

CHAPTER 4

PRELIMINARY

PLANS

DEVELOPMENT

TDOT ROADWAY DESIGN GUIDELINES
CHAPTER 4 PRELIMINARY – PART 1 DEVELOPMENT

English

Revised:

CHAPTER 4 PRELIMINARY

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INTRODUCTION

ROADWAY DESIGN GUIDELINES AND STANDARD DRAWINGS

Roadway Design Guidelines and Standard Drawings have been created to ensure that there is consistency in TDOT projects across the state. The Roadway Design Guidelines and Standard Drawings indicate the current recognized design standards for new construction or reconstruction of existing highways and shall be utilized while giving due regard to topography, natural conditions, availability of road material, and prevailing traffic conditions.

Throughout these guidelines you will see the following terms used: Designer, Design Manager, and Design Team. To clarify the meanings intended in this guide by the use of these terms, the following definitions apply:

- **Designer** – HQ Design, Project Development, or Consultant Designer
- **Design Manager** – HQ Design, Project Development, or Consultant Design Manager
- **Design Team** – HQ Design, Project Development, or Consultant Design
- **Technical Report** – Transportation planning reports (i.e. Transportation Investment Reports (TIR), Transportation Planning Report (TPR)) developed by the Strategic Transportation Investments Division.

All forms mentioned throughout this chapter can be found on the [Roadway Design -TDOT Documents](#) webpage.

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SECTION 1 – GENERAL INFORMATION

4-100.00 PRELIMINARY PLANS REFERENCES

For information on Preliminary plans project information, plans production, survey information, estimates, field reviews, and public hearings, see Chapter One of the Roadway Design Guidelines.

4-100.01 DRAINAGE MANUAL

In order to assist the Designer performing drainage and hydrologic design, the Roadway Design Division has developed a Drainage Manual to provide a collection of applicable drainage criteria, policies, and examples. Designers shall use the Drainage Manual for all projects designed or constructed by TDOT. The manual includes the following chapters:

- Chapter 1 Introduction
- Chapter 2 General Drainage Policies and Practices
- Chapter 3 Drainage Plan Requirements
- Chapter 4 Hydrology
- Chapter 5 Roadside Ditches and Streams
- Chapter 6 Culverts
- Chapter 7 Storm Drainage Systems
- Chapter 8 Stormwater Storage Facilities
- Chapter 9 Energy Dissipaters
- Chapter 10 Erosion Prevention and Sediment Control
- Chapter 11 Natural Stream Design

The [TDOT Design Division Drainage Manual](#) is available to download from the [Roadway Design Standards](#) website.

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4-100.02 PRELIMINARY ENGINEERING PROJECT NUMBERS FOR DESIGN

For all new projects or projects with design currently being charged to the Preliminary Engineering NEPA (PE-N) number, Designers shall charge design work to the Preliminary Engineering NEPA (PE-N) number through Preliminary plans development. Preliminary plans development is defined as all design work prior to issuing plans for R.O.W. acquisition or for utilities only, as covered under the TDOT/FHWA Preliminary Design Agreement. Once plans are submitted for R.O.W. acquisition or for utilities only, Designers shall begin charging design work to the Preliminary Engineering Design (PE-D) number.

Designers and Managers are reminded that a task profile ID, which is the TX number for the timesheet, will need to be set up in Edison for the PE-N number and PE-D number at the appropriate stage to ensure that time is charged to the correct funding source. The Design Manager shall request the task profile ID numbers.

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SECTION 2 - INFORMATION REQUESTS

4-200.00 TRAFFIC REPORT REQUEST

The typical cross-section used when designing a project is largely dependent on the anticipated traffic. It is critical that the traffic data is current. The Technical Report includes traffic data. Generally, the report is distributed when approved by divisional heads and when funding is available. However, there are times when funding or other circumstances delay the distribution of the Technical Report, and the traffic data in the report is not current. If traffic data is three years old upon receipt of the Technical Report, a [Traffic Report Request](#) shall be submitted. Also, if one of the following applies to a project, a [Traffic Report Request](#) shall be submitted:

1. Turning movement or cross road design traffic year data is needed.
2. Survey is updated and area shows growth (building of apartment complex, shopping center, or industrial complex, etc. along corridor or on side road).
3. Information becomes available that denotes areas of growth outside the survey limits that could easily affect traffic within the project limits (building of apartment complex, shopping center, or industrial complex, etc.).

To establish a uniform and systematic method of obtaining desired traffic data for the construction year of projects, use the following procedure:

1. Designers shall complete a title sheet. If crossroad volumes and/or turning movements on certain intersecting streets or roads are needed, this shall be clearly indicated on the title sheet or on an additional sheet if necessary due to limited space on the title sheet.
2. Designers shall submit the title sheet in PDF format along with a completed copy of the [Traffic Report Request](#), to the Special Project Office of the Strategic Transportation Investments Division at the email address shown on the form. Consultants shall submit the information to the appropriate Design Manager for submittal.

To expedite a pavement design from the Pavement Design Section, the following applicable notes shall be included under comments on the [Traffic Report Request](#) Form.

1. Furnish the 20xx-20xx ADL for pavement design on a (number of lanes) lane roadway.
2. Furnish the 20xx-20xx ADL for pavement design on a (number of lanes) lane roadway and the present ADT on all crossroads within the limits of the project.
3. Furnish the 20xx-20xx ADL for pavement design on a (number of lanes) lane roadway and the present ADT on all crossroads outside the limits of the project. (specify locations)

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NOTE:	ADL	(Average Daily Loading)
	ADT	(Average Daily Traffic)
	DHV	(Design Hourly Volume)
	D	(Directional Distribution)
	T	(Truck Percentage)

NOTE: For Bridge Replacement Projects, ADL are not required for ADTs of 1,000 or less and percentage trucks of 7 percent or less.

NOTE: ADTs and DHVs are not required for crossroads with ADTs of 1,000 or less.

A copy of the completed Traffic Report Form shall be included in the Initial Studies Request. (See [Section 4-201.00 Initial Studies Divisional Information Request](#)). If a traffic data request is sent after the Initial Studies Request, a copy shall be forwarded to the Pavement Design Section at TDOT.PavementDesign@tn.gov.

4-201.00 INITIAL STUDIES DIVISIONAL INFORMATION REQUEST

Designers shall request initial studies information in the Preliminary plans phase from the following Divisions: Environmental, Materials and Tests (Soils and Geology Report), Multimodal, Roadway Design (Pavement Design Section), Structures, and Traffic Operations. An [Initial Studies Request](#) Form and Preliminary plans set shall be submitted. Only one form shall be completed to obtain information from these Divisions.

When initial studies are requested, the following material shall be placed on FileNet for use by the divisions listed above and shown in the [Initial Studies Request](#) Form.

1. A PDF packet containing:
 - a. Preliminary Plans- At a minimum, the plan set consists of the following sheets: Title, Typical Section, Present Layout (with preliminary slope lines), R.O.W. Details (with preliminary R.O.W. lines), Proposed Layout with existing contours, Profile, and Cross Sections. It is the Designer's discretion to create a Present Contours sheet if the Proposed sheet is too cluttered. The title sheet shall be stamped using the "Initial Studies" phase stamp.
 - b. Traffic Data report which includes an ADL for the mainline and any other crossroads within the limits of the project.
 - c. See Section [4-201.05 Structures Grade Approval](#) for additional items that may be required for submittal.
2. A ZIP file containing the survey, alignment, proposed, existing contours DGN files, MainlineXSections.dgn, and all necessary MicroStation, GEOPAK, and Microsoft files used to create the plan sheets.

The email notification for Initial Studies Request subject line shall be noted by:

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Region X, County Name, Route Name (as shown in [PPRM](#)), PIN nnnnnn-nn, Initial Studies Request

The Initial Studies Request plan set shall be placed on FileNet. See [FileNet Project Deliverables](#) for additional information. The plans placed on FileNet shall be named: *nnnnnn-nn-InitialStudiesRequest.pdf* and *nnnnnn-nn-InitialStudiesRequest.zip* and shall be noted in the email.

A copy of the email shall be placed in the project folder to document the submittal.

For the Roadway Plans prepared by consultants, the Initial Studies Request package shall be prepared as described above and emailed to the Design Manager for review. Upon acceptance, the Design Manager shall forward the package to the appropriate divisions as noted in the [Initial Studies Request](#) Form.

4-201.01 ENVIRONMENTAL TECHNICAL STUDIES

The Designer shall check the Environmental Technical Studies box and applicable options on the [Initial Studies Request](#) form when requesting Environmental Technical Studies from the Environmental Division. Although some investigation has taken place during the production of the Technical Report by the Strategic Transportation Investment Division, the Preliminary plans shall be used by the Environmental Tech Studies staff to review their initial findings and complete the studies.

If there are revisions to the plans that change the scope of the project and/or affect the areas that were studied by Environmental, it is possible that an initial studies request will need to be resubmitted using the [Initial Studies Request Re-Evaluation](#) form. Refer to [Section 4-201.07 Initial Studies Request Re-Evaluation and Plans Revisions](#) and [Section 4-300.00 Environmental Study Areas](#) for additional information.

4-201.02 MULTIMODAL

The Multimodal Division reviews **all projects** to ensure no changes have occurred in policy since the Technical Report was distributed. Also, older projects that have not been developed due to lack of funds will need a review by the Multimodal Division as well. Designers shall refer to Chapter 3 Multimodal Design of the Roadway Design Guidelines for guidance on application of multimodal components.

4-201.03 PAVEMENT DESIGN RECOMMENDATIONS

The Designer shall check the Pavement Design box and applicable options with dates on the Initial Studies Request when requesting a pavement design. The Roadway Design Division - Pavement Design Section shall furnish pavement designs on projects where concrete pavement or plant mix asphalt pavement is required. The Pavement Design Section does not provide pavement designs for metro-urban resurfacing projects and 100% state resurfacing projects.

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For BRZE and BR-STP projects with an ADL (Average Daily Loading) of 150 or less, or an ADT (Average Daily Traffic) less than 1,000 and percent trucks less than seven, pavement sections shall be designed as in [Section 4-203.01, Pavement Design for Selected BRZE and BR-STP](#).

When the Soils and Geology Report is received, the Designer shall forward the report to the pavement design email, TDOT.PavementDesign@tn.gov. This information is needed to analyze the needs of side roads, overlays, pavement alternates, and other pavement design features.

A preliminary pavement design is completed for the Preliminary/R.O.W. phase. The Pavement Design Section reviews the recommendation upon receipt of the Construction Field Review plans and submits an updated pavement design, if applicable, to the Designer. However, the [Initial Studies Request Re-Evaluation Form](#) for pavement design shall be resubmitted whenever major design revisions are made that could affect the pavement design as determined by the Design Manager, such as information shown in [Section 4-200.00 Traffic Report](#). Also, if the traffic data, is more than three years old or the recommendations are three years or older, an updated [Pavement Design Request](#) shall be submitted. A copy of the email shall be placed in the project folder to document the resubmittal of a pavement design request.

4-201.04 RAILROAD CROSSING SAFETY REVIEW

The Designer shall check the Railroad box on the Initial Studies Request if the project has a railroad crossing on or within 600 feet of the project. A Railroad Crossing Safety Review is required for all projects at railroad crossings. Before preliminary plans are finalized, a collection of photographs of each impacted crossing within the zone of influence must be collected and submitted to the State Railroad Coordinator at HQRailroadCoordinator@tn.gov. The email subject line should be **Region X, County Name, Route Name, PIN nnnnnn-nn, Railroad Crossing Safety Review**. If the zone of influence needs defining, please contact the State Railroad Coordinator. TDOT Regional Survey will provide photos as required in *Figure 4-1, Railroad Safety Crossing Review Process*.

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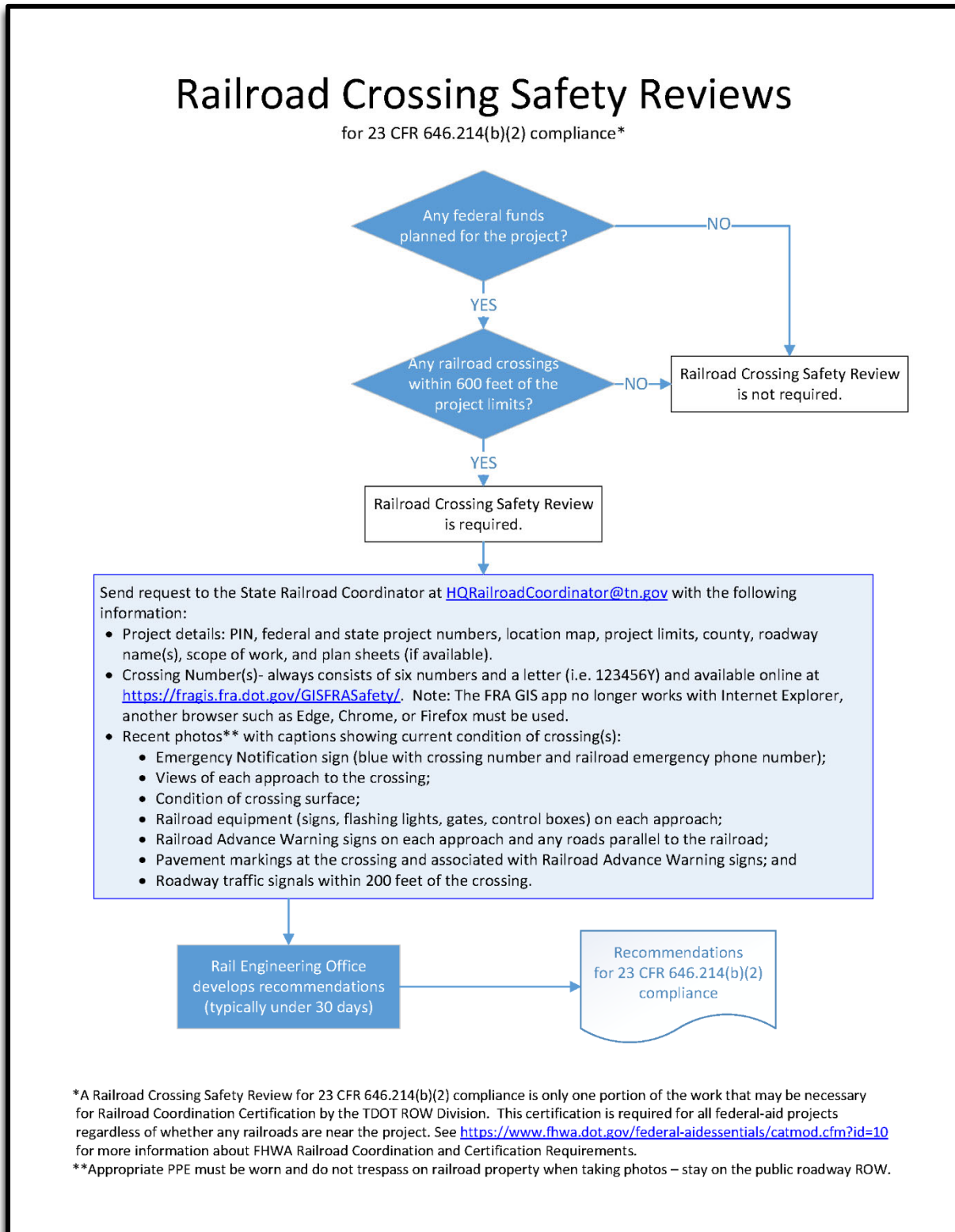


Figure 4-1
Railroad Safety Crossing Review Process

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The Railroad Crossing Review document shall have photographs for each crossing impacted by the project, within the zone of influence. These photos shall be arranged in a document with a short description of the perspective in which the photo was taken. The following is a list of crossing photos that are required as part of the Railroad Crossing Safety Review document. An example of this [document](#) can be found on the Roadway Design Division's website.

