Oregon Department of Transportation

Railroad Final Drawings Manual

March 2025

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Preface

The Railroad Final Drawings Manual provides guidance on producing railroad final drawings used in the rail crossing order and the construction and maintenance agreement. This manual was developed and established in 2025 by representatives from ODOT rail crossing safety, ODOT ROW rail, ODOT traffic standards, and ODOT region 1 & 2 project design at the direction of the chief engineer and the rail crossing safety manager. It reflects the Oregon Revised Statutes, Oregon Administrative Rules, and ODOT practices.

The state utility and rail liaison maintains the Railroad Final Drawings Manual. Send comments or questions on this document to UtilityandRailProgra@odot.oregon.gov or,

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Contents

1 Railroad Final Drawings

This document provides guidance to designers producing the railroad final drawings. Railroad final drawings are sealed engineering drawings that are required to be included in two document processes:

- The construction and maintenance (C&M) agreement
- The crossing order

Both processes are independent but will typically use the exact same railroad final drawings. However, the crossing order may not use all of the railroad final drawings that the C&M agreement uses. These plan sheets help show all the required high-level project design features and traffic control devices that are relevant to the rail crossing or that impact the adjacent railroad right-of-way/railroad operations. They ARE NOT FOR CONSTRUCTION and are NOT part of the contract plan set. They are ideally sealed early in the project design process. As such, they are only a project depiction of key design features and do not need to show the level of detail required for a contract plan sheet that is used to bid and build the project.

The railroad must approve the C&M agreement and the crossing order documents to allow a project to progress to construction.

1.1 Crossing Order

A crossing order is issued by the ODOT rail safety team (see section 1.3 for team information). The main functions of the crossing order are listed below:

- Is a legal document that details the specific terms and conditions associated with constructing, relocating, altering, or closing a rail crossing.
- Assigns responsibility to the appropriate affected authority for furnishing, installing, maintaining, and funding the design features and traffic control devices applicable to the rail crossing.
- Is used by the ODOT rail crossing safety team to inspect the rail crossing for compliance at the end of a project and at regular intervals afterward.

The crossing order is specific to and used only at rail crossings (e.g. tracks that intersect a roadway either at grade, via an overcrossing, or via an undercrossing). As such, the railroad final drawings used for the crossing order will typically have a narrow focus on features located within the safe stopping distance (SSD) of the of rail crossing. The SSD for rail crossings is defined in OAR 741-100-0020 and shown below in Table 1-1.

Table 1-1 | Safe Stopping Distance (SSD) for Rail Crossings

Posted or Statutory Speed* (MPH)	SSD** (Feet)
15	80
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645

*Defined as per OAR 741-100-0005 : "The state's jurisdiction extends a distance equal to the safe stopping distance, for the posted or statutory speed, measured back from the location of the stop clearance lines at the highway-rail grade crossing"

**Defined as per OAR 741-100-0020(19): " (SSD) means the design stopping sight distance as set forth in AASHTO 2001, Exhibit 3-1."

1.2 Construction & Maintenance (C&M) Agreement

A Construction & Maintenance (C&M) agreement is issued by the ODOT ROW rail team (see section 1.3 for team information). The main functions of the C&M agreement are listed below:

- Is an agreement between ODOT, the road authority and the railroad to determine how the project will be constructed, how the project will be maintained, and any associated costs.

The C&M agreement is used for any project work that will construct something new within the railroad right-of-way and responsibility for maintaining the structure (e.g. this can include features or work that run parallel to the track such as retaining walls, fences, guardrail runs, widening/narrowing the roadway, or slope regrading. Also included is any construction work that triggers additional railroad requirements such as railroad flaggers). As such, the railroad final drawings used for the C&M agreement are focused on work that will impact the railroad right-of-way and railroad operations during construction.

1.3 ODOT Railroad Teams

ODOT Rail Crossing Safety Team

- The rail crossing safety team is in the rail safety & regulatory branch of the commerce and compliance division and supplies rail crossing safety expertise to the diagnostic team. The rail crossing program coordinator assigns crossing projects to a crossing team project manager and tracks project progress to ensure accordance with the rail crossing safety team's procedures and compliance with Oregon revised statutes and Oregon administrative rules. The rail crossing team is responsible for the content of the crossing order and works in conjunction with the ROW rail team from project scoping/kick-off through the execution of the final crossing order.

ODOT ROW Rail Team

- The ROW rail team is in the ROW section of the engineering technical services branch (ETSB). The ROW rail team assists project teams and works with the railroad from project scoping/kick-off to the railroad's approval of the railroad final drawings. The team also executes the project construction & maintenance (C&M) agreement. Once the railroad final drawings are approved and the C&M agreement signed, the project process is handed to the ODOT rail crossing safety unit to draft the crossing order.

1.4 Diagnostic Team

Defined as per the MUTCD 11th Edition Section 1C.02: A group of knowledgeable representatives of the parties of interest in a grade crossing or group of grade crossings (See 23 CFR Part 646.204). The diagnostic team is typically comprised of the following members, but may include others:

- Project team leader
- ODOT rail crossing safety team representative
- ODOT ROW rail team representative
- Railroad company representative
- Region traffic representative
- Construction representative
- Designers (signal, roadway, and others as needed)
- Road authority (rail crossings off the state highway)

1.5 Responsibility for the Railroad Final Drawings

A licensed professional engineer in Oregon is responsible for providing and sealing the drawings. Typically it is the engineer of record (EOR) for the applicable disciplines on the project.

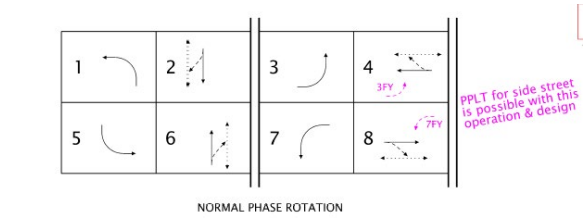
1.6 Railroad Final Drawings Milestones

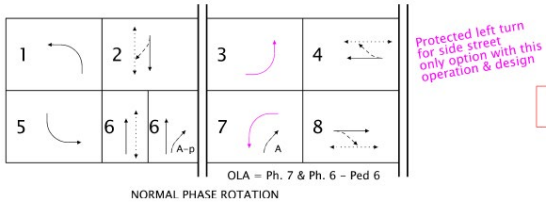
The timeline for development of the railroad final drawings has six major milestones as shown in Table 1-2. Examples of rough sketches (stated in milestones 1 and 2) are shown in Figure 1-1.

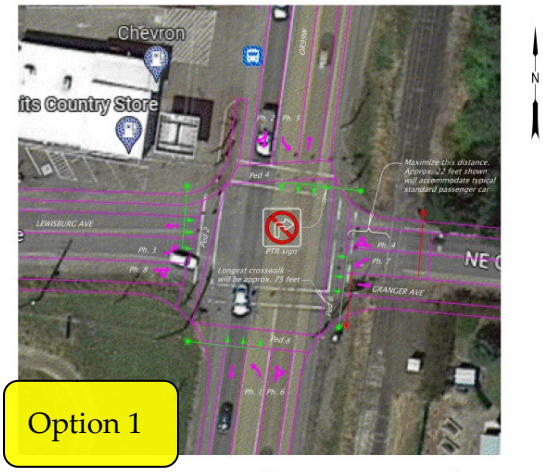
Table 1-2 | Railroad Final Drawings Milestones

Project Milestone		Railroad Final Drawings Status	Description
1	Project Scoping	Conceptual narrative/rough sketches of all options ideal	The starting point for coordinating with all disciplines and interested parties for a **potential project.** Discussion of project goals, scope, schedule, budget, concerns, and other relevant information.
2	Project Kick-Off	Rough sketch of chosen option ideal	The starting point for coordinating with all disciplines and interested parties for a **funded project**. Discussion of project goals, scope, schedule, budget, and concerns. Determine applicable design standards and design criteria. Request survey and right-of-way data.
3	dDAP (draft DAP): Diagnostic Team Meeting(s)	30% Review Plans (i.e. Concept Plans)	The ODOT ROW rail team will coordinate a diagnostic team which will meet prior to DAP (and as often as necessary) during the project development. The diagnostic team will identify issues and potential design requirements based on the scope of project.
4	Between DAP and Advance Plan Review	100% Review Plans (i.e. Final Review Plans)	After addressing all the comments received from the 30% review plans, 100% final review plans are produced. Note: multiple reviews of the 100% review plans could be necessary depending on comments received and complexity of the project. The plans should be 100% complete. **The due date is determined the by ODOT railroad teams based on the minimum required timelines for railroad review.**
5	Pre-PS&E: C&M Agreement	Sealed Railroad Final Drawings	After addressing all the comments received from the 100% review plans, final drawings are sealed by the EOR and submitted to ODOT railroad teams to include in the crossing order and obtain the C&M agreement.
6	Pre-PS&E: Crossing Order		
Assume 60 days minimum for the railroad to review each milestone submittal			

