
D-CB-14RB	05-15-18	STANDARD PRECAST CIRCULAR NO. 14RB CATCH BASIN
D-CB-14SE	05-15-18	STANDARD 9' X 9' SQUARE CONCRETE NO. 14 CATCH BASIN
D-CB-42S	05-15-18	STANDARD 32" X 32" SQUARE CONCRETE NO. 42 CATCH BASIN
D-CB-99	05-20-14	MISCELLANEOUS DETAILS FOR RECTANGULAR STRUCTURES
D-CB-99R	03-11-14	MISCELLANEOUS DETAILS FOR ROUND STRUCTURES
D-CB-99RA	03-19-14	BILL OF STEEL FOR ROUND CATCH BASIN LIDS
D-CBB-12A	06-28-19	TYPE 'B' CAST IRON FRAME, GRATE & NONMOUNTABLE INLET DETAILS FOR NOS. 10, 12, 14, 16 & 17 TYPE CATCH BASINS
D-CBB-42	05-27-01	CAST IRON GRATE DETAILS FOR NOS. 42, 43 & 44 TYPE CATCH BASINS

Figure 3A-41  
Example of Standard Drawings



ESTIMATED ROADWAY QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QUANTITY 123
607-02.30	15IN PIPE CULVERT	L.F.	150
607-03.30	18" PIPE CULVERT	L.F.	950
607-05.30	24" PIPE CULVERT	L.F.	100
607-06.30	30" PIPE CULVERT	L.F.	56
607-07.30	36" PIPE CULVERT	L.F.	93
607-08.30	42" PIPE CULVERT	L.F.	325
607-09.30	48" PIPE CULVERT	L.F.	500
607-10.30	54" PIPE CULVERT	L.F.	38
611-07.63	36IN ENDWALL (CROSS DRAIN) 3:1	EACH	15
611-07.64	36IN ENDWALL (CROSS DRAIN) 4:1	EACH	2
611-07.65	36IN ENDWALL (CROSS DRAIN) 6:1	EACH	2
611-07.66	42IN ENDWALL (CROSS DRAIN) 3:1	EACH	1
611-07.67	42IN ENDWALL (CROSS DRAIN) 4:1	EACH	1
611-07.70	48IN ENDWALL (CROSS DRAIN) 4:1	EACH	2
611-12.01	CATCH BASINS, TYPE 12, 0' - 4' DEPTH	EACH	24
611-12.02	CATCH BASINS, TYPE 12, > 4' - 8' DEPTH	EACH	40
611-12.03	CATCH BASINS, TYPE 12, > 8' - 12' DEPTH	EACH	4
611-12.04	CATCH BASINS, TYPE 12, > 12' - 16' DEPTH	EACH	2
611-12.05	CATCH BASINS, TYPE 12, > 16' - 20' DEPTH	EACH	1
611-14.02	CATCH BASINS, TYPE 14, > 4' - 8' DEPTH	EACH	13
611-14.03	CATCH BASINS, TYPE 14, > 8' - 12' DEPTH	EACH	1
611-42.01	CATCH BASINS, TYPE 42, 0' - 4' DEPTH	EACH	2

Figure 3A-42  
Example of Estimated Roadway Quantities

ESTIMATED BRIDGE QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QUANTITY
(1) 202-04.50	REMOVAL OF STRUCTURES (BRIDGE, STA. 189+02)	LS	1
(1) 202-04.51	REMOVAL OF STRUCTURES (10'X6' RCBC, STA. 196+64)	LS	1
(1) 202-04.52	REMOVAL OF STRUCTURES (3'X3' RCBC, STA. 246+48)	LS	1
(1) 202-04.53	REMOVAL OF STRUCTURES (8'X6' RCBC, STA. 246+91)	LS	1
(1) 202-04.54	REMOVAL OF STRUCTURES (BRIDGE, STA. 312+83)	LS	1
(1) 202-04.55	REMOVAL OF STRUCTURES (4'X3' RCBC, STA. 355+39)	LS	1
(1) 202-04.56	REMOVAL OF STRUCTURES (5'X4' RCBC, STA. 402+78)	LS	1
203-08	CHANNEL EXCAVATION (UNCLASSIFIED)	C.Y.	533
604-02.01	CLASS A CONCRETE (BOX BRIDGES)	C.Y.	3579
604-02.02	STEEL BAR REINFORCEMENT (BOX BRIDGES)	LB.	703578