- Emergency Notification sign with crossing number and railroad emergency contact information. This plaque will be on a pole or a railroad bungalow at the crossing.
- Views of each approach to the crossing
- Condition of the crossing surface
- Railroad equipment (signs, flashing lights, gates, control boxes) on each approach
- Railroad Advance Warning signs on each approach and any roads parallel to the railroad
- Pavement markings at the crossing and associated with Railroad Advance Warning signs
- Roadway traffic signals within 200 feet of the crossing
- NOTE: Safety should be considered at all times when around active railroad tracks and corridors. There should always be at least two (2) persons at the site when taking crossing photos. The first is to be watching for a train while the other takes the required photos. When taking photos up and down the track, it is not advisable to stand on the tracks. The photos can be taken offset from the tracks to ensure the photographer is as safe as possible.

Once the State Railroad Coordinator and the Multimodal Rail Safety Office concludes their review of the Initial Studies plans and Railroad Safety Crossing Review document, they will release their recommendations. The designer shall review the recommendations and implement them into the plans and the quantities of the project. Railroad crossing safety reviews are performed on resurfacing projects. However, Designers are not responsible for submitting the Railroad Safety Crossing Review document and plans for resurfacing projects.

If there are changes that result in the project being within 600 feet of a railroad, an initial studies request will need to be resubmitted. Refer to Section 4-201.08, Initial Studies Request Re-Evaluation and Plans Revision.

4-201.05 SOILS AND GEOLOGY REPORT

On all new alignment, widening on existing alignment, and bridge projects, the Designer shall check the Soils and Geology Report box on the Initial Studies Request to request a report from the Materials and Tests Division – Geotechnical Engineering Section. If a Design Meeting is scheduled for the project, the box shall be checked on the form. The Soils and Geology Report may include, but not be limited to, recommendations for slope design verification, embankment stabilization, earthwork shrink/swell characteristics for earthwork calculations, acid producing properties of earthwork, and subgrade evaluation (CBR) needed for pavement design.

If a Design Meeting is held and the comments resulted in a change in alignment, the Design Manager shall notify the Geotechnical Engineering Section immediately by email. Updated plan

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sheets and cross-section sheets are to be resubmitted with the [Initial Studies Request Re-Evaluation](#) form. Refer to [Section 4-201.07 Initial Studies Request Re-Evaluation and Plans Revisions](#).

All soils data shall be incorporated into the plans prior to distribution of the R.O.W. Field Review plans. In the [Initial Studies Request](#), the requested date for completion of the Soils and Geology report shall be determined based on the size of the project and the projected time the Designer would need to make adjustments to the plans based on changes in slope lines due to slope recommendations. If comments from the R.O.W. Field Review deem additional soils information is needed, the Designer shall request an update. All soil comments shall be incorporated into final R.O.W. plans to ensure sufficient R.O.W. is acquired to accommodate all slope requirements. If there are revisions to the plans after R.O.W. submittal, the Designer shall determine if the changes require re-evaluation by the Geotechnical Engineering Section, and if it does, the R.O.W. Revision shall be issued in conjunction with the [Initial Studies Request Re-Evaluation](#) form. Refer to [Section 4-201.07 Initial Studies Request Re-Evaluation and Plans Revisions](#).

4-201.06 STRUCTURES GRADE APPROVAL

Structural grade analysis is needed for the vertical alignment of a proposed structure which may cross a waterway, railroad, or roadway. The Designer shall check the Structures Grade Approval box on the Initial Studies Request to request hydraulic and structural grade analysis and approval of the proposed vertical alignment. The Design Manager shall send the Structures Division all the material applicable to the project as specified in Sections 3.11, 3.14, 3.15, and 3.16 of the TDOT Survey Manual.

If a grade or alignment change is made on the project following the submission for grade approval, a revision shall be submitted and the [Initial Studies Request Re-Evaluation](#) form shall also be included. Refer to *Section 4-201.07 Initial Studies Request Re-Evaluation and Plans Revisions*.

4-201.07 TRAFFIC OPERATIONS - SIGNAL, LIGHTING, AND INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

The Designer shall check the Traffic Operations box and any applicable options on the [Initial Studies Request](#) form when requesting Signals, Lighting, and/or Intelligent Transportation Systems (ITS) for a project. The ITS is also called TDOT SmartWay. The system uses live video cameras to monitor highways across the state and is monitored by TDOT personnel. The system also consists of live message boards which notify drivers of urgent traffic notices and provide safety messages to drivers.

Generally, the Technical Report will indicate if signals, lighting, and/or ITS are proposed on the project. However, in some instances, the report may have been distributed prior to significant land use changes within the project limits or there may be existing elements on a project that are not up to current TDOT standards. Distribution for Initial Studies shall be sent to the Traffic Operations Division for all projects except bridge projects located in remote locations

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with no indications of existing signals, nearby intersections, etc. If the Designer is unsure if any Traffic Operations design is needed, the Designer shall note in the email distribution that no signals, lighting, or ITS were proposed in the Technical Report and a final determination review is requested by the Traffic Operations Division. These studies shall be completed early in the plans production to ensure the Designer has pole locations and other items that may require additional R.O.W. acquisition and to avoid potential conflicts by utility companies when designing their plans.

The following steps shall be followed by TDOT and Consultant Designers in order to assist the Traffic Operations Division in providing signalization, lighting, and/or ITS designs in a timely manner, as well as to allow the Traffic Operations Division to schedule work-load.

1. Signal Design:

When the Technical Report indicates that signalization is required on a project, existing signalization exists on the project, or if signalization is not included in the report but there is suspicion that signals may be involved in a project (intersections exist on project in a growing area), the Designer shall check the Traffic Signals box on the [Initial Studies Request](#) form and notify by email, TDOT.TrafficOps.SNL-Reviews@tn.gov. For all projects with signals, the Traffic Operations Division- ITS Section requests notification as well by email, TDOT.TrafficOps.ITS-Reviews@tn.gov. For bridge projects in remote locations with no indications of existing signals, nearby intersections, etc., the Initial Studies for signal design shall not be requested. Designers are reminded that all available design traffic data (including ADT's, DHV's, design speed, and traffic turning movements at all intersections) shall be included in the initial studies request packet.

The Traffic Operations Division - Signals and Lighting Section will respond to the Designer indicating where signalization is warranted, or if no signalization will be involved, give comments pertaining to geometric improvements that will provide better operational characteristics.

If the project has roadway plans that are designed by a consultant who is also responsible for signal design, indicate with the proper check box on the [Initial Studies Request](#) form. Attach the crash data and traffic volumes that were used in the signal warrants analysis. The Traffic Operations Division - Signals and Lighting Section will review the plans and analysis and provide comments, if needed.

2. Lighting Design:

When any of the following occur, the Designer should check the Roadway Lighting box on the [Initial Studies Request](#):

- Technical Report indicates that lighting is required,
- There is existing lighting, or
- If lighting is not included in the report, but there is suspicion that there might be a need, especially in urban areas.

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The TDOT designer shall notify the Traffic Operations Division -Signals and Lighting Section by email, TDOT.TrafficOps.SNL-Reviews@tn.gov of the [Initial Studies Request](#). This early notification will ensure that the utility requirements will be shown on the plans for the R.O.W. Field Review. For bridge projects in remote locations with no indications of existing lighting, the Initial Studies for lighting design shall not be requested.

The proposed roadway lighting involves a design process which begins with a photometric layout after which the lighting design process can begin. Pole locations are dependent on the photometric layout and the complete roadway lighting design. Refer to Chapter 15 of the Traffic Design Manual for more information.

If the project has roadway plans that are designed by a consultant who is also responsible for lighting design, indicate with the proper check box on the [Initial Studies Request](#) form and attach the photometric layout, if available. The Traffic Operations Division- Signals and Lighting Section will review the plans and provide comments, if needed.

3. Intelligent Traffic System Design:

When the Technical Report indicates that ITS are required on a project or that elements may already be on the project, the TDOT Designer shall check the ITS box on the [Initial Studies Request](#). Traffic Operations Division - ITS Section shall be notified by email TDOT.TrafficOps.ITS-Reviews@tn.gov. **In addition to the Technical Report, for all projects that have signals and projects with roads classified as major arterials or higher, the ITS box shall be checked.** This early notification will ensure that the ITS section reviews the plans for installation of fiber at signalized intersections or for installation parallel to major arterials. The requirements will be shown on the plans for the R.O.W. Field Review.

If there are changes to the plans that might affect the location of signals, lighting, or ITS, it is possible that an initial studies request will need to be resubmitted. Refer to [Sections 4-201.07 Initial Studies Request Re-Evaluation and Plans Revisions](#).

4-201.08 INITIAL STUDIES REQUEST RE-EVLAUATION AND PLANS REVISIONS

If a revision occurs that would impact a portion of the Initial Studies Sections, the Initial Studies Form shall be resubmitted and once approved the form shall be distributed as a part of the R.O.W. revision. Examples that require revisions and the [Initial Studies Request Re-Evaluation](#) Form would be alignment changes, scope changes, slope changes, addition of lanes at intersections, and/or anything outside of the study areas completed by the Environmental Division. If there are changes as defined in [Section 4-300.00 Environmental Study Areas](#), then a PDF of an Environmental Technical Studies Additional Area map shall be made and included in the revision.

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The Multimodal Division and Roadway Design Division-Pavement Design Section do not receive R.O.W. revisions; only field review notices. If there are changes to a project, it is possible that because of the type of change, these two Divisions would need to receive the [Initial Studies Request for Re-Evaluation](#) Form while the other divisions received the form as part of the R.O.W. revision. Examples would be an updated survey that identified a new distribution facility with additional truck traffic and increased ADT, a new traffic signal at the entrance to the facility, and/or a new drainage system at the site that could change the amount of water flowing to a proposed structure on TDOT's project. This survey information would affect all Divisions listed in the Initial Studies Request. The [Initial Studies Request Re-Evaluation](#) Form shall be sent to Multimodal and Pavement Design. Those Divisions listed in Chapter 1, Table 1-12, *Internal Email Distribution List*, will receive R.O.W. revisions and those listed on the [Initial Studies Request](#) Form would receive the R.O.W. revision notice and the [Initial Studies Request Re-Evaluation](#). The body of the email would note that the [Initial Studies Request Re-Evaluation](#) Form is attached. The form would refer to the R.O.W. revision plan set placed on FileNet for review.

For the Roadway Plans prepared by consultants, the Initial Studies Request Re-Evaluation package shall be prepared as described above and emailed to the Design Manager for review. Upon acceptance, the Design Manager shall forward the information to the appropriate divisional emails as noted in the [Initial Studies Request Re-Evaluation](#) Form.

4-202.00 INCIDENTALS FUNDING REQUEST

An [Incidentals Funding Request](#) shall be submitted at the same time the Initial Studies request is submitted,. Receipt of this funding will allow distribution of plans to regional R.O.W. personnel for "All Incidentals Except Appraisals". R.O.W. personnel will be able to begin the task of researching incidentals, including title searches, and preparing the R.O.W. proposal. Unlike the funding request for R.O.W. submittal, the Environmental Document does not have to be complete.

An [Incidentals Funding Request](#) form shall be submitted for all projects that contain an acquisition table and property map in the survey file. Exclusions would be resurfacing, ramp queue, or other similar projects that do not have surveys or do have surveys but do not have the acquisition table. A complete plan set is not needed for requesting Incidentals Funding.

When Incidentals Funding is requested, the following material shall be emailed to the Program Development and Administration Division TDOT.PDSO@tn.gov.

The PDF should be named *nnnnnn-nn-Incidentals.pdf* and include the following:

- a. Incidentals Funding Request Form
- b. Title Sheet stamped "Incidentals Only" with the Preliminary Engineering NEPA (PE-N) number as the project number
- c. R.O.W. Acquisition table(s).

The email notification for Incidentals Funding request subject line shall be noted by:

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**Region X, County Name, Project Description (as shown in [PPRM](#)), PIN nnnnnn-nn,
Incidental Funding Request**

For the Roadway Plans prepared by consultants, the Incidentals Funding Request package shall be prepared as described above and emailed to the Design Manager for review. Upon acceptance, the Design Manager shall forward the package to the Program Development and Administration Division TDOT.PDSO@tn.gov.