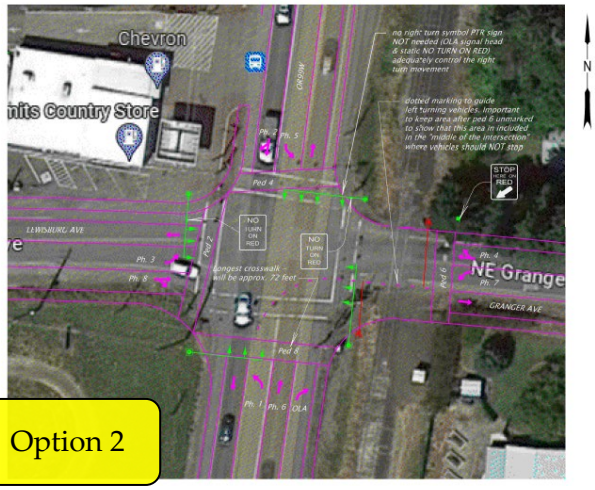
Figure 1-1 | Rough Sketch Examples for Project Milestones 1 and 2



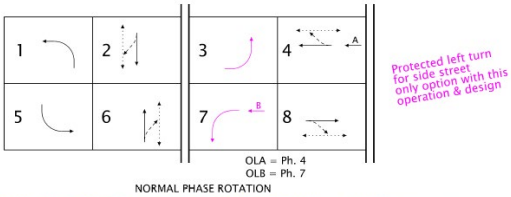


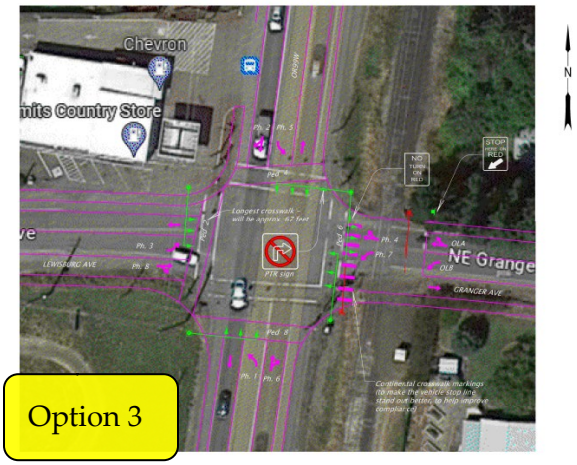


Option 1



Option 2





Option 3

These are three conceptual options for different lane use and traffic signal operations at a rail interconnected traffic signal.

All sketches are very rough and basic – using approximate dimensions for everything, drawn over a google map image.

These types of sketches help ALL of the discipline experts on the diagnostic team. It enables a focused discussion of pros/cons, discipline specific requirements, and identification of any fatal flaws early on.

Time spent up front on these rough sketches often results in quicker reviews of the milestone submissions that follow.

1.7 Requests for Information Not Shown in the Railroad Final Drawings

The affected and interested parties reviewing the railroad final drawings may also request additional information to review throughout the design phase of the project such as, but not limited to:

- Site pictures/photo logs
- Documentation of crashes or incidents at the crossing
- Drainage report
- Traffic signal timing sheets
- Traffic signal plans
- Traffic signal cabinet prints
- Workzone traffic control plans/construction staging information
- Illumination plans
- Drawings of sight lines and potential obstructions
- Specifications and/or special provisions
- Standard Drawings

These items should be provided when requested, but the information shown in these documents is not typically included in the railroad final drawings. The are only provided to give additional context and aid in their review.

2 Railroad Final Drawing Format

A railroad final drawing contains two key elements:

1. Not for construction and/or watermark text. (see section 2.2)
2. Railroad ID information (see section 2.3)

These key elements make the intent of the drawing clear and also allow the EOR to seal the high-level railroad specific content prior to finishing the detailing that is required on a contract plan sheet used for bidding and building the project.

There are two methods for creating the railroad final drawings:

1. Creating them as a stand-alone plan sheet that is not connected to the production of contract plan sheets. This method allows the designer the ability to choose a scale that best fits the site conditions and conveys the information in the most efficient manner, resulting in quicker review times. It usually results in a smaller total number of railroad final drawings as the necessary information can be better condensed by combining content from different disciplines, using cut & match lines, blow-up views, and/or adjustments to the scale as needed. **For these reasons, this is the preferred method.**
2. Creating them from the plan sheets that will eventually become contract plan sheets. When using this method, care should be taken to delete or turn-off levels that show content that is unnecessary or unrelated to the railroad crossing as this can make the review and approval by the railroad more difficult and time consuming. This method requires advance thought to separating the unnecessary/unrelated features from necessary ones by use of different levels, models, etc. beyond the normal CAD workflow for producing the contract plan sheets which may actually be more time consuming than method 1 above. This method also limits the drawing to the standard scale and sheet cuts used for the contract plans, which may not be the ideal scale or ideal view to display the necessary information. **For these reasons, use this method with caution.**

All drawings shall be submitted as an 11x17 pdf using digital signatures.

NOTE! Information shown in the sealed railroad final drawings SHALL match the information shown in the contract plans. If changes to any of the sealed railroad final drawings are necessary in the design phase or construction phase, contact the ODOT ROW rail team and the ODOT rail crossing safety team for instructions to resolve the issue.

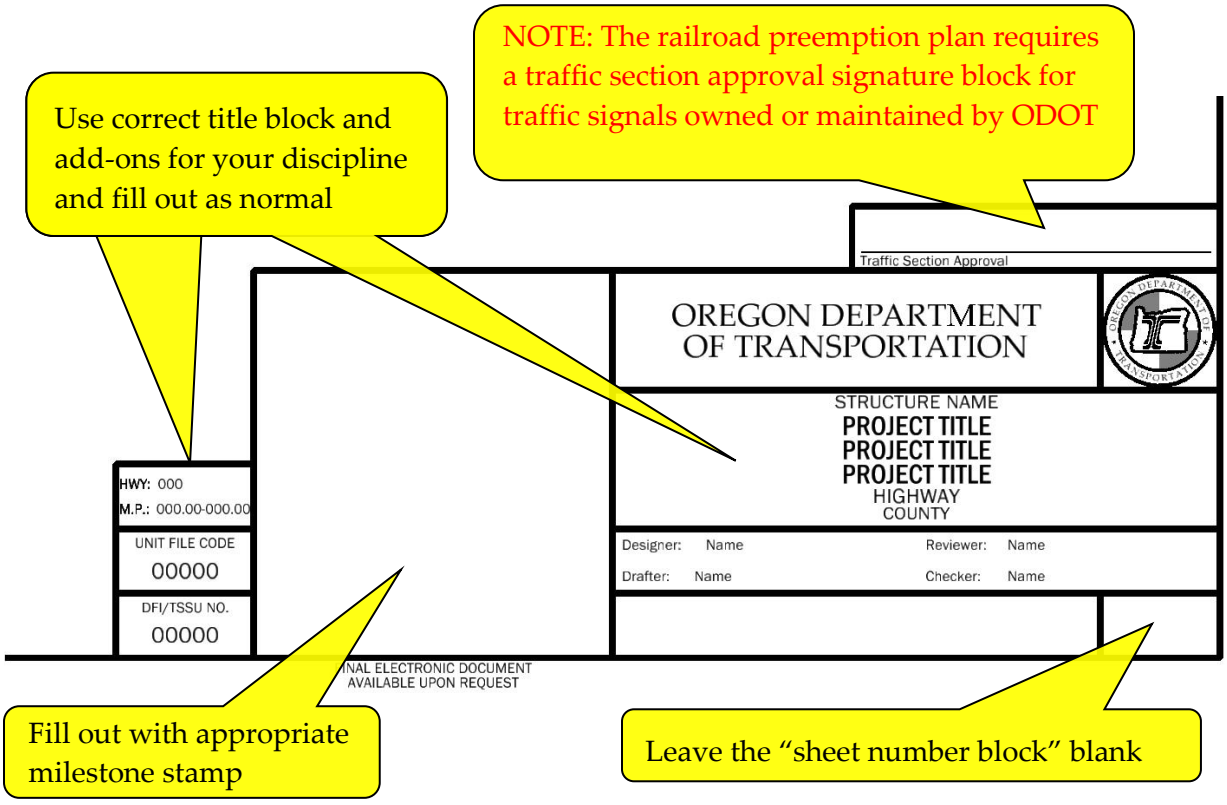
2.1 Title Block

Use the ODOT standard title block and fill out as per discipline-specific instructions (see ODOT CAD Manual and discipline-specific CAD guidance) with the following exceptions (see Figure 2-1):