(1) SALVAGE SHALL BECOME THE PROPERTY OF THE CONTRACTOR

Figure 3A-43  
Example of Box Bridge Quantities

**DRAINAGE**

- (1) THE CONTRACTOR SHALL SHAPE DITCHES TO THE SPECIFIED DESIGN. THIS WORK WILL NOT BE MEASURED AND PAID FOR DIRECTLY, BUT THE COST WILL BE INCLUDED IN THE COST OF OTHER ITEMS.
- (2) EXCAVATION FOR PIPE CULVERTS, STORM SEWERS, CONDUITS, ALL OTHER CULVERTS AND MINOR STRUCTURES WILL NOT BE MEASURED AND PAID FOR DIRECTLY, BUT WILL BE INCLUDED IN THE PRICE BID PER LINEAR FOOT OF PIPE (PIPE CULVERTS, STORM SEWERS, CONDUITS, ALL OTHER CULVERTS AND MINOR STRUCTURES).
- (3) CULVERT EXCAVATION FOR CONCRETE BOX OR SLAB TYPE CULVERTS OR BRIDGES WILL NOT BE MEASURED AND PAID FOR DIRECTLY, BUT THE COST WILL BE INCLUDED IN THE COST OF OTHER ITEMS.
- (4) THE CUTTING OF INLET AND OUTLET DITCHES WHERE SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER WILL BE MEASURED AND PAID FOR AS ITEM NO. 203-01 ROAD AND DRAINAGE EXCAVATION (UNCLASSIFIED).
- (5) WHERE A CULVERT (PIPE, SLAB OR BOX) IS MOVED TO A NEW LOCATION OTHER THAN THAT SHOWN ON THE PLANS, INCREASING OR DECREASING THE AMOUNT OF CULVERT EXCAVATION, NO INCREASE OR DECREASE IN THE AMOUNT OF PAYMENT WILL BE MADE DUE TO SUCH CHANGE.
- (6) DURING CONSTRUCTION OF DRAINAGE STRUCTURES ALL COST ASSOCIATED WITH MAINTAINING THE FLOW OF WATER AND TRAFFIC, AT THESE STRUCTURES, DURING THE PHASED CONSTRUCTION OF THIS PROJECT ARE TO BE INCLUDED IN THE UNIT PRICE OF THE DRAINAGE STRUCTURES AND TRAFFIC CONTROL ITEMS.
- (7) ALL EXISTING PIPES AS SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER THAT ARE TO BE LEFT IN PLACE AND ABANDONED MUST BE BACKFILLED AND PLUGGED. ALL COST FOR THIS WORK SHALL BE INCLUDED IN ITEM NO. 204-08.01, BACKFILL MATERIAL (FLOWABLE FILL), C.Y.