4-202.01 DISTRIBUTING PLANS FOR INCIDENTALS

Once funding is authorized by the Program Development and Administration Division, the Designer shall submit plans for "All Incidentals Except Appraisals" to regional R.O.W. personnel. The submittal will allow R.O.W. personnel to start the task of researching incidentals, including title searches, and preparing the R.O.W. proposal and Final Relocation plan. The PDF used to request Incidentals Funding should be updated to include the signed Incidental Funding Request letter. Below is the procedure for making and distributing the PDF.

The PDF should include the following:

- a. Signed and Approved Incidentals Funding Request letter from Program Development and Administration Division
- b. Title Sheet stamped "Incidentals Only" with the Preliminary Engineering NEPA (PE-N) number as the project number
- c. R.O.W. Acquisition table(s).

The email notification for Incidentals Funding request subject line shall be noted by:

**Region X, County Name, Project Description (as shown in [PPRM](#)), PIN nnnnnn-nn,
Incidental Plans Distribution**

The updated PDF shall also be named (*nnnnnn-nn-Incidentals.pdf*) and shall be attached to the email. The PDF shall be placed on FileNet and the date shall be noted in the email.

The email shall be sent to the appropriate email address listed below based on regional location of the project.

Region 1	TDOT.RG1.ROW@tn.gov
Region 2	TDOT.RG2.ROW@tn.gov
Region 3	TDOT.RG3.ROW@tn.gov
Region 4	TDOT.RG4.ROW@tn.gov

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If a change occurs in the acquisition table after the incidentals funding was requested, the original shall be removed from FileNet and replaced with a new PDF.

4-203.00 PAVEMENT DESIGN

The design of pavement structure takes into consideration many forms of input. Several of these are traffic loadings, soil characteristics (C.B.R. (California Bearing Ratio) tests from the Geotechnical Engineering Section), material availability, construction considerations, past performance, engineering judgement, quality control, and Departmental policy. Paving sections are analyzed for structural capacity and for life-cycle cost.

The Pavement Design Section shall review and approve all pavement designs for each phase of the project to ensure the proposed design is adequate for the specific project. The Pavement Design Section will review their original recommendation and submit the updated pavement design, if applicable, to the Designer two months prior to the schedule date of the Construction Field Review to ensure correct information is shown in the Construction Field Review plans.

If a Designer is asked to deviate from the pavement design at field reviews or by others in the Department, it shall be noted in the field review report or project file and then brought to the attention of the Pavement Design Section. If traffic data is three years or older, updated traffic should be requested and the pavement design should be reevaluated. **Under no circumstance is the pavement design to be altered without the written approval from the Pavement Design Section.** After reviewing the requested change with the Designer, the Pavement Design Section will make the final decision on changes to be incorporated into the project plans relative to paving.

4-203.01 PAVEMENT DESIGN FOR LOCAL ROADS

Local Governments should use the following pavement design guidance for local roads. For projects with an Average Daily Load (ADL) of less than 150, or an Average Daily Traffic (ADT) less than 1,000 and percent trucks (T) less than seven, the pavement design can be obtained by using the County Soils Groupings, shown in Table 4-1, *County Soil Groupings*, and Tables 4-2 and *Table 4-3*.

ADL's shall not be provided when ADT's are less than 1,000 and T is less than seven percent. In this case, use Pavement Design No. IV for ADT less than or equal to 200 and Pavement Design No. I for ADT greater than 200 but less than or equal to 1,000.

Two examples are given as follows:

- 1.) The Designer has a project in Hamblen County. The ADL is 53. First, go to the *County Soils Groupings*, Table 4-1, to obtain the Group No. which is 2. Then refer to Table 4-2, *Pavement Design Number*, go to the column for Group 2 and down to the row containing 53 ADL. This determines that Pavement Design No. I shall be

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used. Refer to Table 4-3, *Pavement Design*, to obtain the pavement design (1.25 inch "D" mix, 2.00 inch "B-M2", 3.00 inch "A" mix, and 8.00 inch mineral aggregate).

2.) The Designer has a project in Hamblen County. The ADT is 874 and the percentage of trucks is 5. No ADL is given, because the ADT and T is low. As stated above, Pavement Design No. I shall be used. Refer to Table 4-3, *Pavement Design*, to obtain the pavement design (1.25 inch "D" mix, 2.00 inch "B-M2", 3.00 inch "A" mix, and 8.00 inch mineral aggregate).

When the shoulders are 4 feet or less, the Designer shall determine during the R.O.W. Field Review whether the shoulder shall be stone and double bituminous surface treatment or paved with 1.25 inches of 411 D-mix. When the existing road is crushed stone base only or base and double bituminous surface treatment, the roadway surface shall be replaced in kind. The proposed roadway pavement shall be a higher type or equal surface than that of the shoulders. When using ADT's for pavement design, use design year traffic.

Designers shall specify mineral aggregate, Item Number 303-01 Mineral Aggregate, Type A Base, Grading D, for projects located in Regions 1, 2, and 3. For Region 4 projects, Designers shall specify mineral aggregate, Item Number 303-02, Mineral Aggregate, Type B Base, Grading (Description) as the base stone layer.

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COUNTY	GROUP	COUNTY	GROUP	COUNTY	GROUP
Anderson	2	Hamilton	3	Morgan	4
Bedford	3	Hancock	6	Obion	5
Benton	2	Hardeman	3	Overton	6
Bledsoe	6	Hardin	2	Perry	3
Blount	4	Hawkins	6	Pickett	5
Bradley	1	Haywood	4	Polk	5
Campbell	4	Henderson	3	Putnam	6
Cannon	4	Henry	3	Rhea	1
Carroll	4	Hickman	4	Roane	4
Carter	6	Houston	6	Robertson	4
Cheatham	3	Humphreys	5	Rutherford	6
Chester	4	Jackson	6	Scott	2
Claiborne	2	Jefferson	4	Sequatchie	3
Clay	6	Johnson	6	Sevier	1
Cocke	5	Knox	4	Shelby	5
Coffee	4	Lake	3	Smith	3
Crockett	4	Lauderdale	4	Stewart	5
Cumberland	5	Lawrence	5	Sullivan	4
Davidson	3	Lewis	4	Sumner	3
Decatur	3	Lincoln	3	Tipton	5
DeKalb	3	Loudon	6	Trousdale	4
Dickson	6	McMinn	3	Unicoi	6
Dyer	5	McNairy	4	Union	5
Fayette	5	Macon	4	Van Buren	5
Fentress	2	Madison	4	Warren	5
Franklin	4	Marion	3	Washington	4
Gibson	5	Marshall	4	Wayne	5
Giles	5	Mauy	5	Weakley	4
Grainger	6	Meigs	3	White	4
Greene	5	Monroe	3	Williamson	3
Grundy	2	Montgomery	4	Wilson	2
Hamblen	2	Moore	3		

Table 4-1
County Soil Groupings

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FLEX ADLs	COUNTY SOIL GROUP NUMBER					
	GROUP 1	GROUP 2	GROUP 3	GROUP 4	GROUP 5	GROUP 6
1-19	I	I	III	III	III	IV
20 – 29	I	I	I	I	III	III
30 – 39	I	I	I	I	I	III
40 – 59	II	I	I	I	I	I
60 – 89	II	II	I	I	I	I
90 – 119	II	II	II	I	I	I
120 – 150	II	II	II	II	I	I

Table 4-2
Pavement Design Number

MIX TYPE	PAVEMENT DESIGN NUMBER			
	I	II	III	IV
“D”	1.25”	1.25”	1.25”	1.25”
“B-M2”	2.00”	2.00”	2.00”	2.00”
“A”	3.00”	3.00”	----	----
Mineral aggregate	8.00”	10.00”	12.00”	8.00”

Note: Remember to include Prime Coat should be included on concrete and rock surfaces and Tack Coat should be included on asphalt surfaces.

Table 4-3
Pavement Design

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4-203.02 PERFORMANCE GRADE ASPHALT ON PROJECTS

The type of performance grade asphalt used on all construction projects shall adhere to the following criteria:

Performance Grade PG64-22 Asphalt is to be used on all construction projects with current ADT less than 10,000. Performance Grade PG70-22 Asphalt is to be used on all construction projects with current ADT equal to or greater than 10,000, and on the NHS system on SR-15 (US-64), SR-5 (US-45W), SR-43 (US-45E), and SR-22 regardless of their traffic volume.

Performance Grade PG76-22 Asphalt is to be used on all interstate construction projects. It may also be used on state resurfacing and construction projects in cases of heavy truck traffic or severe rutting. However, in order to be used on these projects, prior approval by the Director of Materials and Tests must be given.

Performance Grade PG82-22 Asphalt is to be used on very select urban interstate projects with extremely high volumes. These projects shall always be designated by the Pavement Design Section.

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SECTION 3 – ENVIRONMENTAL COORDINATION

4-300.00 ENVIRONMENTAL STUDY AREAS

The Environmental Division conducts studies for streams, wetlands, threatened and endangered species, air quality, noise, archaeology, hazardous material, permits, and historical preservation. The reports from these studies are used with other information to create the environmental documents required for the National Environmental Policy Act (NEPA). When a Technical Report is developed, initial studies are done based on the scope of project as defined in the document. The following are the boundaries of the study areas:

Mainline

1. Study Area Extends a minimum of 300 feet before the project begins.
2. Study Area Extends a minimum of 300 feet after the project ends.
3. Width shall be a minimum of 50 feet beyond the proposed R.O.W. line.
4. If the project intent is to remain within the present R.O.W. with no proposed right-of-way or easements outside of the present R.O.W., the Environmental Study Area Boundary shall be the existing R.O.W. and shall be labeled as such.
5. Adjustments to the width shall be made as necessary based, on proposed concepts.

Side Roads

1. Study area extends a minimum of 150 feet past the proposed tie in point for the side road.
2. Width shall be a minimum of 50 feet beyond the proposed R.O.W. line.
3. If the project intent is to stay within the present R.O.W. with no proposed right-of-way or easements outside of the present R.O.W., the Environmental Study Area Boundary shall be the existing R.O.W. and shall be labeled as such.
4. Adjustments to the width shall be made as necessary, based on proposed concepts.

When changes occur to the Environmental Study Areas, as defined above for mainlines and side roads, a PDF of the Environmental Technical Studies Additional Area map shall be made and included in the R.O.W. or Construction revision. The PDF shall be made from a MicroStation file showing the additional areas as cross hatched. Including this map as part of the revision will aid the Environmental Division and Regional Environmental Technical Office in assessing what should be re-evaluated.

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Figure 4-2, *Initial Environmental Technical Studies Area*, shows the original designated environmental study area as turned in for the Initial Studies Request. For this project, the study area is 300' before the beginning of the project and the project intent is to remain within existing R.O.W. There is not any improvement on the side road. Notice the R.O.W. is labeled as existing and proposed R.O.W.

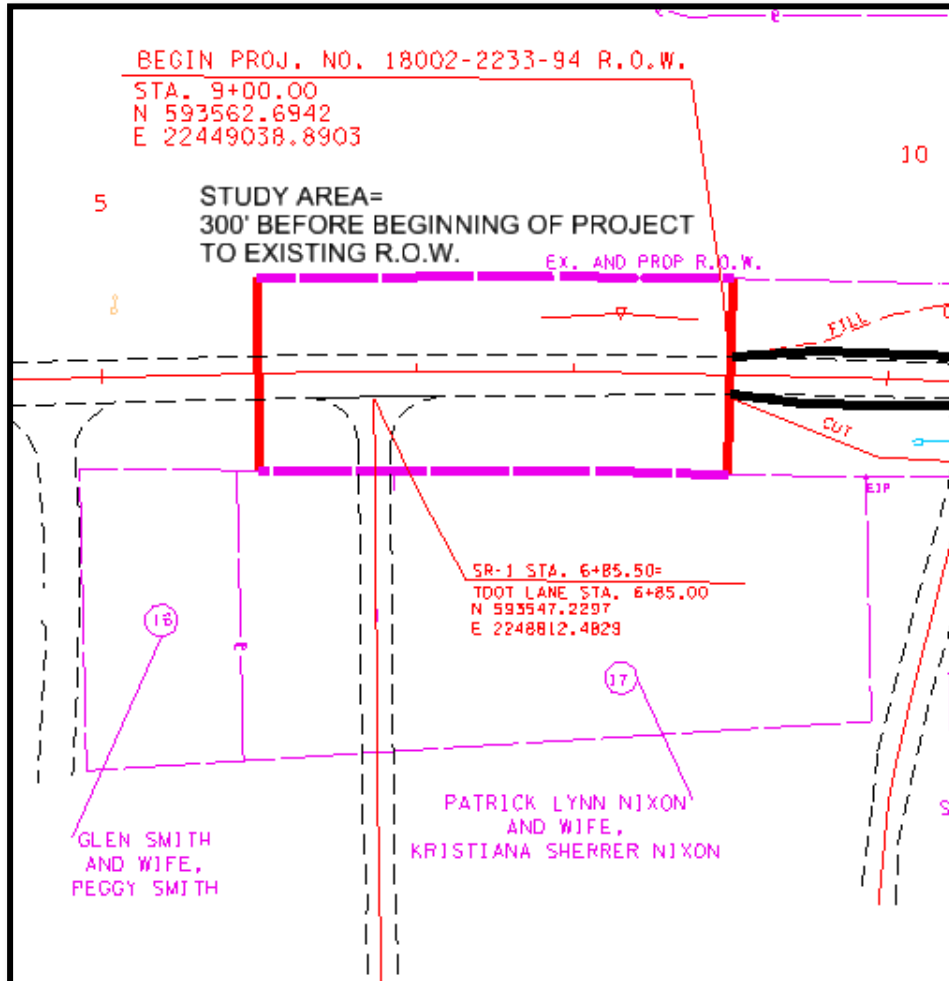


Figure 4-2
Initial Environmental Technical Studies Area

As the project developed, TDOT was contacted by the County. Since the original survey was completed, two (2) tracts were bought which will become the location of the county hospital off the side road TDOT Lane. The county requests that TDOT add a right turn lane on S.R. 1 to turn onto TDOT Lane. The right turn lane will drop at the intersection. The hospital also requested that TDOT add a left turn lane on TDOT Lane to turn onto S.R. 1. The request includes 200' of storage for each turn lane. The requests were approved by the Department and Traffic Operations personnel requested that a flashing beacon should be added at the intersection to warn traffic that emergency vehicles would be in the area. These changes moved the beginning

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of the project back 523.78', and the additional lanes and area needed for the poles for the flashing beacon require R.O.W. acquisition. These changes are outside the original Environmental Technical Study area. A R.O.W. revision shall be distributed that includes a PDF of an Environmental Technical Studies Additional Area map. An [Initial Studies Request Re-Evaluation Form](#) will need to be resubmitted as well. See [Section 4-201.07 Initial Studies Request Re-Evaluation and Plans Revisions](#). See *Chapter 1, Project Scope and Changes in Scope* for the change of scope process.