- Leave the "sheet number block" blank
- The milestones shown in Table 1-2 for railroad final drawings are placed in the EOR stamp area:
    - 30% review plans information only
    - Final review plans
    - Engineering stamp with signature

For non-ODOT projects, use of a local agency or consultant standard title block with the same basic information as shown in Figure 2-1 is acceptable.

Figure 2-1 | Title Block



2.2 Not for Construction Text

There are two options for indicating the drawings are not contract plans and are only to be used for the purposes of the C&M agreement and crossing order:

1. A text box in the CAD file and/or
2. A watermark on the pdf file

The text box or watermark shall state "Not for construction for railroad review only". The text box should be placed near the title block in a prominent font, all uppercase. See Figure 2-2. The watermark needs to be placed and formatted so it doesn't obscure any content on the plan sheet. See Figure 2-3.

Figure 2-2 | Not for Construction Text Box

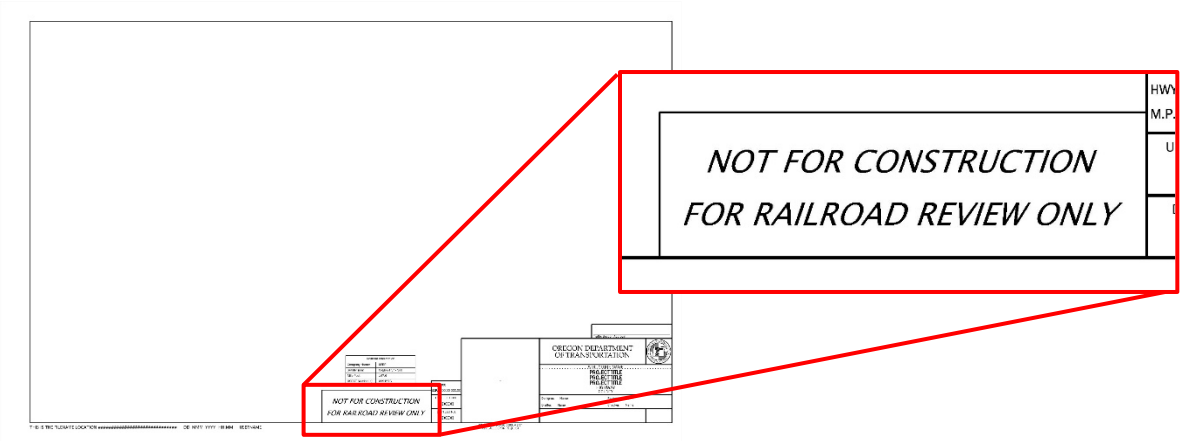
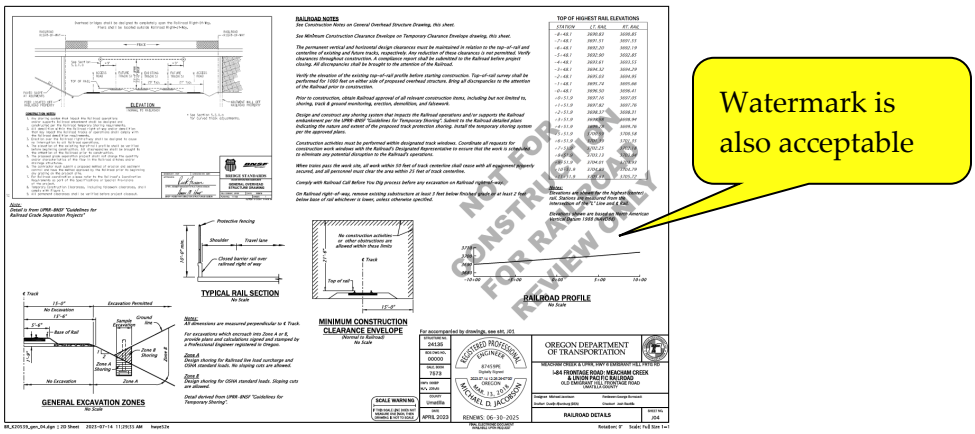


Figure 2-3 | Not for Construction Text Watermark



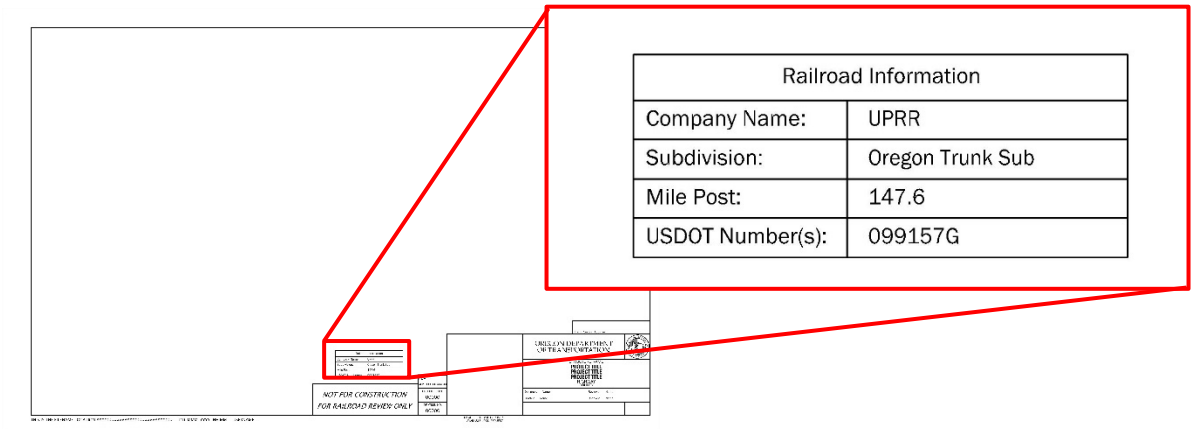
2.3 Railroad ID Information

The following railroad identification information is required on all railroad final drawings:

- Company name
- Subdivision
- Mile post
- USDOT number(s)

The ODOT ROW rail team will provide the designer with this information. This information can also be found on the railroad certification documents in the projectwise rail folder. The information should be placed near the title block and formatted as shown in Figure 2-4.

Figure 2-4 | Railroad ID Information Example



3 General Content Guidelines for Railroad Final Drawings

General guidelines for the content of railroad final drawings are listed below:

- The scope of the project will determine what drawings are needed.
- The drawings should clearly show and detail all devices/features pertaining to the rail crossing or adjacent rail right-of-way including:
    - Removal of existing devices/features
    - Installation of new devices/features
    - Relocation of existing devices/features
    - Existing devices/features in the current crossing order that will be retained and protected.
- Avoid showing or detailing unnecessary information. The information shown should be high level, clear, and pertinent to only the rail crossing.
- Those reviewing the drawings during the diagnostic team meeting(s) may identify unique site specific details that will need to be shown in a drawing. The ODOT railroad teams will instruct the designer if any unique details or drawings are necessary.

4 Discipline Specific Content for Railroad Final Drawings

The typical required railroad final drawing plan sheets for each discipline/designer are shown in Table 4-1. Depending on the project scope, other discipline/designer railroad final drawings not shown in the table could also be required (e.g. illumination plans showing a modification to pole location that is required for a railroad quiet zone designation).