Figure 3A-44  
Example of General Notes

**SPECIAL NOTES**

**GRADING**

- (1) THE GRADING TABULATIONS AND RESULTING EARTHWORK ASSOCIATED BID QUANTITIES WERE PREPARED UTILIZING AVAILABLE GEOTECHNICAL INFORMATION AND/OR REPORTS PREPARED FOR THIS PROJECT. THIS INFORMATION IS PROVIDED FOR GENERAL INFORMATION AND ESTIMATION GUIDANCE ONLY.
- (2) BORING DEPICTIONS SHOWN ON THE FOUNDATION DATA SHEETS, SOILS SHEETS, PLANS, AND CROSS-SECTIONS INDICATE SOIL AND ROCK CONDITIONS AT THE SPECIFIC BORING LOCATIONS. ANY SOIL PROFILE AND/OR ROCK LINE IS INTERPRETIVE BASED ON THE JUDGMENT OF THE GEOTECHNICAL ENGINEER/GEOLOGIST. THE TRANSITION BETWEEN BORINGS AND LAYERS MAY VARY SIGNIFICANTLY DEPENDING ON THE GEOLOGIC FORMAT IONS ENCOUNTERED.
- (3) TO ASSIST IN BID PREPARATION FOR EARTHWORK AND FOUNDATION CONSTRUCTION, DETAIL ROCK AND SOIL DESCRIPTION AND ON SOME PROJECTS, ROCK CORE SAMPLES ARE AVAILABLE FOR INSPECTION AT THE MATERIALS AND TESTS HEADQUARTERS AT 601 CENTENNIAL BOULEVARD, NASHVILLE, TN OR AT THE TDOT REGION 1 BUILDING IN KNOXVILLE, TN.
- (4) THE CONTRACTOR SHALL UTILIZE ALL INFORMATION PROVIDED IN THE PLANS, CROSS-SECTIONS AND CONTRACT DOCUMENTS INCLUDING ANY SPECIAL PROVISIONS AS WELL AS UTILIZING HIS PAST EXPERIENCE WITH PROJECTS OF SIMILAR NATURE, SCOPE AND LOCATION IN PREPARATION OF HIS BID FOR EARTHWORK ITEMS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE AND PROVIDE EQUIPMENT AND MEANS NECESSARY TO CONDUCT THE EXCAVATION ACTIVITIES IN ACCORDANCE WITH PLANS AND SPECIFICATIONS.
- (5) EARTHWORK IS PAID FOR UNDER ITEM 203.01, ROAD AND DRAINAGE EXCAVATION (UNCLASSIFIED). NO ADDITIONAL PAYMENT WILL BE MADE FOR EARTHWORK QUANTITIES BASED SOLELY ON A CLAIM THAT THE QUANTITIES SHOWN IN THE GRADING TABULATION OR ELSEWHERE IN THE PLANS ARE INACCURATE WITH RESPECT TO THE TYPE OF MATERIALS ENCOUNTERED DURING CONSTRUCTION EXCEPT AS PROVIDED FOR BY SECTION 104.02 IN THE CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION OR AS AMENDED IN SUPPLEMENTAL SPECIFICATIONS.

**GRADED SOLID ROCK**

- (6) THIS GRADED SOLID ROCK MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING THREE FEET IN DEPTH

**DEMOLITION**

**DEMOLITION OF BUILDINGS**

- (1) IF THE ASBESTOS SURVEY AND ABATEMENT IS NOT PART OF THE ON TRACT, THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE TDOT HAZARDOUS MATERIALS OFFICE TO VERIFY THAT AN ASBESTOS SURVEY HAS BEEN COMPLETED FOR ANY BUILDING TO BE REMOVED. IN THE CASE THAT NO SURVEY HAS BEEN COMPLETED THE CONTRACTOR SHALL COORDINATE WITH THE HAZARDOUS MATERIAL OFFICE IN SCHEDULING A SURVEY.
- (2) ASBESTOS-CONTAINING MATERIALS (ACM) ABATEMENT SHALL BE COMPLETED PRIOR TO ANY DEMOLITION ACTIVITIES FOR BUILDINGS INCLUDED IN THE PROJECT. ABATEMENT SHOULD BE ACCOMPLISHED PER SP202ACM SPECIAL PROVISION REGARDING REMOVAL OF ASBESTOS-CONTAINING MATERIALS. STATE OF TENNESSEE ASBESTOS ACCREDITATION REQUIREMENTS (TCA 1200-01-20) MANDATE THAT ACM ABATEMENT WORK BE PERFORMED BY AN ACCREDITED FIRM (CONTRACTOR) USING ACCREDITED ABATEMENT WORKERS AND SUPERVISORS.
- (3) THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTING A NOTICE TO THE TDEC, DIVISION OF AIR POLLUTION CONTROL TEN (10) DAYS IN ADVANCE OF ANY ACM ABATEMENT, DEMOLITION, OR MAJOR REPAIR INVOLVING THE REMOVAL/REPLACEMENT OF A STRUCTURAL COMPONENT.