Figure 4-3, Environmental Technical Studies Additional Area Map, illustrates the additional area (cross hatched) where the study is needed. The labeling for “new” and “original” on the Begin Project Limits and the labels for the 300’ station prior to the beginning of project station are for illustrative purposes only. Also, name changes and pavement markings are adjusted to better illustrate the changes.

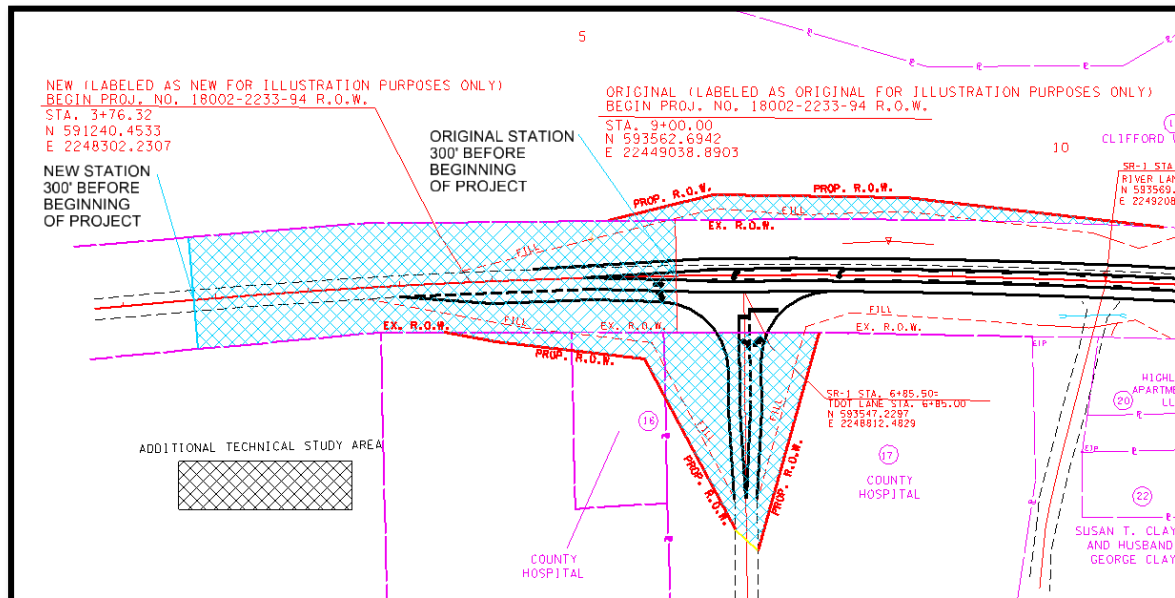


Figure 4-3
Environmental Technical Studies Additional Area Map

4-301.00 ENVIRONMENTAL IMPACTS AND MITIGATION

The following recommendations need to be followed in order to achieve an environmentally acceptable project as perceived by the United States Army Corps of Engineers (USACE), Environmental Protection Agency (EPA), United States Fish and Wildlife Service (USFWS), Tennessee Wildlife Resources Agency (TWRA), and Tennessee Department of Environment and Conservation (TDEC).

Although the Designer shall take all precautions to not impact an existing environmental feature, it is often unavoidable and encroachment occurs on features such as wetlands, streams,

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or other aquatic resources. The TDOT Environmental Mitigation Office is responsible for providing compensatory mitigation to offset unavoidable stream and wetland impacts. The office provides the required mitigation through use of restoration, establishment, enhancement, and/or preservation.

When encroachment occurs, the Designer shall evaluate the area to determine if any adjustments can be made to eliminate or lessen the impact without causing safety and drainage concerns. Possible solutions would be alignment shifts, steeper slopes that are acceptable by the Geotechnical Engineering Section as stated in the Soils and Geology report or adding guardrail. When any of these impacts occur, the Designer shall contact the Regional Environmental Technical Office and Environmental Division in the preliminary plan preparation phase of the project to discuss measures for possible mitigation that may have to occur. Discussions may include the possibility of new stream alignments which shall be shown on the R.O.W. plans to ensure sufficient R.O.W. acquisition and/or construction easement is acquired. For additional information regarding stream mitigation, see Section 4-401.05, *Mitigation Right-of-Way*.

4-301.01 WETLAND IMPACTS

The Regional Environmental Technical Office or Environmental Division shall identify wetland boundaries in the Ecology Report and will use surveying instruments to record the area as a shape file to deliver to the Designer. The shape file can be imported into MicroStation. If a shape file is not available or does not reference in the correct coordinate system in the MicroStation file, the Designer shall request a survey update for the boundaries of the wetland.

Wetland boundaries shall be shown by the appropriate level feature in MicroStation, as shown on Standard Drawing RD-L-1. The wetlands shall be numbered (WTL-1, WTL-2, etc.) as indicated in the Environmental Boundary Report or Technical Report and placed within the wetland boundary in MicroStation. See *Figure 4-4, Wetland Impact* for an example. The plans shall also indicate locations where stormwater outfall discharges are modified and locations where the wetland receiving flows are redirected.

The area (in square feet or acres) and volume (in cubic yards) of any wetlands impacted by the project or any R.O.W. taken for wetland replacement shall be indicated on the Present Layout sheet. Impacts or alterations to a wetland may require an Aquatic Resources Alteration Permit (ARAP). See Roadway Design Guidelines Chapter 5 *Section 5-508.00, Environmental Permit Requirements*, for additional information on permit sketch requirements.

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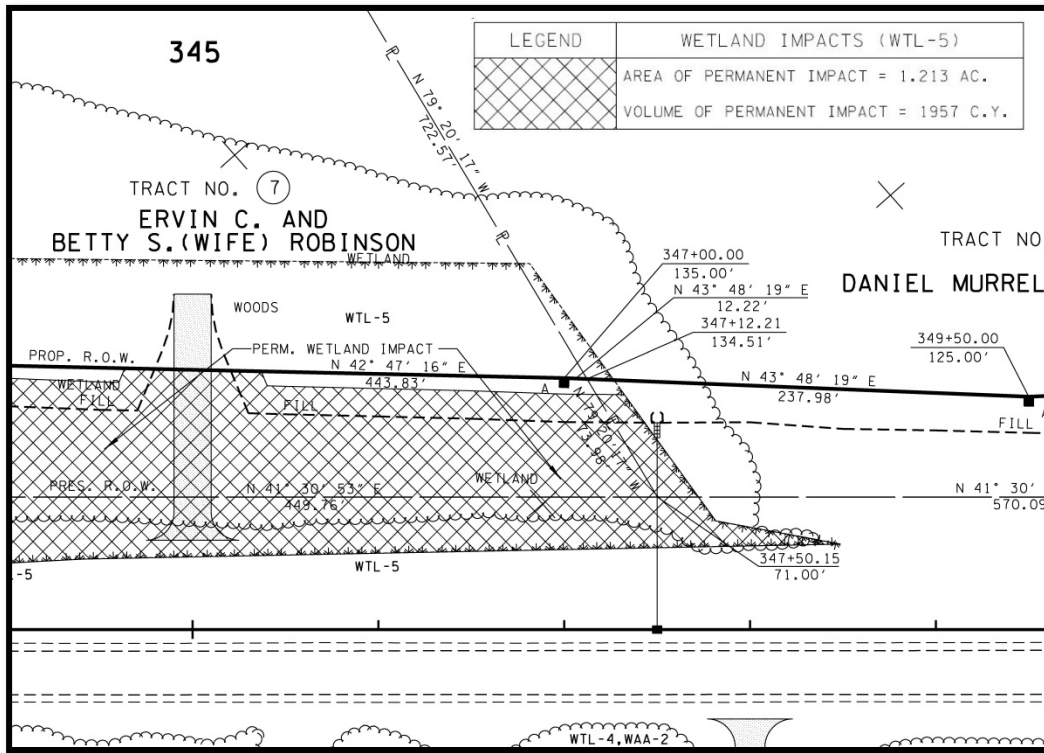


Figure 4-4 Wetland Impact

4-301.02 STREAM IMPACTS

As structures are proposed or changed on projects, the impacts to the environmental feature shall be considered. Early consideration for the type of structure and construction of the structure shall be considered, especially when there are restrictions in the water (such as piers) or time of year for construction in the water.

BOX/SLAB STRUCTURES

The following recommendations apply to box and slab impacts:

1. Any project which proposes long extensions of boxes and/or channel changes on streams (as indicated on the Environmental Boundaries Report) and/or wetlands involvement must be studied for alternate solutions; after which, a project coordination meeting between the involved TDOT Divisions, including the Regional Environmental Technical Offices must be held.
2. Where box and slab-type culverts and bridges are utilized, their length shall be held to a minimum. In the case of interchanges, intermittent boxes, rather than continuous boxes, are preferred.
3. Given the choice between long runs of boxes and channel changes, channel changes are generally preferred.

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CHANNEL CHANGES

The following recommendations apply to channel impacts:

1. Concrete lined channels and rock lined (rip-rapped) channels are not acceptable for channel changes on blue-line streams.
2. In streams with enough flow to support aquatic life, a normal flow keyway within a channel change shall be considered if flood plain hydraulics dictates a channel larger than the natural channel is required. The normal flow keyway shall have approximately the same width (X) and height (Y) as the existing normal flow channel, as shown in *Figure 4-5, Channel Changes*.
3. Meanders must be included in channel changes on blue-line streams in order to maintain the natural stream length, sinuosity, and slope.

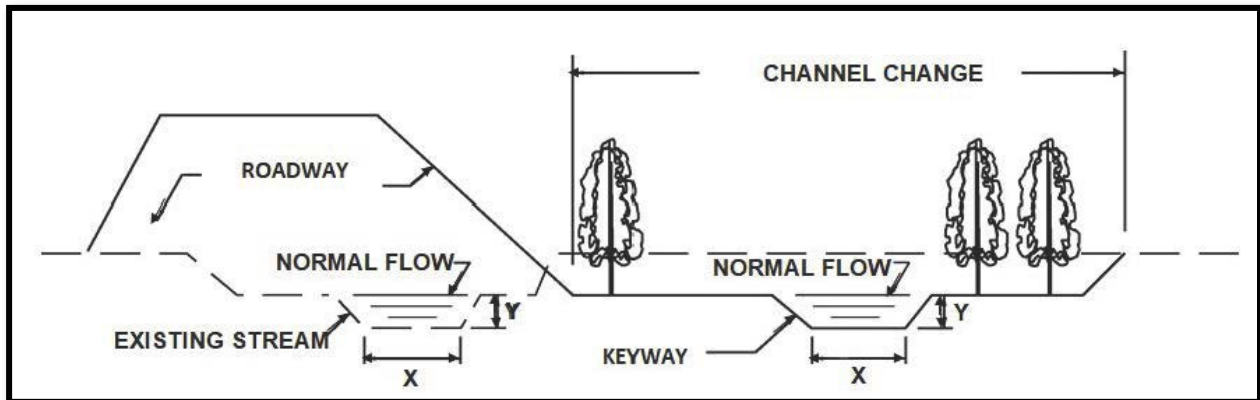


Figure 4-5 Channel Changes

For additional information on channel changes, see Drainage Manual, [Chapter 5, Section 5.05, Guidelines and Criteria for Stream Modifications](#). For additional information on box and slab-type culvert and bridge lengths, see Drainage Manual, [Chapter 6, Section 6.04, Guidelines and Criteria](#). For additional information on Natural Stream Design, see Chapter 11 of the Drainage Manual.

4-301.03 EMBEDDED PIPE CULVERTS

It is sometimes necessary to place a culvert bottom below a streambed. This is referred to as an embedded, sunken, or depressed culvert. Generally, when this is done, it is to eliminate the need to design specific hydraulic criteria for existing species of aquatic life. If an embedded pipe culvert is required, the Environmental Division or Regional Environmental Technical Office (R1.EnvTechOffice@tn.gov, R2.EnvTechOffice@tn.gov, R3.EnvTechOffice@tn.gov, R4.EnvTechOffice@tn.gov), shall notify the Designer of any stream with aquatic viability on the project in the Environmental Boundaries Report. If Designers are instructed to embed a pipe culvert, the Designer shall follow

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the HEC 26 recommendations. The hydraulic capacity should be re-evaluated to ensure proper flow and capacity.

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SECTION 4 – RIGHT OF WAY

4-400.00 RIGHT OF WAY (R.O.W.)

Once grade approval is received, both horizontal and vertical alignment are finalized, the R.O.W. process can begin. During the preliminary phase, the impacts to property owners can be identified and shown on the plans. At this point, the R.O.W. Division can start some of their Incidental activities. For additional information, refer to the [TDOT R.O.W. Manual](#).