Content from different disciplines' drawings will often overlap. Designers must coordinate with the other disciplines to make sure features are shown, referenced, and/or labeled correctly. In certain situations, separate discipline-specific plan sheets may not be necessary and instead combined into a single plan sheet (e.g. small project scope). For example, signing, pavement marking, and railroad equipment can and are often shown and detailed on one railroad final drawing. This requires the EOR for each discipline to coordinate and determine who will seal the drawing. See Figure 4-3, Figure 4-4 and Figure 4-9 for examples of combining different disciplines into a single plan sheet. However, each designer may choose to produce and seal their own separate discipline-specific drawing instead.

Table 4-1 | Typical Railroad Final Drawing Content

Discipline	Designer	Typical Railroad Final Drawing Plan Sheets See specific section in this manual for examples
Roadway	Roadway Designer	Project Title Drawing
		Roadway Plan View
		Roadway Profile & Typical Sections
		Roadway Details*
Bridge	Bridge Designer	Structure Type, Size & Location
		Railroad Structure Details
Traffic	Sign Designer	Sign Plan
		Sign Details*
	Signal Designer	Railroad Preemption Plan
	Striping Designer	Pavement Marking Plan
		Pavement Marking Details*
Railroad	Railroad Designer	Railroad Equipment Plan
		Railroad Equipment Details*

*Details plan sheets for roadway, traffic, and railroad are usually not necessary. They are typically only used to show rare/unique project details. See section 5 for examples of these discipline's specific detail sheets.

4.1 Roadway - Project Title Drawing

The project title drawing provides an overview of the project. Depending on the size and scope of the project, this drawing may be omitted at the discretion of the ODOT railroad teams.

The following features should be shown:

- Vicinity map
- Project limits and/or locations
- Railroad crossing location
- Project name and other basic project information

Note: The project title drawing does not require an EOR signature. Other features typical of a project title sheet may be shown also (e.g. index of sheets, etc.), but are not required.

See Figure 4-1 and Figure 4-2 for examples.

Figure 4-1 | Project Title Drawing Content Example 1

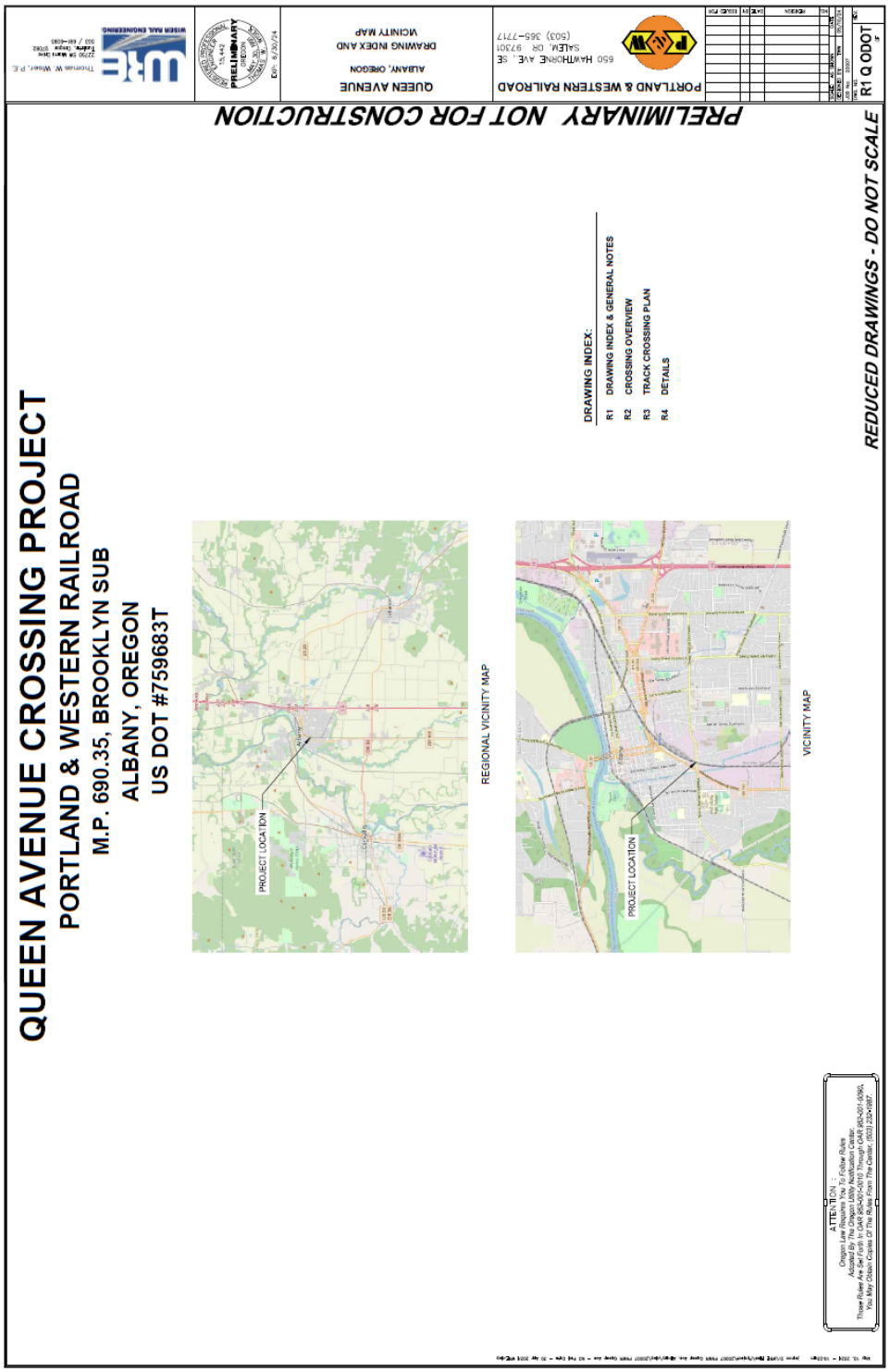
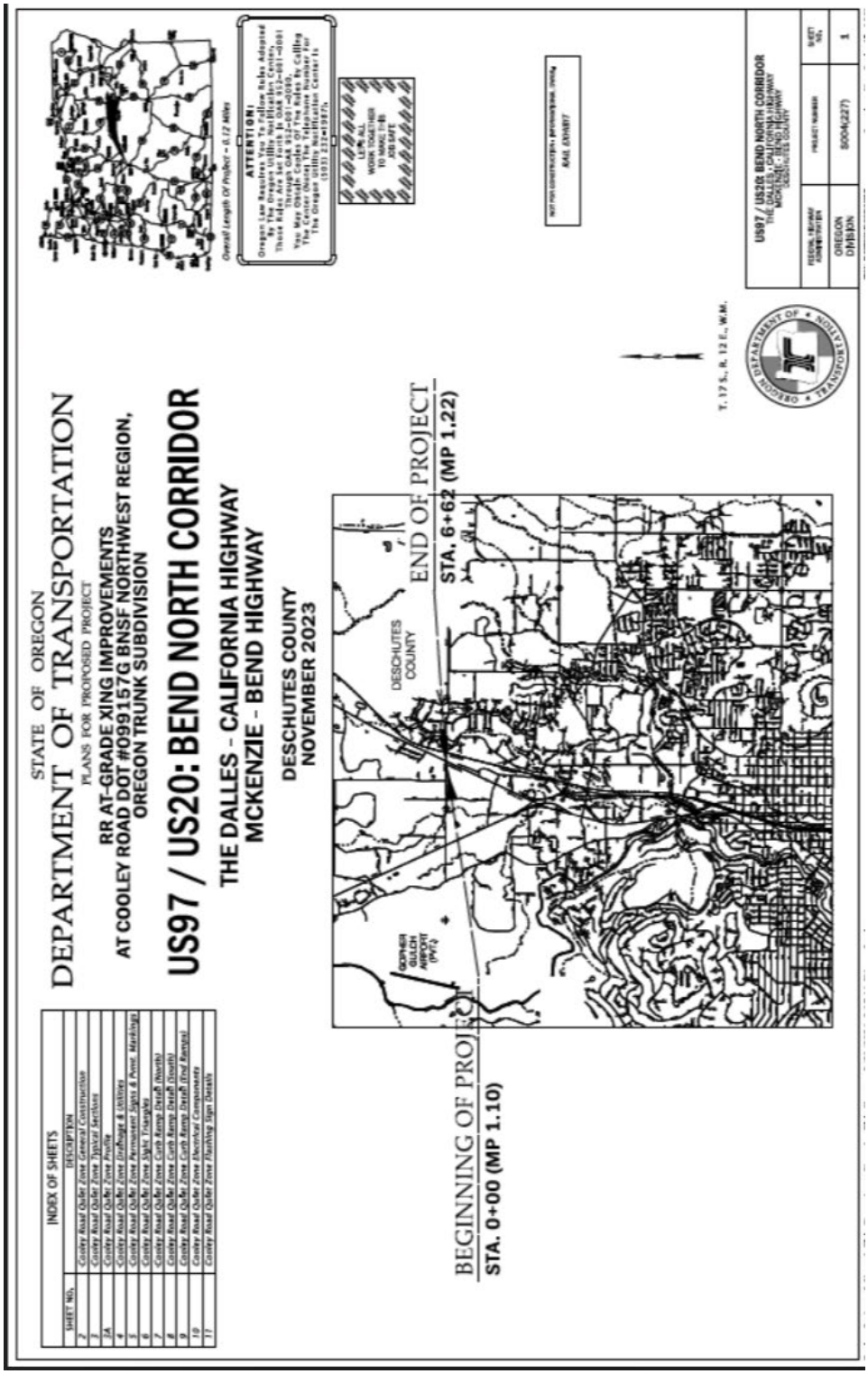