**DEMOLITION, REPAIR, OR REHABILITATION OF BRIDGES**

- (1) IF THE CONTRACTOR SHALL VERIFY THAT AN ASBESTOS SURVEY HAS BEEN COMPLETED PRIOR TO ANY DEMOLITION, REPAIR OR REHABILITATION ACTIVITIES (NOT INCLUDING ASPHALT MILLING OR OVERLAY).
- (2) ASBESTOS-CONTAINING MATERIALS (ACM) ABATEMENT IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE COMPLETED PRIOR TO ANY DEMOLITION, REPAIR OR REHABILITATION OF BRIDGES). ABATEMENT SHOULD BE ACCOMPLISHED PER SP202ACM SPECIAL

PROVISION REGARDING REMOVAL OF ASBESTOS-CONTAINING MATERIALS. STATE OF TENNESSEE ASBESTOS ACCREDITATION REQUIREMENTS (TCA 1200-01-20) MANDATE THAT ACM ABATEMENT WORK BE PERFORMED BY AN ACCREDITED FIRM (CONTRACTOR) USING ACCREDITED ABATEMENT WORKERS AND SUPERVISORS.

- (3) THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTING A NOTICE TO THE TDEC, DIVISION OF AIR POLLUTION CONTROL TEN (10) DAYS IN ADVANCE OF ANY ACM ABATEMENT, DEMOLITION, OR MAJOR REPAIR INVOLVING THE REMOVAL/REPLACEMENT OF A STRUCTURAL COMPONENT.

**HISTORICAL**

- (1) THE CONTRACTOR WILL BE RESPONSIBLE FOR REMOVING AND COORDINATING WITH THE TDOT REGIONAL SIGN SHOP FOR STORING HISTORIC MARKERS). AT THE TIME THE MARKER(S) IS TAKEN DOWN, LINDA WANN WITH THE TENNESSEE HISTORICAL COMMISSION SHOULD BE NOTIFIED AT (615)770-1093. AT THE END OF CONSTRUCTION, MARKER(S) WILL BE RESET BY THE SIGN SHOP AT THE DIRECTION OF THE REGIONAL TRAFFIC ENGINEER. IF THE MARKER CANNOT BE RESET OUTSIDE OF THE CLEAR ZONE, THE REGIONAL TRAFFIC ENGINEER WILL CONTACT THE TENNESSEE HISTORIC COMMISSION AND RETURN THE MARKER(S).

**SIGNALIZATION**

- (1) THE DESIGN OF TRAFFIC SIGNAL SUPPORT POLES, MAST ARMS, STRAIN POLES, ETC. SHALL BE IN CONFORMANCE WITH THE AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS, CURRENT EDITION. OVERHEAD CANTILEVERED TRAFFIC SIGNAL STRUCTURES SHALL BE DESIGNED FOR FATIGUE CATEGORY 1.

**EROSION PREVENTION AND SEDIMENT CONTROL**

**ENVIRONMENTAL**

- (1) STAFF FROM THE TDOT ENVIRONMENTAL DIVISION COMPLIANCE AND FIELD SERVICES OFFICE SHALL BE INVITED TO ALL PRE-CONSTRUCTION MEETINGS.
- (2) STAFF FROM THE TDOT REGIONAL ENVIRONMENTAL TECH OFFICE SHALL BE CONTACTED AFTER THE STREAM RELOCATION IS STAKED OUT, AND BEFORE THE STREAM RELOCATION IS CONSTRUCTED.

**ECOLOGY**

- (3) STAFF FROM THE TDOT ENVIRONMENTAL DIVISION OR A DESIGNEE SHALL ADVISE THE CONTRACTOR DURING THE PRE-CONSTRUCTION MEETING WHEN ENVIRONMENTAL DIVISION PERSONNEL OR A DESIGNATED CONSULTANT WILL NEED TO BE ON SITE FOR WORK BEING DONE WHICH COULD AFFECT WATERS OF THE STATE U.S. OR SPECIES.
- (4) STAFF FROM THE TDOT ENVIRONMENTAL DIVISION OR A DESIGNEE SHALL ATTEND THE PRE-CONSTRUCTION MEETING FOR ALL PROJECTS WHICH HAVE THREATENED OR ENDANGERED SPECIES OR CRITICAL HABITAT PROXIMAL TO SCHEDULED WORK. THIS WILL PROVIDE THE OPPORTUNITY TO ENSURE THAT PERSONNEL INCLUDING THE CONTRACTOR'S PERSONNEL AND SUBCONTRACTORS ARE MADE AWARE OF THE NECESSARY PRECAUTIONS THAT MUST BE FOLLOWED.
- (5) ALL PROJECTS WITH LEGALLY PROTECTED SPECIES OR CRITICAL HABITAT IDENTIFIED SHALL HAVE MEASURES IN PLACE TO CONTAIN CONCRETE DUST, CEMENT DUST AND ALL OTHER MATERIALS. THESE MATERIALS ARE NOT ALLOWED TO ENTER WATERS OF THE STATE U.S..