4-401.00 R.O.W. ACQUISITION TABLE

The R.O.W. Acquisition Table is provided by the Regional Survey in Excel format as part of the original survey documents for the project. The Excel file allows the Designer to insert measured areas into the table which in turn has pre-set formulas to calculate remaining areas, etc. If there are incorrect formulas, the acquisition tables need to be sent back to Regional Survey to revise. The Designer links the Excel file to a CADD file.

The R.O.W. Acquisition Table lists the property owners located on the project. Each property owner is assigned a tract number that shall not be altered or deleted. (See RDG Chapter 1- *Section 1-304.00 Tract Numbers on Plans*). The amount of land is shown as it appears in the CADD survey file with its location relevant to the centerline (left or right). The recorded deed documentation is obtained from a courthouse and shown in the table. The table shows the amount of existing land and the amount that is proposed to be acquired. There are formulas in the Excel file that calculate what remains of the original acreage.

Acquisition Areas and Easement Areas of 0.100 acre or more shall be shown in acres to 3 decimal places. Areas less than 0.100 acre shall be shown to the nearest square foot.

There are six columns for easements shown in the Excel Acquisition Table:

- Column One: Permanent Drainage Easements
- Column Two: Slope Easements
- Column Three: Construction Easements
- Column Four: Permanent Easements
- Column Five: Railroad Air Rights

If the proposed centerline is changed during design, it shall be necessary to re-compute the areas left and right supplied with the survey and appearing in the TOTAL AREA columns of the table. The sum of all areas to be acquired and/or utilized as easements shall be totaled and shown at the bottom of the acquisition table. The survey file should be sent back to the Regional Survey Office for a file update.

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If a tract is not affected by the project, the tract shall have a line placed through the name and number along with associated entries in the Excel file. There shall also be a line placed through the tract number in the CADD file.

The disturbed area is shown under the table. The total project area should be provided; this includes all disturbed and undisturbed areas. Footnotes are added to describe where and/or why some of the easements are needed. For example, they may be used to designate areas to be used for erosion control *Figure 4-6, Typical R.O.W. Acquisition Table*, is an example of a R.O.W. Acquisition Table.

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R.O.W. ACQUISITION TABLE																													
TRACT NO.	PROPERTY OWNERS			COUNTY RECORDS				TOTAL AREA (ACRES)			AREA TO BE ACQUIRED (ACRES)			AREA REMAINING (ACRES)			EASEMENT (SQUARE FEET)												
				TAX MAP NO.	PARCEL NO.	DEED DOCUMENT REFERENCE	BOOK	PAGE	LEFT	RIGHT	TOTAL	LEFT	RIGHT	TOTAL	LEFT	RIGHT	TOTAL	PERM DRAINAGE	SLOPE	CONST	AIR RIGHTS	PERM RAILROAD							
1	WENTWORTH CALDWELL, JR., TRUSTEE			116-02	16	QC-00010021	141	2.89	2.89	0.85	0.85	2.04																	
2	H. G. HILL REALTY COMPANY			116-03	4	DB-00000731	542C	5.1	5.1	0.21	0.21	4.89				2268		0.815 AC											
3	WENTWORTH CALDWELL, JR., TRUSTEE			116-02	23	QC-00010021	141	10.18	10.18	0.48	0.48	9.7					500	2754											
4	MARTHA R. INGRAM			116-02	11	QC-00009989	232	11	11	0.28	0.28	10.72						0.535 AC											
5	CSX TRANSPORTATION					19-011												0.217 AC	3044										
ACQUISITION TOTALS (ACRES)																													

DISTURBED AREA	
IN BETWEEN SLOPE LINES	1.15 (AC)
15 FOOT WIDE STRIP (OUT SIDE SLOPE LINES)	0.95 (AC)
TOTAL DISTURBED AREA	2.1 (AC)
TOTAL PROJECT AREA	3.05 (AC)

- ① For construction of Haul Road 1
- ② For construction of Haul Road 2

Figure 4-6
Typical R.O.W. Acquisition Table

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4-402.00 EASEMENTS

4-402.01 PERMANENT DRAINAGE EASEMENTS

Permanent Drainage Easements may be appropriate for channel changes and/or realignments or proposed ditches where no ditch existed before the proposed project. Permanent Drainage Easements shall be required for structures installed outside the proposed R.O.W. such as a catch basin or cross drain pipe and headwall that are needed to eliminate ponding. In these instances, it is not practical or economical to extend the proposed R.O.W. width to accommodate the structure. Any rip-rap or protection of these proposed structures shall also be included in the Permanent Drainage Easement. The Designer shall ensure that adequate drainage easement is obtained for placement of the structure, erosion protection, and maintenance of the structure.

The Permanent Drainage Easement shall extend from the R.O.W. and have precedence over other easements. Slope and Construction Easements shall not overlap Permanent Drainage Easements. A Permanent Drainage Easement should include stations/offsets and bearing/distances.

4-402.02 SLOPE EASEMENTS

Slope Easement is the area between the proposed R.O.W. and where the side slopes of the road meet the existing conditions. A Slope Easement is a permanent easement used to for the construction and maintenance of said slopes, but remains as a part of the property owner's R.O.W. The Slope Easement column in the table shall contain only that area outside the R.O.W. required to tie down the slopes.

4-402.03 CONSTRUCTION EASEMENTS

Construction Easement consists of the area between where the side slopes of the proposed road meet the existing ground and the width needed to construct the slope to that point (usually 10'). Construction Easement may also be used for building haul roads, improvements to a road that will be used as a detour on the project, area for construction behind a retaining wall, bridge, etc. It is also used in some drainage circumstances to provide a drainage ditch or channel improvement such as widening or bank stabilization with rip-rap, for placement of sediment basins and other erosion prevention and sediment control devices during the construction phase, and areas that will be used during construction for equipment, etc.

Generally, a 10-foot Construction Easement is the width defined for working outside slope easements. This area must be shown on the appropriate plan sheets. The Construction Easement may be reduced or eliminated as necessary to avoid trees, buildings, etc. It may also be necessary to increase the easement width to allow for erosion control devices and areas that may be harder to construct such as steep slopes, rock slopes, rock catchments, etc.

An example of the three types of easements are shown in *Figure 4-7, Construction, Permanent Drainage, and Slope Easements in Plans.*

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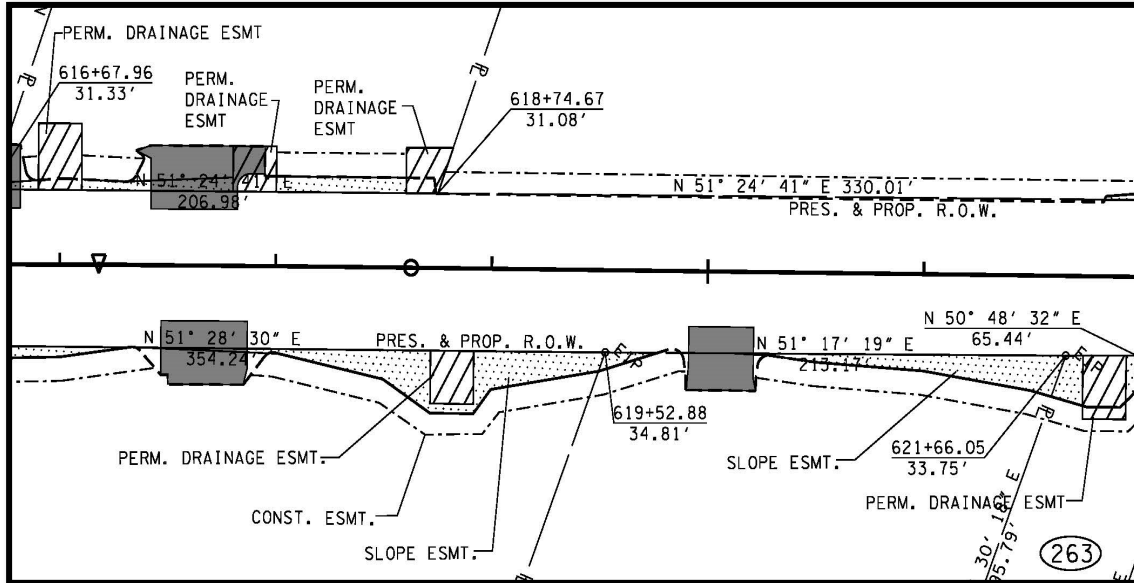


Figure 4-7
Construction, Permanent Drainage, and Slope Easements in Plans

4-402.04 RAILROAD EASEMENTS

RAILROAD AIR RIGHTS

When an overpassing structure impedes the Railroad’s capacity to use their property for Railroad purposes, the Department is required to compensate the Railroad for the encumbrance imposed on the Railroad. Air rights are a type of easement obtained by the Agency to compensate the Railroad for limiting the Railroad’s use of their property vertically or horizontally. Air rights are generally bounded by the abutments on either side of the Railroad Corridor and furthest dimensions of the superstructure – generally the parapet walls on either side of the structure. In some cases, the proposed structure does not span the Railroad ROW but in all cases the Air Rights are limited to the dimensions of the superstructure. Air rights will never be acquired from the Railroad for at-grade crossings or crossing where the Railroad operates above a transportation facility, [or crossings where the Railroad’s ownership interest in its corridor is an easement for railroad purposes](#) See [Section 4-601.00 HQ Railroad Office Coordination](#) for more information on the types of easement needed for railroad projects

PERMANENT RAILROAD EASEMENTS

Permanent Railroad Easements include all properties the railroad has rights to prior to the project but will no longer have rights during and after construction. Examples of permanent easement are slope pavement and foundations for abutments, bents, and columns.

Examples of these and other easements are shown in *Figure 4-8, Temporary Construction, Permanent Drainage, and Air Rights Easements in Plans.*

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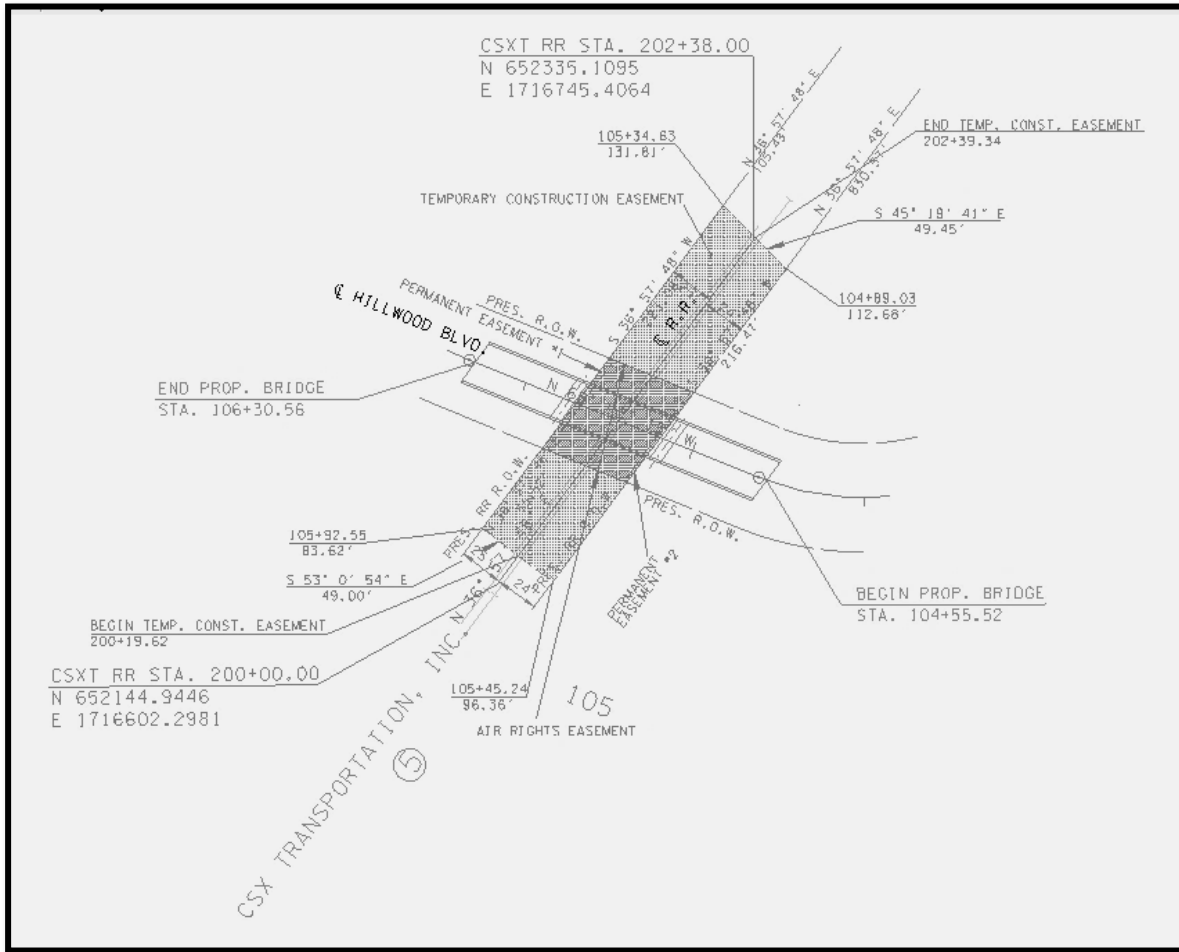


Figure 4-8
Temporary Construction, Permanent Drainage, and Air Rights Easements in Plans

4-403.00 MITIGATION RIGHT-OF-WAY

Stream Mitigation Right-of-Way is land acquired for stream mitigation enhancements to help satisfy the Environmental Permitting requirements of roadway projects. Utilities cannot relocate into Proposed Stream Mitigation Right-of-Way and the requirement should be stated on both Present Layout sheets, Right-Of-Way Detail sheets, and in the Right-of-Way/Utility notes. If there are no feasible alternatives for existing utilities to relocate outside of the Proposed Stream Mitigation Right-of-Way, a solution will be determined on an individual basis.