Figure 4-2 | Project Title Drawing Content Example 2



4.2 Roadway - Plan View

Only the roadway features that affect the rail crossing should be shown on the drawing. Show new installations, existing features that will be retained and protected, and removals. If bubble notes are used to label the features, include the bubble note legend.

The following roadway features should be shown:

- Track centers
- Right-of-way (including Railroad right of way and distance from centerline of track to right-of way)
- Roadway alignment and stationing
- Roadway surface type
- Lanes and lane use
- Lane widths for the roadway at the rail crossing
- Sidewalks, crosswalks, ADA ramps in the vicinity of the rail crossing
- Detectable warning surfaces for the rail crossing
- Type of curb and gutter
- Medians, islands
- Barricades, guardrail, curb, fencing
- Accesses
- Label offset distances for critical features as requested

See Figure 4-3 and Figure 4-4 for examples.

Figure 4-3 | Roadway Plan View Content Example 1

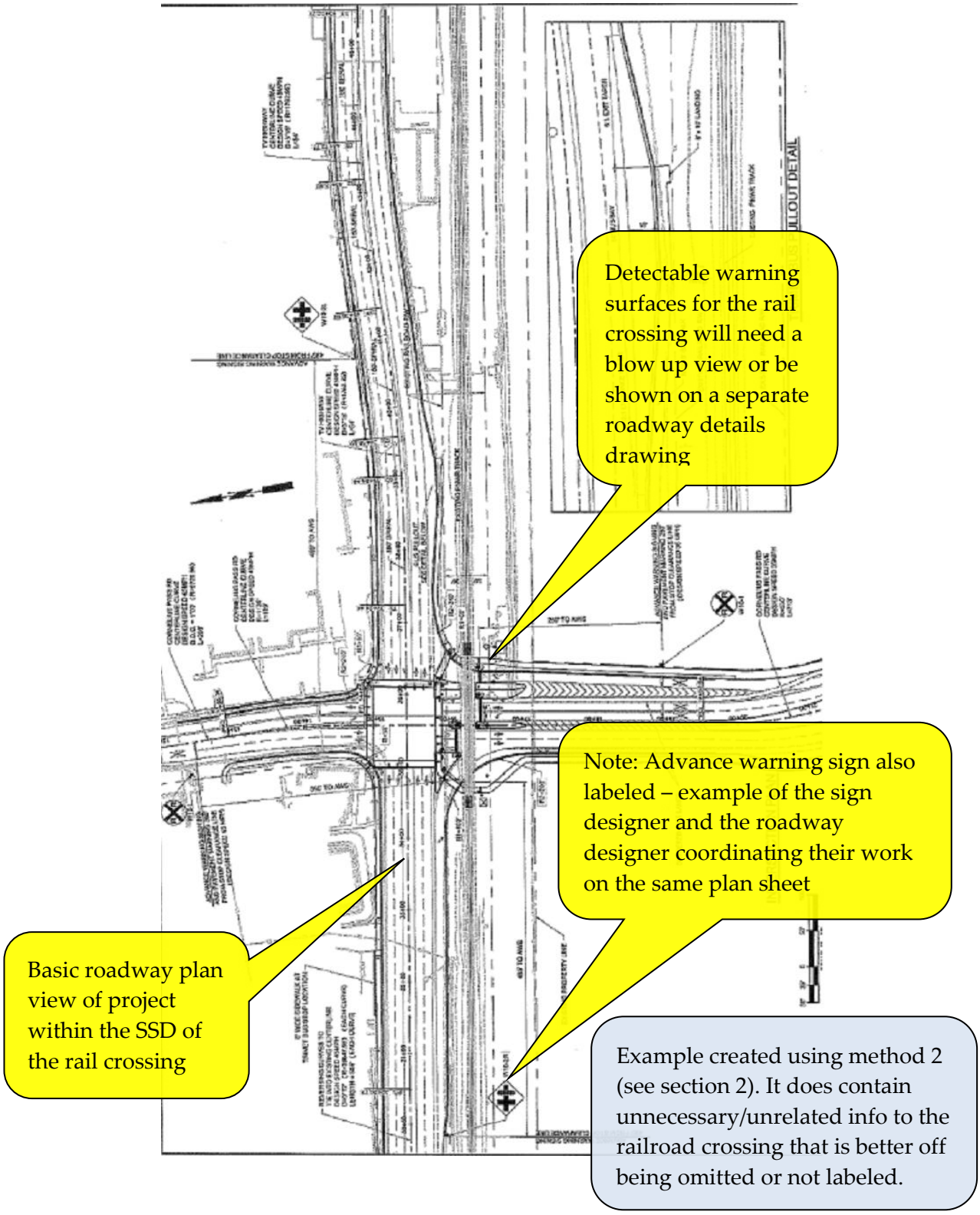
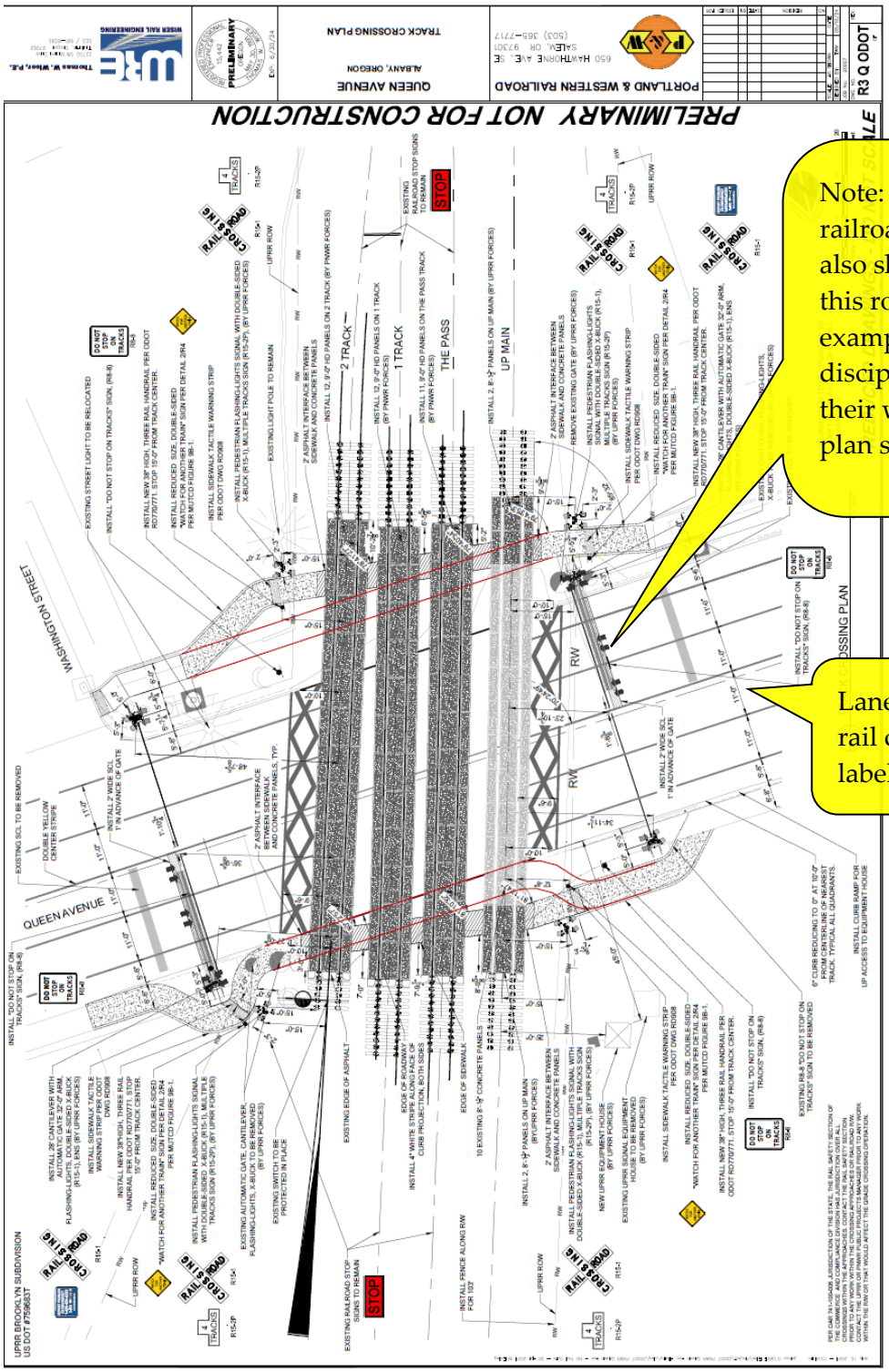