**PROJECT COMMITMENTS**

- (6) SEE PROJECT COMMITMENTS SHEET 1B, FOR DETAILS RELATING TO SPECIAL ENVIRONMENTAL COMMITMENTS REQUIRED BY THIS PROJECT.

Figure 3A-45  
Example of Special Notes

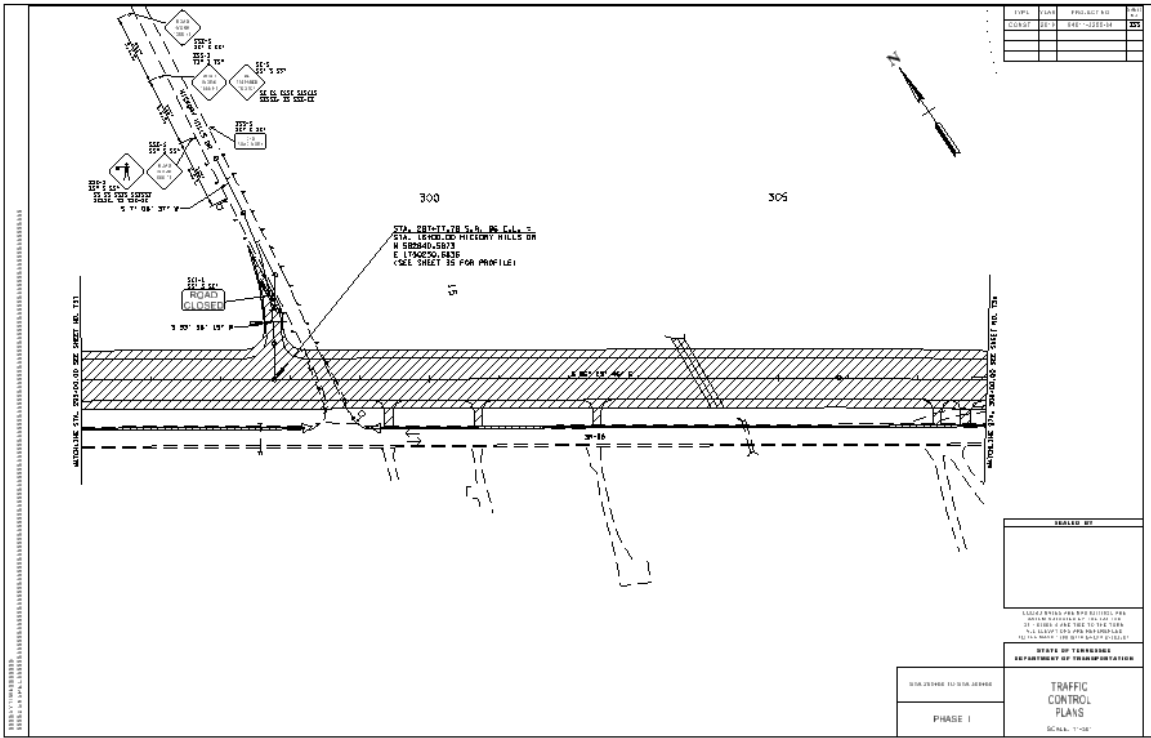


Figure 3A-46  
Example of Phase I Traffic Control, Showing Box Culvert

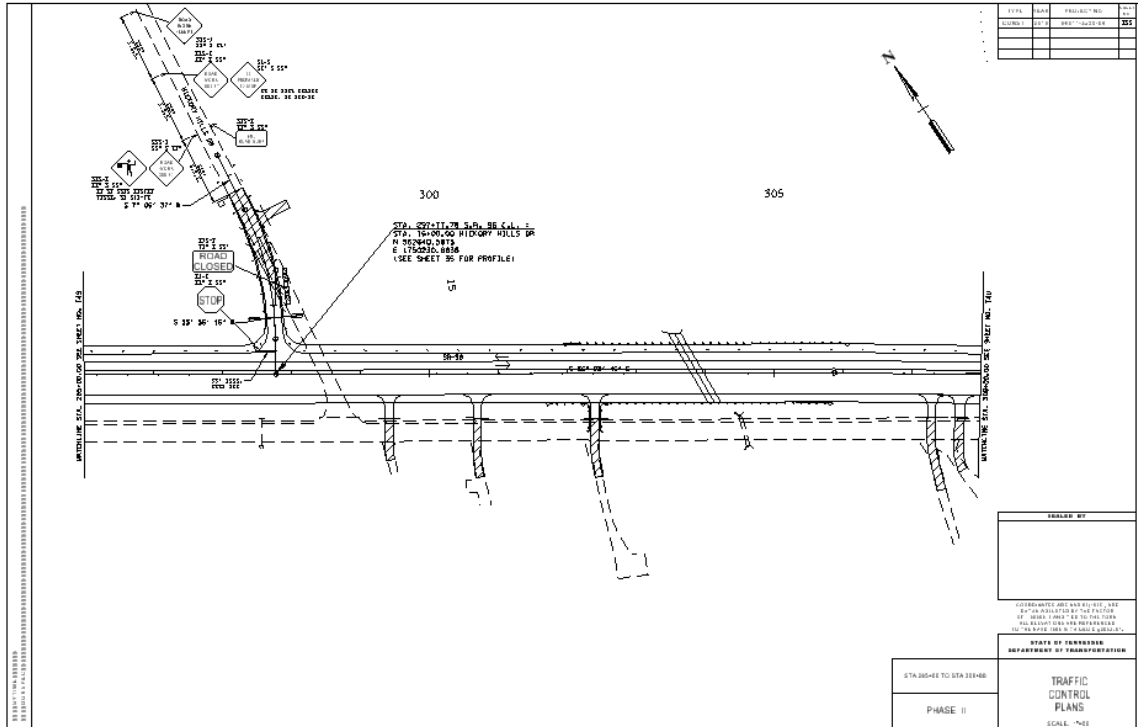


Figure 3A-47  
Example of Phase II Traffic Control, Showing Box Culvert

**3.07.2 REFERENCES**

American Association of State Highway and Transportation Officials. *Model Drainage Manual [Metric Edition]*. Washington, D.C. 1999.

Indiana Department of Transportation. *Indiana Design Manual Part IV Volume 1*. Indianapolis, IN, 1999.

Kentucky Transportation Cabinet, *Drainage Guidance Manual - Proposed Revisions*. Frankfort, KY. September 29, 2000.

Tennessee Department of Transportation. *Design Guidelines - English*, Nashville, TN 2001.

### 3.07.3 ABBREVIATIONS

Following are the abbreviations used in the descriptions of Federal policies:

AC. – Acres  
 C.Y. – Cubic Yards  
 CFS – Cubic Feet Per Second  
 CMP – Corrugated Metal Pipe  
 D.A. – Drainage Area  
 DS – Design Speed  
 EL – Elevation  
 ESMT – Easement  
 EW – Endwall  
 FEMA – Federal Emergency Management Agency  
 FPS – Feet Per Second  
 GT. – Gutter  
 H/V – Horizontal to Vertical  
 INV – Invert  
 PVT. DRV. – Private Drive  
 R.O.W – Right-of-Way  
 RCP – Reinforced Concrete Pipe  
 S.D. – Storm Drain  
 SHLD. – Shoulder  
 SL. – Slope  
 STAB – Stabilized  
 TDOT – Tennessee Department of Transportation  
 VC – Vertical Curve  
 VPC- Vertical Point of Curvature  
 VPI – Vertical Point of Intersection  
 WS – Water Surface