4-403.01 OFF-SITE STREAM MITIGATION

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Off-site stream mitigation is a stand-alone project that has a separate PIN and provides mitigation to one or more roadway projects. These projects will always have land use restrictions or conservation easements on them. In some rare cases, the off-site mitigation project might be directly adjacent to a roadway project it is offsetting. These projects are started with mitigation and once a NEPA document has been completed, the Regional Project Development Office holds a kick-off meeting to determine the PPRM schedule and next steps. The actual mitigation design is completed by an environmental consultant, but the designer will review and comment on the plans prior to field reviews.

4-403.02 ON-SITE STREAM MITIGATION

Most stream mitigation projects are on-site stream mitigation. This is where the Environmental Division determines a location within the project limits for a natural stream design and the environmental consultant completes a design to be incorporated into a roadway project. Trees and plantings included within the design cannot be cleared and the restriction must be incorporated into the plans.

4-404.00 DISTURBED AREA BLOCK

Designers shall show both the total project area (full R.O.W., disturbed plus undisturbed) and the total disturbed project area below the R.O.W. Acquisition Table. The total disturbed area shall be updated, and the plans revised for any change in the amount of disturbance. Disturbed Area is defined in Chapter 10 of the *TDOT Drainage Manual* as the total area of the site to be cleared, graded, or excavated within the life of the project, and shall be calculated as the area within the slope lines plus a 15-foot wide strip adjacent to the slope lines. For urban areas, the disturbed area may be calculated as the area within the slope lines plus the width of the Construction Easement. The disturbed area shall include the area for the construction of driveways. The designer should verify enough R.O.W. is available for construction activities.

See *Figure 4-8, Temporary Construction, Permanent Drainage, and Air Rights Easements in Plans*, for an example of how to show disturbed area below the R.O.W. Acquisition Table. Designers should contact the Regional Environmental Technical Offices if additional clarification is needed.

4-405.00 PRELIMINARY R.O.W. ESTIMATE FROM PRELIMINARY FIELD REVIEW PLANS

The Designer shall provide preliminary acquisition areas and Slope Easement areas to the technical R.O.W. teams in Project Development (see Chapter 1, Table 1-12, *Internal Email Distribution List*, for email addresses) so that a preliminary R.O.W. estimate can be developed. Design Managers will be responsible for furnishing a copy of the R.O.W. Acquisition Excel File with acquisition areas, Slope Easement areas, and disturbed area after finalizing the Preliminary plans. R.O.W. Form 44A is for any estimates done prior to R.O.W. Field Review.

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Designers shall calculate preliminary areas using the following procedure:

1. Calculate acquisition areas and Slope Easements with MicroStation's Measure Area tool using the Points or Flood methods. It is not necessary to store areas in the GEOPAK GPK file nor should time be spent defining shape elements in MicroStation for area calculations.
2. In the **R.O.W. Acquisition Excel File**, provided by Survey and includes owner and tract information, enter the calculated square foot areas on the "DES IN" worksheet.
3. Make a copy of the Excel file and rename it using the State Route Number, County, and PIN followed by the extension .xlsx. **Example: SR1Knox405132.00.xlsx**
4. Consultants shall provide the Excel file to the Design Manager. For projects developed in-house, the Designer should submit the Excel file to the email address listed below with a copy of the email being sent to the Design Manager and the Regional R.O.W. Manager.
5. Once the Preliminary Field Review invitations are sent out, submit the Excel file via email as an attachment to Preliminary.acquistiontable@tn.gov. Subject line for email shall be Preliminary Areas-State Route #, County, PIN nnnnnn.nn. **Example: Preliminary Areas, SR 1, Knox County, PIN 405132.00.** A copy of the email shall be placed in the project folder to document the submittal of preliminary acquisition, Slope Easement areas, and disturbed area.

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SECTION 5 – TRAFFIC OPERATIONS COORDINATION

4-500.00 TRAFFIC SIGNAL DESIGNS

The following steps are to be followed in order to assist the Traffic Operations Division in providing signalization designs in a timely manner, as well as to allow the Traffic Operations Division to schedule its work efficiently.

For Preliminary Plans:

- a. In-house Designed Roadway Plans: When the Technical Report indicates that signalization is required on a project, or if signalization is not included in the report, but there is suspicion that signals may be involved in a project, the Traffic Operations Division – Signals and Lighting Section and the ITS section shall be notified by email, TDOT.TrafficOps.SNL-Reviews@tn.gov and TDOT.TrafficOps.ITS-Reviews@tn.gov, of the Preliminary Field Review. Designers are reminded that all available design traffic data (including ADT's, DHV's, design speed, and traffic turning movements at all intersections) shall be included in the preliminary plans.

The Traffic Operations Division – Signals and Lighting Section will respond to the Designer indicating where signalization is warranted, or if no signalization will be involved, give comments pertaining to geometric improvements that will provide better operations characteristics.

- b. Consultant Designed Roadway Plans: The Design Project Manager shall notify the Traffic Operations Division – Signals and Lighting Section by email of the Preliminary Field Review for projects which contain signalization. The Traffic Operations Division – Signals and Lighting Section will provide comments for the Preliminary Field Review.

4-501.00 LIGHTING DESIGNS FOR ROADWAY PROJECTS

The following steps are to be followed in order to assist the Traffic Operations Division in providing lighting designs in a timely manner, as well as to allow the Traffic Operations Division to schedule its work efficiently.

For Preliminary Plans:

- a. In-house Designed Roadway Plans: When the Technical Report indicates that lighting is required on a project, the TDOT Designer shall furnish the Traffic Operations Division – Signals and Lighting Section with a PDF of the preliminary plans and request a pole location layout. The PDF shall be furnished by the TDOT Designer at the preliminary plans stage of project development to ensure that the utility requirements will be shown on the plans for the Right-of-Way Field Review.

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If there is no right-of-way acquisition required on the plans, but lighting is required, the TDOT Designer shall furnish the Traffic Operations Division – Signals and Lighting Section with a PDF of the plans as soon as the Present and Proposed Layout sheets are drawn and request the light pole locations. This is to ensure that the utility requirements will be shown on the plans for Right-of-Way plans submittal.

The Designer shall notify the Traffic Operations Division – Signals and Lighting Section by email of the Preliminary Field Review.

The proposed roadway lighting involves a design process which begins with a photometric layout after which the lighting design process can begin. Pole locations are dependent on the photometric layout and the complete roadway lighting design. Refer to Chapter 15 of the Traffic Design Manual for more information.

- b. Consultant Designed Roadway Plans: If a lighting design will be completed by the consultant, then the consultant designer will be responsible for providing the Traffic Operations Division – Signals and Lighting Section with a PDF of the plans showing the light pole location layout. The Design Project Manager shall notify the Traffic Operations Division – Signals and Lighting Section by email of the Preliminary Field Review for projects which contain lighting. Traffic Operations Division – Signals and Lighting Section will provide comments for the Preliminary Field Review. **If a lighting design will not be completed by the consultant, then the in-house procedure shall be followed.**

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SECTION 6 – RAILROAD COORDINATION

4-601.00 HQ RAILROAD OFFICE COORDINATION

The State Railroad Coordinator is in the HQ ROW and Utility Office. This position is responsible for coordinating with any railroads on a project. It differs from the Multimodal Division Railroad program coordinator who generally has stand-alone Railroad Safety projects.

All railroad coordination and communication should be submitted through the State Railroad Coordinator to the railroad entities impacted by a State let project. Plans should be directed to the State Railroad Coordinator who will submit the plans and revised plans to the necessary railroad(s). When plan review comments are supplied by the railroad entity involved, the plan review comments will be submitted to the responsible Designer/Design Manager for the project.

During each project phase, an Excel file will accompany the plan review comments. Within the Excel file, under each plan review comment, there is a space titled: “*Agency Response*”. In this section the Designer responds to how, if and where they have addressed the specific plan review comment. If the Designer disagrees with the request made by the plan review comment, the Designer may use the “*Agency Response*” area to state TDOT’s position. Once all the plan review comments have been addressed, the completed Excel spreadsheet and the revised plans shall be submitted to the State Railroad Coordinator as a non-portfolio PDF set. The set will then be released to the railroad(s) involved.

Iterations of plan reviews will take place until the Railroad or their representative provides the following statement to the State Railroad Coordinator: “*(Railroad Entity) takes no further exceptions to the project plans.*” When this statement is received by the State Railroad Coordinator, a request will be made of the Designer and the Point of Accountability for final plans. Once the final plans have been released to the Railroad(s), the coordination effort between the State Railroad Coordinator and the Designers is complete. If letting or construction revisions are made, the State Railroad Coordinator should be included in the revision notification email.

RAILROAD COORDINATION NOTES:

- By Agreement, the Railroad has thirty (30) days to review plans.
- A submission of revised plans without the completed Excel file will not be acknowledged as a submission by the Railroad. The completed Excel spreadsheet and the revised plans are both required.
- Revised sheets which only address the plan review comments are not permitted. Only full sets of plans will be transmitted by the State Railroad Coordinator to the Railroad.

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4-602.00 SHOWING RAILROAD PROPERTIES ON PLANS

4-602.01 RAILROAD PROPERTY TYPES

Railroad property exists as corridors in the State of Tennessee by two means: easement or fee simple. Below is a short summary of the two cases. Inquiries regarding whether a Railroad's Right of Way is Easement or Fee-Simple, should be sent to the State Railroad Coordinator at HQRailroadCoordinator@tn.gov.

Easement

Historically, the Government (Federal/State) condemned individual parcels of property in stretches of corridors in the name of the Government. The Government granted these corridors to individual railroad entities for railroad purposes. If the grantee railroad entity uses the corridors for railroad purposes, the railroads are granted certain rights to the Right of Way (ROW) which facilitates the railroad's needs. If the corridor is no longer used for railroad purposes, the railroad must abandon the corridor at which time the Railroad Easement is relinquished and transferred to the current adjoining property owner up to the centerline of rail.

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Fee-Simple

Fee-simple property is the highest order of ownership of property. This means the Railroad has acquired property from the individual parcel owners and paid for the acquisition which is accompanied by a deed of ownership. The railroad has all rights to all fee-simple properties they own and if a public project infringes on their rights, compensation must be made in accordance with the Uniform Act.

NOTE: If a fee-simple corridor is discovered, the schedule for the project is increased by a minimum of nine months. Any modification will take an additional three to nine months. It is imperative that the information be presented correctly from the beginning.

4-602.02 RAILROAD ACQUISITION TYPES

Various easement types apply to Railroad acquisition. These include Permanent Easement, Temporary Construction Easement, Air Rights, Slope Easement, and Permanent Drainage Easement. The following give a brief description of the type and methods often used in railroad acquisition. Permanent easement **CANNOT** overlap construction easement. Air Rights **CAN** overlap permanent easement and construction easement.

- **Permanent Easement** - This would include all properties the railroad has rights to prior to the project but will no longer have rights to during and after construction. Examples of Permanent Easement are slope pavement and foundations of abutments, bents, and columns. No Permanent Easement can infringe on the Railroad's ability to use their current configuration of tracks (i.e., Permanent Easement cannot be atop the Railroad's tracks).
 - **NOTE:** When establishing the required square footage of Permanent Easement, the required Permanent Easement should extend one (1) foot beyond the furthest dimension of the proposed or actual footing. For example, if a footing is 4' x 4' or 16 square feet, the required permanent easement, which should be inserted within the Acquisition Table, will be 6' x 6' or 36 square feet. This note applies to abutment foundations and bent foundations which will permanently exist on the Railroad's Right-of-Way during and after construction. Slope pavements should be registered in the Acquisition Table by their actual dimensions. Slope pavements would include those constructed of concrete pavement, rip-rap, etc.

- **Temporary Construction Easement**
 - Any property necessary to construct the proposed project in which the Designer/contractor anticipates personnel or equipment on the Railroad's Right-of-Way during construction activities. This should be an envelope which encompasses the entire footprint of the structure, and any other areas where construction activities will take place on the Railroad's

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R.O.W. Included in this type of easement are all necessary haul roads and crane pads needed to construct the proposed project. It is important to get adequate Temporary Construction Easement as there is a lengthy revision process if the corridor is Fee-Simple. If necessary, consult with the Construction Division to ensure the initial amount of Temporary Construction Easement is enough to feasibly construct the project.

○ **Air Rights**

- An air rights easement, or aerial easement, may be needed for a grade-separated railway-highway crossing when the Railroad owns fee simple interest in its corridor and the Department holds no highway easement or other land rights for the ground beneath the structure. Such an easement is reserved for future maintenance activities of the structure throughout its life. The required square footage is an envelope that includes the entire superstructure. This is bounded by the bridge abutments (or bridge piers immediately adjacent to railroad track(s)) and the outside dimensions of the proposed bridge parapet walls.
- Air rights will never be acquired from the railroad for at-grade crossings, crossings where the Railroad operates above a transportation facility, or crossings where the Railroad's ownership interest in its corridor is an easement for railroad purposes.

○ **Slope Easement –**

- This type of easement is reserved for embankments which shall encroach onto the Railroad's property. These types of easements are rare, and if seen, will generally be on parallel encroachments. Often, the Railroad will request the Department to install a retaining wall to hold back the cut/fill materials from encroaching onto their right-of-way, however, in rare occasions, this type of easement will be used. The total square footage or acres shall be registered as the actual dimension on the Acquisition Table.
- Slope easements shall be reserved for earthen Slope Easements having to do with the embankments necessary to establish the vertical/horizontal alignments and cross-sections. All slope pavements (i.e., concrete pavement or rip-rap) shall be shown as Permanent Easements.

○ **Permanent Drainage Easement –**

- This type of easement is also rare; however, it is utilized more often than a Slope Easement. Generally, the Railroad will request no additional water be released onto their corridor and request the additional water generated by the project be channeled away from the Railroad's corridor. In certain

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circumstances, this request is impossible to accommodate. In such a case, the necessary Permanent Drainage Easement shall be totaled as a square footage or acres and registered as the actual dimension on the Acquisition Table.