Figure 4-4 | Roadway Plan View Content Example 2



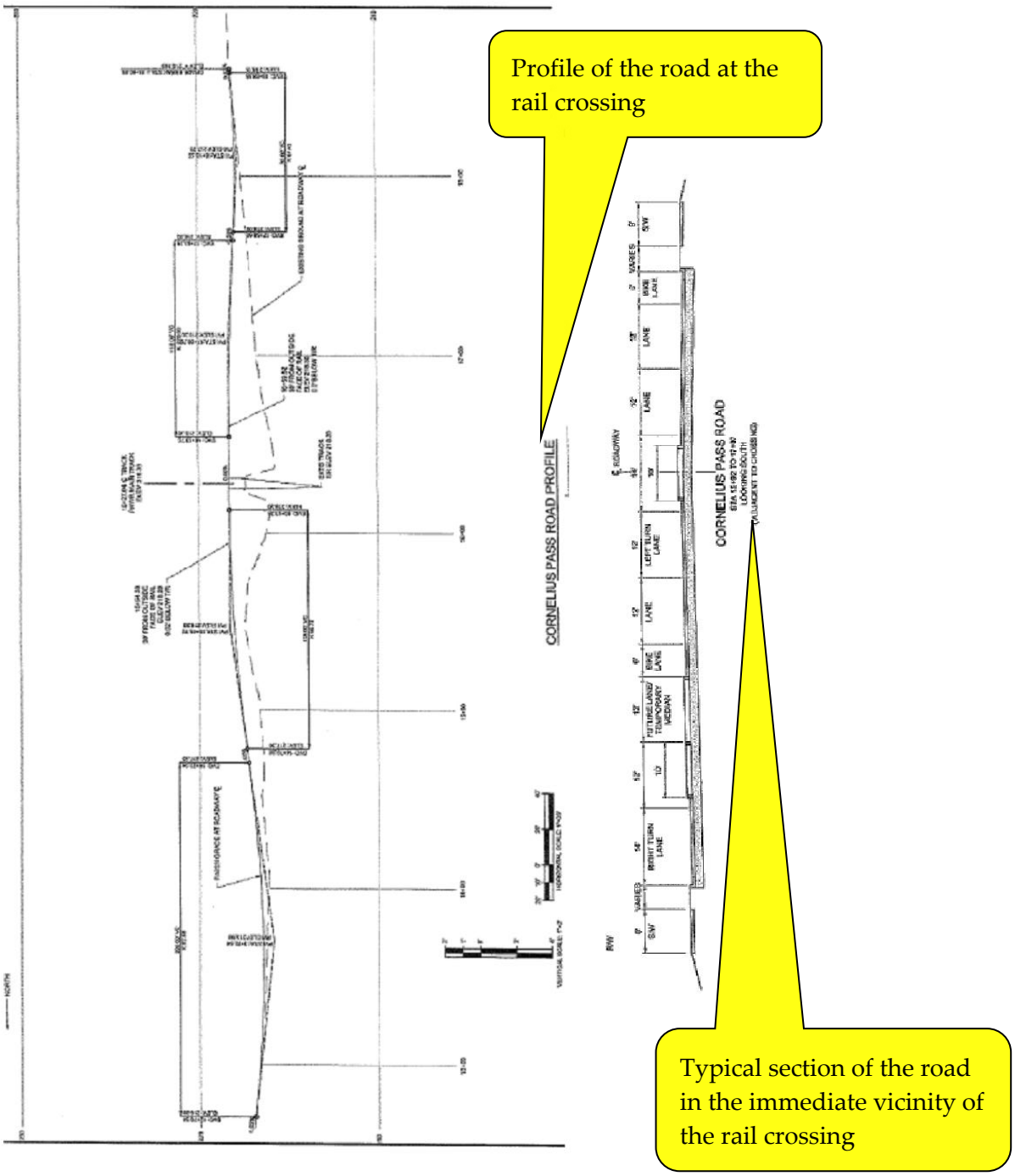
4.3 Roadway - Profile & Typical Sections

The following features should be shown and labeled:

- Profile of the roadway
    - Roadway alignment and stationing
    - Elevations
    - Track location
- Typical section(s) of the roadway in the immediate vicinity of the rail crossing or adjacent to the tracks
    - Lane widths
- Railroad right of way and distance from centerline of track to right-of way

See Figure 4-5 for example.

Figure 4-5 | Roadway Profile & Typical Sections Content Example



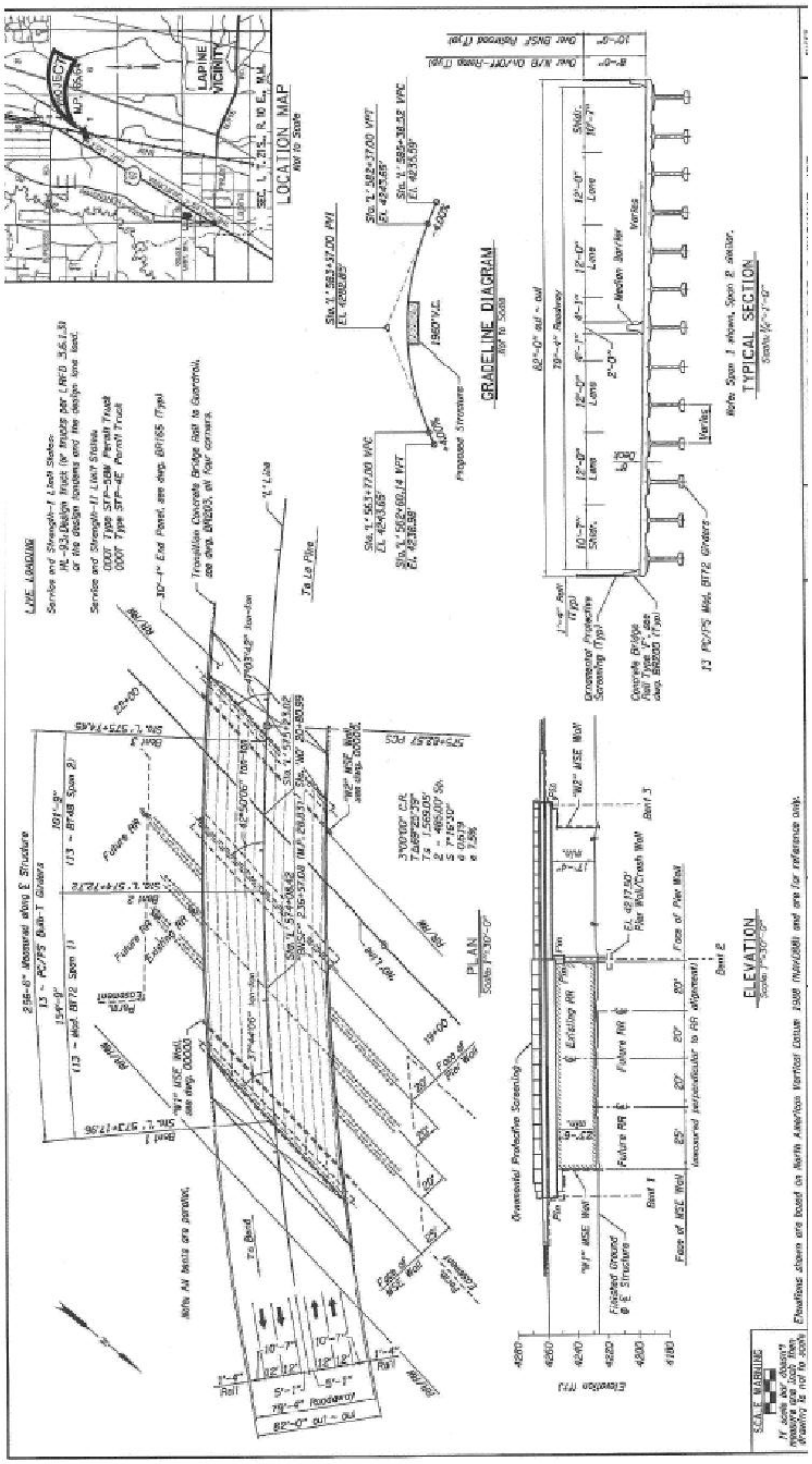
4.4 Bridge - Structure Type, Size, & Location

The following features should be shown and labeled:

- Structure number
- Plan view (with roadway alignment, track alignment, right-of-way, etc.)
- Railroad right of way and distance from centerline of track to right-of way
- Elevation
- Typical section
- Profile
- Structure design criteria and construction methods
- Track location
- Label offset distances for critical features as requested

See Figure 4-6 for example.

Figure 4-6 | Bridge Structure Type, Size, & Location Content Example



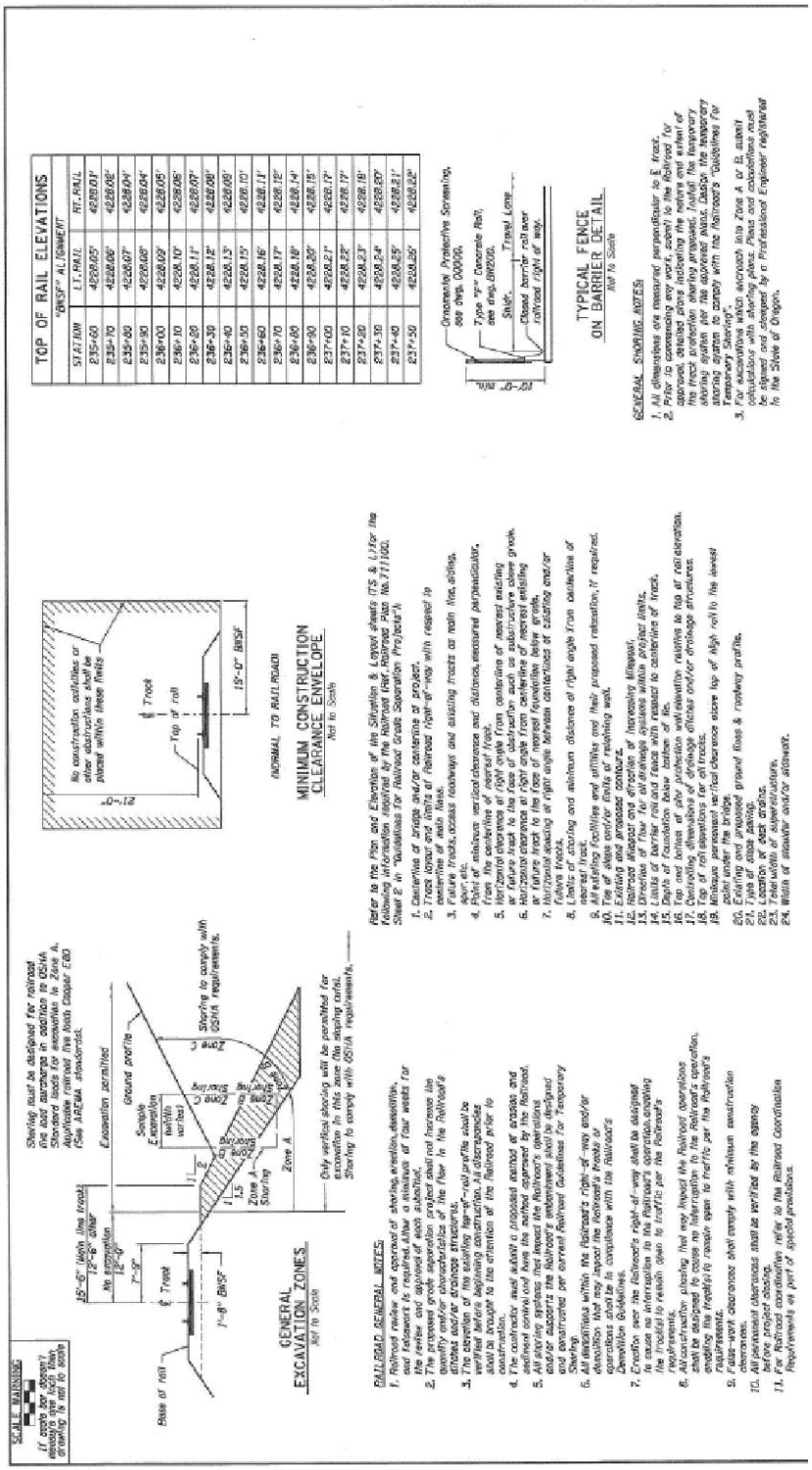
4.5 Bridge - Railroad Structure Details

The following features should be shown and labeled:

- Railroad right of way and distance from centerline of track to right-of way
- Top of rail elevations table
- Excavation zones
- Minimum construction clearance envelope
- Protective screening/fencing
- Railroad general notes

See Figure 4-7 for example.

Figure 4-7 | Bridge Structure Details Example



4.6 Traffic - Sign Plan

Only the traffic control devices that are used to regulate or affect the rail crossing should be shown on the drawings. Show new installations, existing features that will be retained and protected (that are relevant to the scope of work), and removals. If bubble notes are used to label the features, include the bubble note legend.