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4-602.03 PROPERTY MAP REQUIREMENTS FOR RAILROADS

The property map for both Fee-Simple and Easement property interests held by the Railroad will generally look the same. In addition to the items shown in the checklist, the Designer should add the following note to the Property Map for railroad corridors that are held as Easement by the Railroad. Refer to *Figure 4-11, Easement Corridor Property Map*.

“The Agreement required for the Railroad crossing will be obtained by the ROW Division’s Utility Office Railroad Coordinator through negotiations and Special Provisions with the Railroad.”

4-602.04 ACQUISITION TABLE REQUIREMENTS FOR RAILROAD FEE-SIMPLE AND EASEMENT ACQUISITION TYPES

The Acquisition Table for both Fee-Simple and Easement property interests held by the railroad will generally look the same. The Acquisition Table, whether for Easement or Fee-Simple railroad corridors, identifies properties impacted by the project and rights as easements. Refer to *Figure 4-12, Easement Corridor R.O.W. Acquisition Table* and *Figure 4-20, Fee-Simple Corridor R.O.W. Acquisition Table*:

Fee-Simple and Easement Corridors

- All railroad entities impacted by a project will be identified along with their corresponding tract number(s) within the Acquisition Table.
- Each type of easement will be totaled as a square footage (or as acreage if the square footage number is greater than 0.1 acre) and inserted into the appropriate column.
- If the corridor is held in Fee-Simple by the Railroad, there will be a Deed with a book and page reference. This information must be entered into the Acquisition Table. If the information is not provided by the Surveyor, contact the State Railroad Coordinator at HQRailroadCoordinator@tn.gov for the required information.
- It is extremely rare that a Railroad entity will sell the underlying Fee of a Fee-Simple Corridor to the State which is why we purchase easements from the Railroad. For this reason, the Total Area Acres, Area to be Acquired Acres, and the Area Remaining Acres columns of the Acquisition Table are very rarely filled out for a railroad tract. Instructions will be provided by the State Railroad Coordinator or the Special Acquisitions Agent at the Tennessee Department of Transportation (TDOT) Headquarters if these fields require inputs, otherwise they can be left blank.
- If not already inserted within the Acquisition Table, additional easement columns including: PERM. DRAINAGE (Permanent Drainage Easement), SLOPE (Slope Easement), CONST. (Temporary Construction Easement), PERM. (Permanent Easement), and AIR RIGHTS (Air Rights Easement) shall be inserted.

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Acquisition Tables for Easement Corridors Only

Similar to the Fee-Simple Acquisition Table, the Easement Acquisition Table will look exactly the same with the exception of two small additions:

- A double asterisk will be added to the left of the Railroad tract number(s).
- A footnote will be added to the bottom of the Acquisition Table referencing the double asterisk. The exact language to be inserted as a footnote will be provided by the State Railroad Coordinator.

4-602.05 PRESENT LAYOUT SHEET(S) REQUIREMENTS FOR RAILROADS

The Present Layout sheets for both Fee-Simple and Easement property interests held by the Railroad will generally look the same. Refer to *Figure 4-13, Easement Corridor Present Layout Sheet*, and *Figure 4-21, Fee-Simple Corridor Present Layout* for additional information. Additional information is shown in the checklists that should be added to the Present Layout sheets for Railroad involvement.

Whether a Railroad corridor is held in Fee-Simple or Easement the Present Layout sheet(s) will look exactly alike with one simple difference:

FEE-SIMPLE:

The Present Layout sheet(s) will be shown as described above and shall look similar to *Figure 4-8, Temporary Construction, Permanent Drainage, and Air Rights Easements in Plans*.

EASEMENT:

The Present Layout sheet(s) will be shown as described above and a boxed note will be placed on the sheet with the following statement:

“The Agreement required for the Railroad crossing will be obtained by the ROW Division’s Utility Office Railroad Coordinator through negotiations and Special Provisions with the Railroad.”

4-602.06 RIGHT-OF-WAY DETAILS SHEET(S) and RAILROAD DETAILS SHEET(S)

Depending on the volume of information on the Right-of-Way Details sheet(s), the impacted railroad easements may need to be shown on multiple Right-of-Way Details sheets. See *Figure 4-10, Easement Corridor Title Sheet*, and *Figure 4-11, Easement Corridor Property Map*, for a large volume plan which exists on an Easement corridor. See *Figure 4-18, Fee-Simple Corridor Title Sheet*; *Figure 4-19, Fee Simple Corridor Property Map*; *Figure 4-20, Fee-Simple Corridor Right-Of-Way Acquisition Table*; *Figure 4-21, Fee-Simple Corridor Present Layout*; *Figure 4-22, Fee-Simple Corridor R.O.W. Details (A)*; *Figure 4-23, Fee Simple Corridor R.O.W. Details (B)*; and *Figure 4-25, Fee-Simple Corridor Profile* for Fee-Simple corridor examples.

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- The overall impacted railroad properties shall be shown in the Right-of-Way Details sheet(s) which would include: Permanent, Slope, Drainage, Air Rights, and Temporary Construction Easements. The Right-of-Way Details sheet(s) will include all the bearings/distances and stations/offsets of the impacted easements. Reference *Figure 4-10, Easement Corridor Title Sheet; Figure 4-11, Easement Corridor Property Map; Figure 4-18, Fee-Simple Corridor Title Sheet; and Figure 4-19, Fee-Simple Corridor Property Map*, for examples.
- The Temporary Construction Easement and the Air Rights Easement shall be shown on one overlaid Right-of-Way detail. See *Figure 4-14, Easement Corridor Right-of-Way Details (A), Figure 4-15, Easement Corridor Right-of-Way Details (B), Figure 4-16, Easement Corridor Proposed Layout*

4-602.07 PROPOSED LAYOUT SHEETS

The Proposed Layout Sheets for both Fee-Simple and Easement property interests held by the Railroad will generally look the same. Refer to *Figure 4-16, Easement Corridor Proposed Layout*, and *Figure 4-24, Fee-Simple Corridor Proposed Layout* for additional information. Additional information is shown in the checklists that should be added to the Proposed Layout sheets for railroad involvement.

4-603.00 GRADE SEPARATED RAILROAD CROSSINGS

This section should only be referenced for crossing types which overpass or underpass the Railroad's corridor i.e., grade separated. All other crossing types are covered in subsequent sections of these guidelines.

4-603.01 GENERAL DESIGN CRITERIA FOR GRADE SEPARATED CROSSINGS

- If designing under or over CSXT or Norfolk Southern Railway Company, use their published Public Projects Manual. If a copy of the Public Projects Manual is needed, please contact the State Railroad Coordinator for the latest version. For all other railroads, the publications of CSXT and Norfolk Southern Railway Company are a great rule of thumb to follow. If additional guidance is required, use the American Railway Engineering and Maintenance Association (AREMA) standards or contact the State Railroad Coordinator to determine if the railroad entity has some general standards.
- When possible, develop design plans concurrently with the structural plans.
- Starting with the Construction plans, indicate where modifications have been made to railroad plans.

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4-603.02 PRELIMINARY PLANS FOR PROJECTS CONTAINING GRADE SEPARATED CROSSING(S)

In order to facilitate the Railroad's review of all future highway plans, including a highway-railroad grade separated crossing, the following information must be included on the preliminary plans, which are to be submitted to the State Railroad Coordinator as an info only set (non-portfolio PDF set) to be distributed to the Railroad(s) for comments and/or approval:

1. A minimum of five (5) railroad cross-sections shall be provided at the following locations:
 - The roadway grade at the proposed bridge
 - Both faces of the proposed bridge
 - Right-of-Way limits (minimum 100 ft.) from face of the proposed bridge (perpendicular to the railroad alignment)
- a. The proposed bridge toe of abutment fill slopes, existing railroad drainage structures and ditches, and roadside ditches should be shown on all applicable cross-sections.
- b. For any proposed structure (example: retaining wall, end wall), a cross-section view showing the location of such structures in relation to the location of the railroad centerline of track shall be shown.
- c. Cross-sections need to show any changes proposed during grading operations to the railroad embankment, drainage ditches, or sub-track structures.

NOTE: If the distance between the subject cross sections exceeds fifty (50) feet, additional cross-sections are required to adequately depict conditions along the tracks. See *Figure 4-9, Example Cross Section Locations*, for cross-sections that are required to adequately depict conditions along the tracks.

2. Provide the Project Drainage Report with the Preliminary plans submission to the State Railroad Coordinator. An [example](#) can be found on the TDOT Roadway Design website.

NOTE: The Railroad is concerned that no new water will be placed on their property as a result of the project and request proof to be provided by the State or their representative which confirms this as fact.

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- h. On the plan views, dimension the minimum horizontal clearance from the centerline of track(s) to the proposed slope protection/pavement.
- i. At skewed crossings, the plans must include a structure elevation view normal to the track.
- j. Proposed distance from centerline of track(s) to toe of end slopes at their intersection with natural ground.
- k. If end slopes are to be paved, indicate limits of paving.
- l. Location of the railroad milepost on Railroad Right of Way.
- m. Existing and proposed drainage structures.
- n. Railroad station at highway-railroad intersection, or distance in feet from nearest railroad milepost.

In general, the information listed above is the minimum information needed by the Railroad to enable them to make a logical investigation of the proposed project. To furnish less information would only serve to delay the Railroad's approval of the plans.

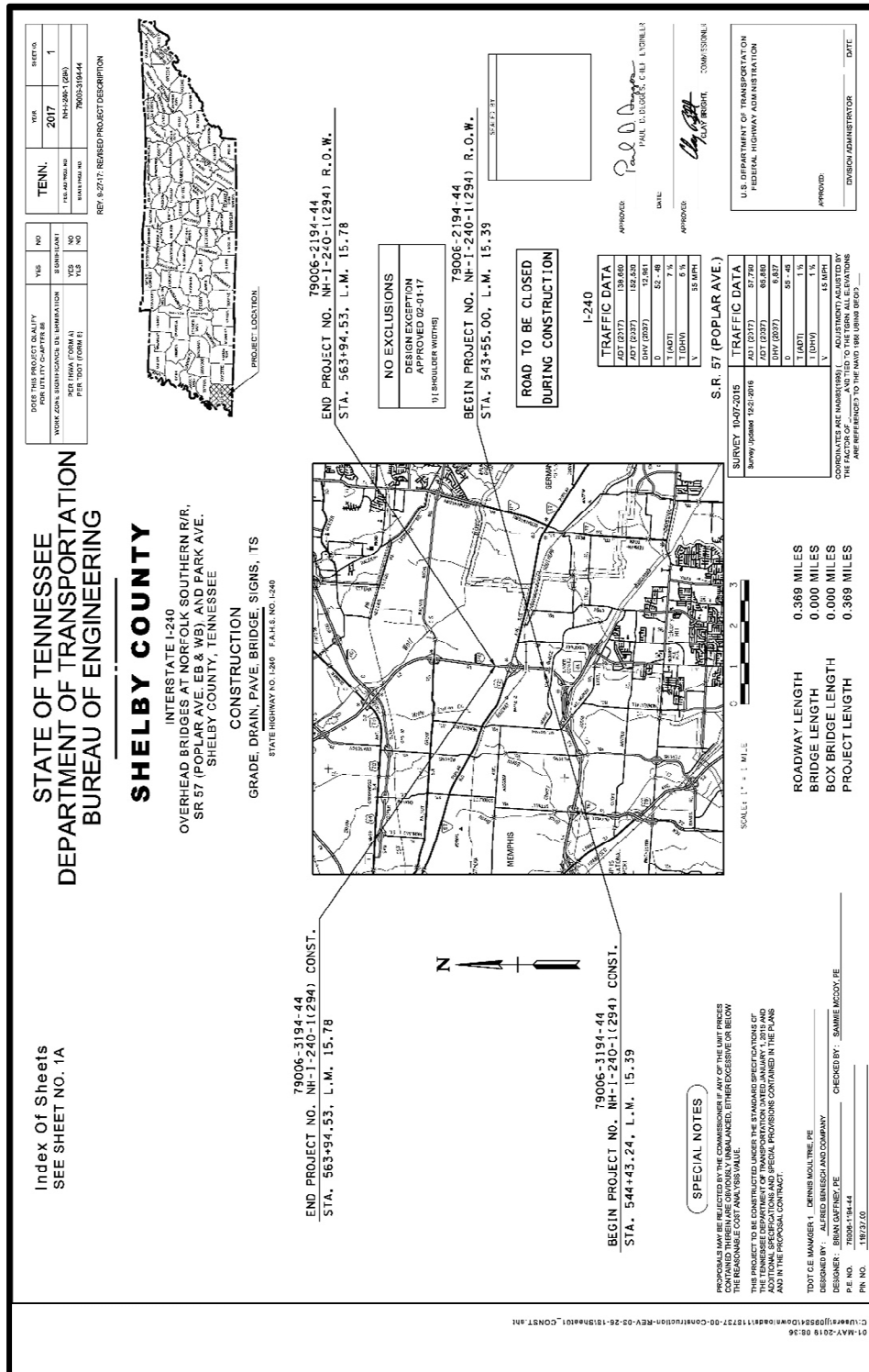


Figure 4-10
 Easement Corridor Title Sheet

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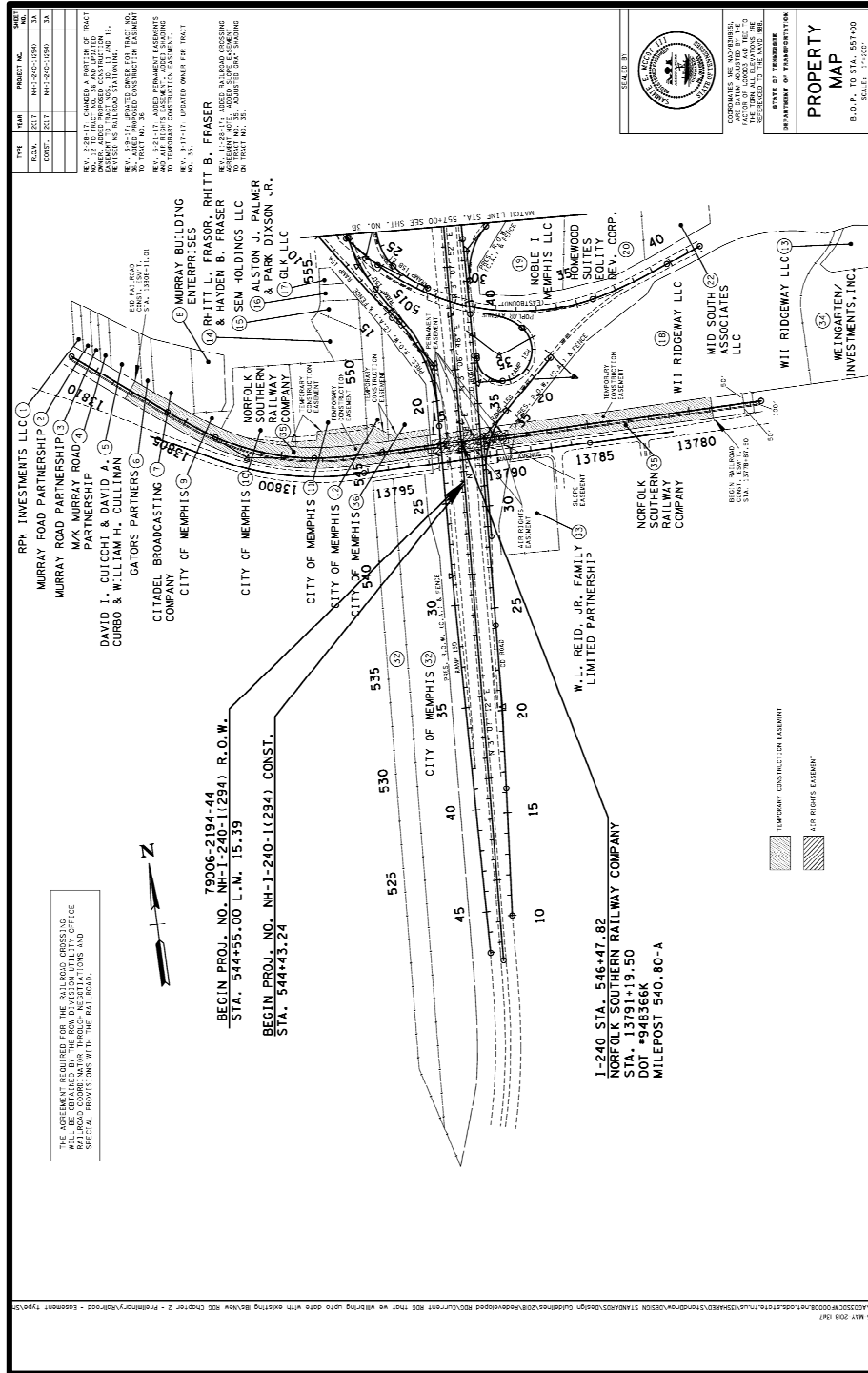


Figure 4-11
Easement Corridor Property Map

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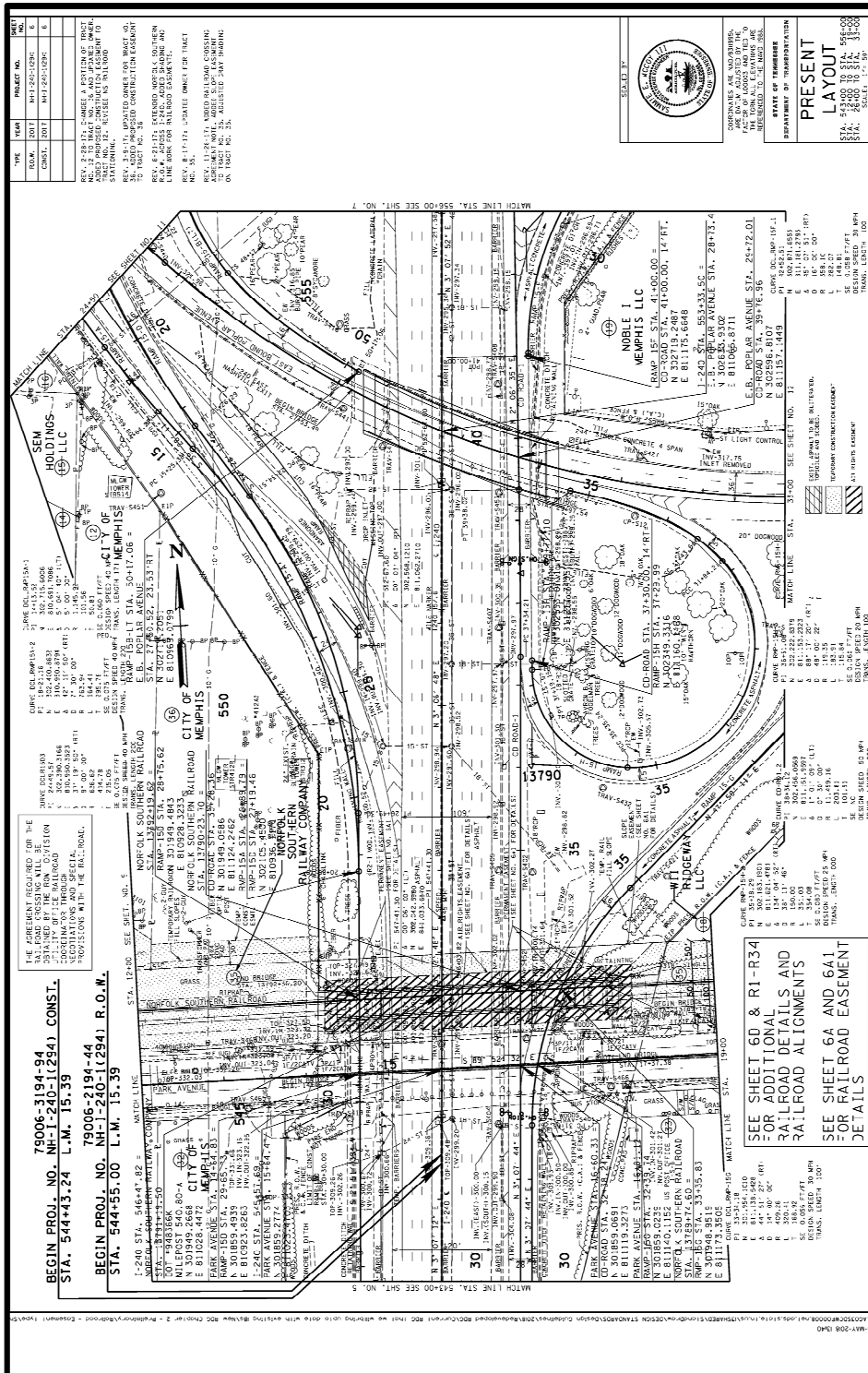


Figure 4-13
Easement Corridor Present Layout Sheet

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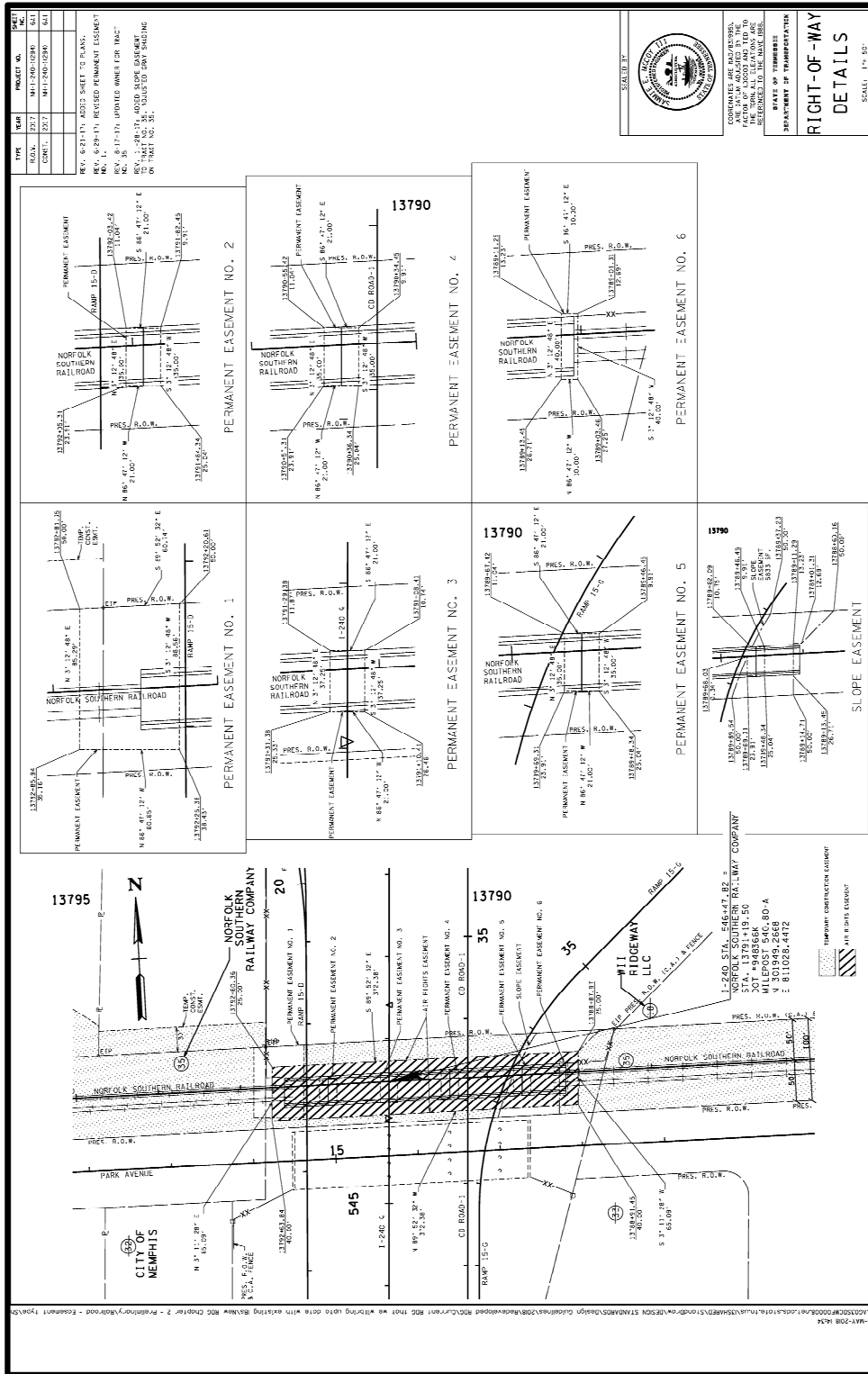


Figure 4-15
Easement Corridor Right-of-Way Details (B)

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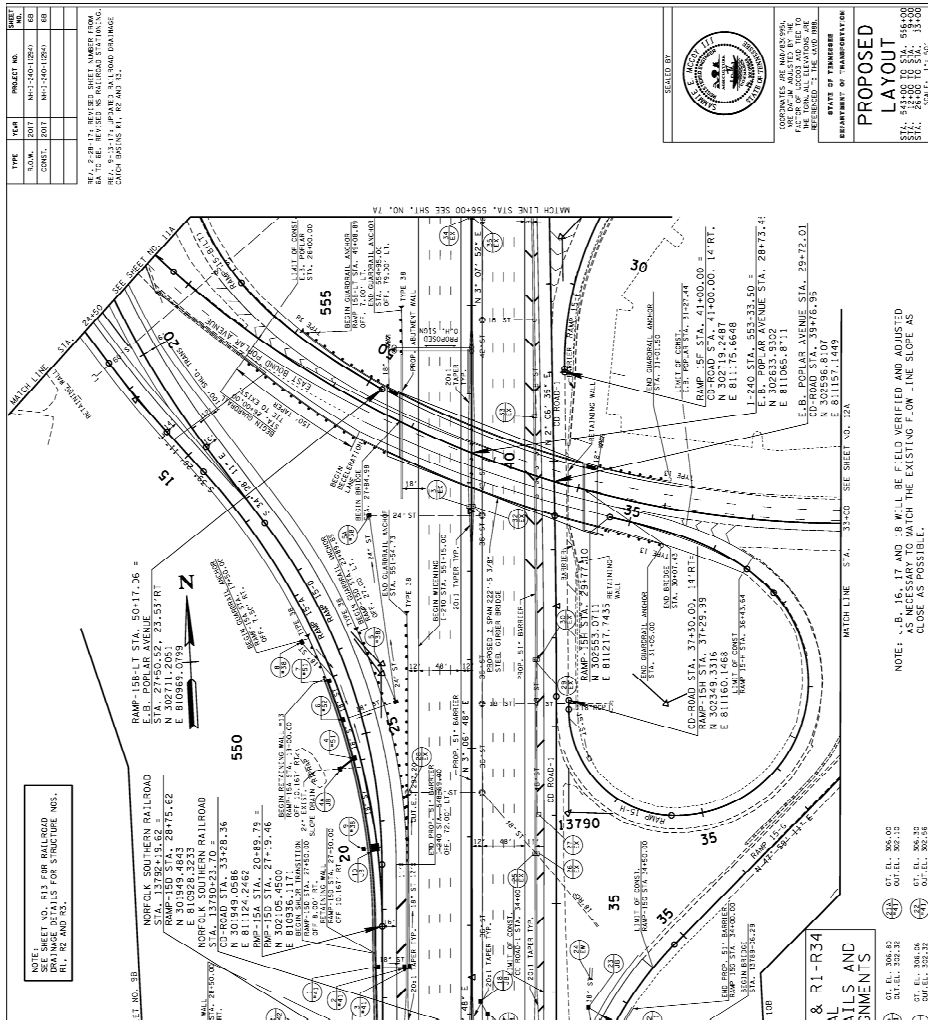


Figure 4-16
Easement Corridor Proposed Layout