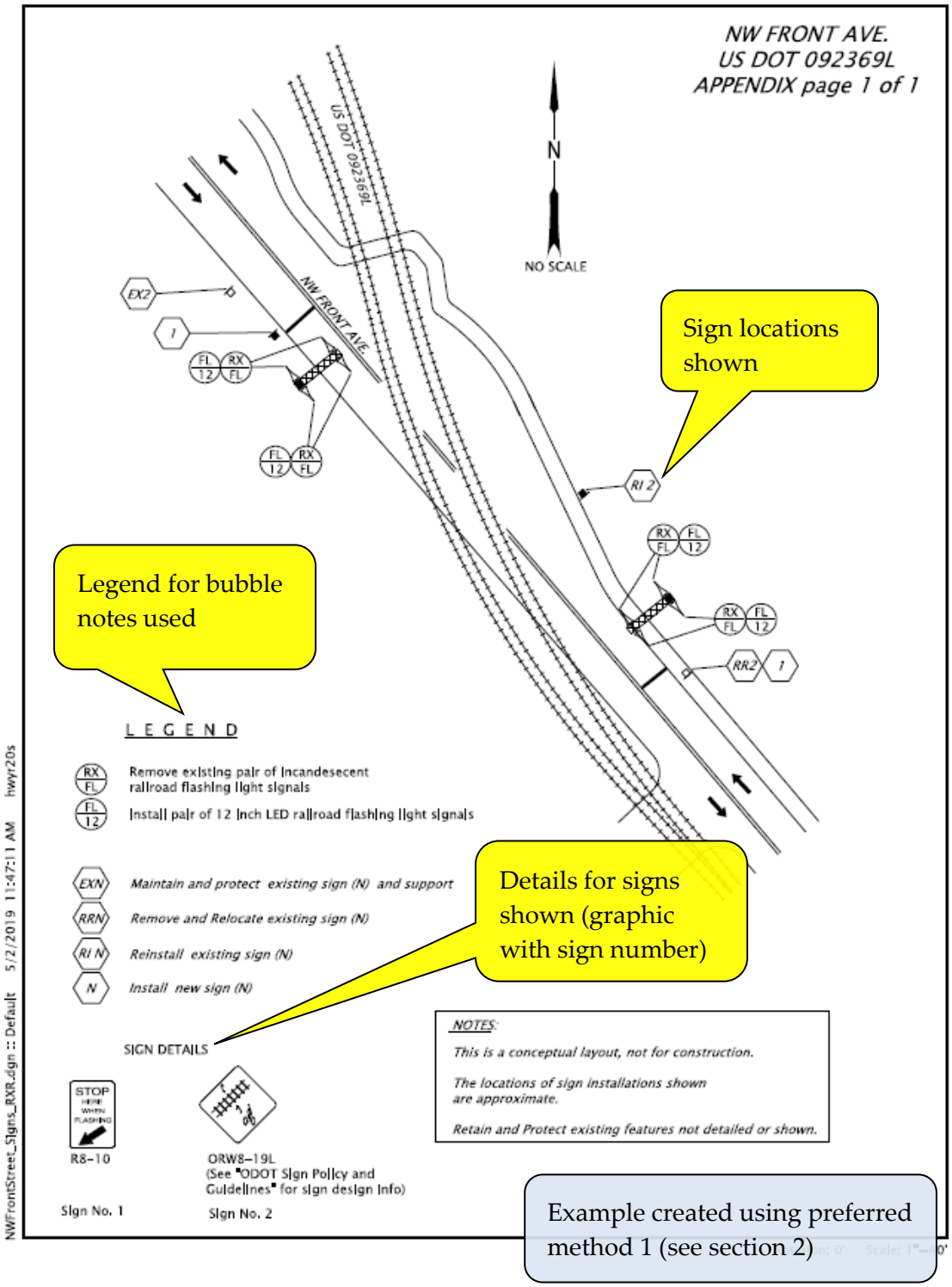
The sign plan should show the sign location and the sign details (e.g. a graphical depiction of the sign and the MUTCD sign number or Oregon sign number). The sign details should be shown on the plan view if it is not too cluttered; a separate sign details sheet is typically not needed.

The following signs should be shown and labeled:

- All railroad advance warning signs (MUTCD part 8).
- DO NOT STOP ON TRACKS sign
- High level warning flag kit
- STOP HERE ON RED sign
- NO TURN ON RED sign
- Turn restrictions
- LOOK sign
- Emergency Notification Sign (ENS)
- Any other sign that is important to document in the crossing order as determined by the ODOT rail crossing safety unit.

See Figure 4-8 for example.

Figure 4-8 | Sign Plan Content Example



4.7 Traffic - Railroad Preemption Plan

Provide the railroad preemption plan as per the detailed instructions in the ODOT Signal Design Manual (Chapter 16 and Chapter 21).

4.8 Traffic - Pavement Marking Plan

Only the traffic control devices that are used to regulate or affect the rail crossing should be shown on the drawings. Show new installations, existing features that will be retained and protected (that are relevant to the scope of work), and removals. If bubble notes are used to label the features, include the bubble note legend.

The pavement marking plan should show and label following pavement markings.

- Railroad right of way and distance from centerline of track to right-of way
- Railroad advance warning pavement markings
- Railroad stop clearance lines
- Dynamic envelope markings
- Crosswalk markings within the rail crossing safe stopping distance (SSD)
- Lane lines (graphically shown, but not labeled)
- Lane use arrows (graphically shown, but not labeled)
- Any other pavement marking that is important to document in the crossing order as determined by the ODOT rail crossing safety unit

See Figure 4-9 and Figure 4-10 for examples.

Figure 4-9 | Pavement Marking Plan Content Example 1

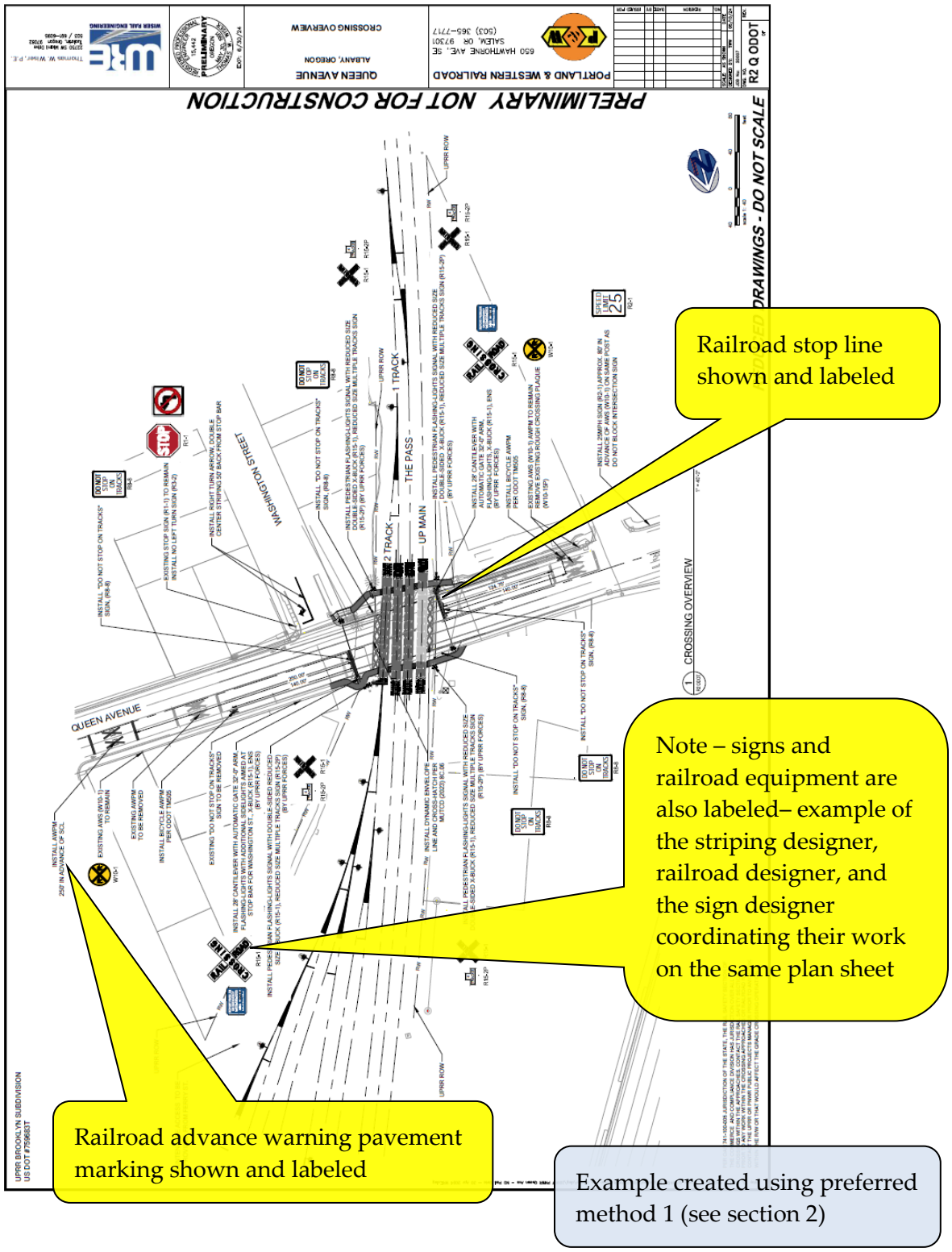
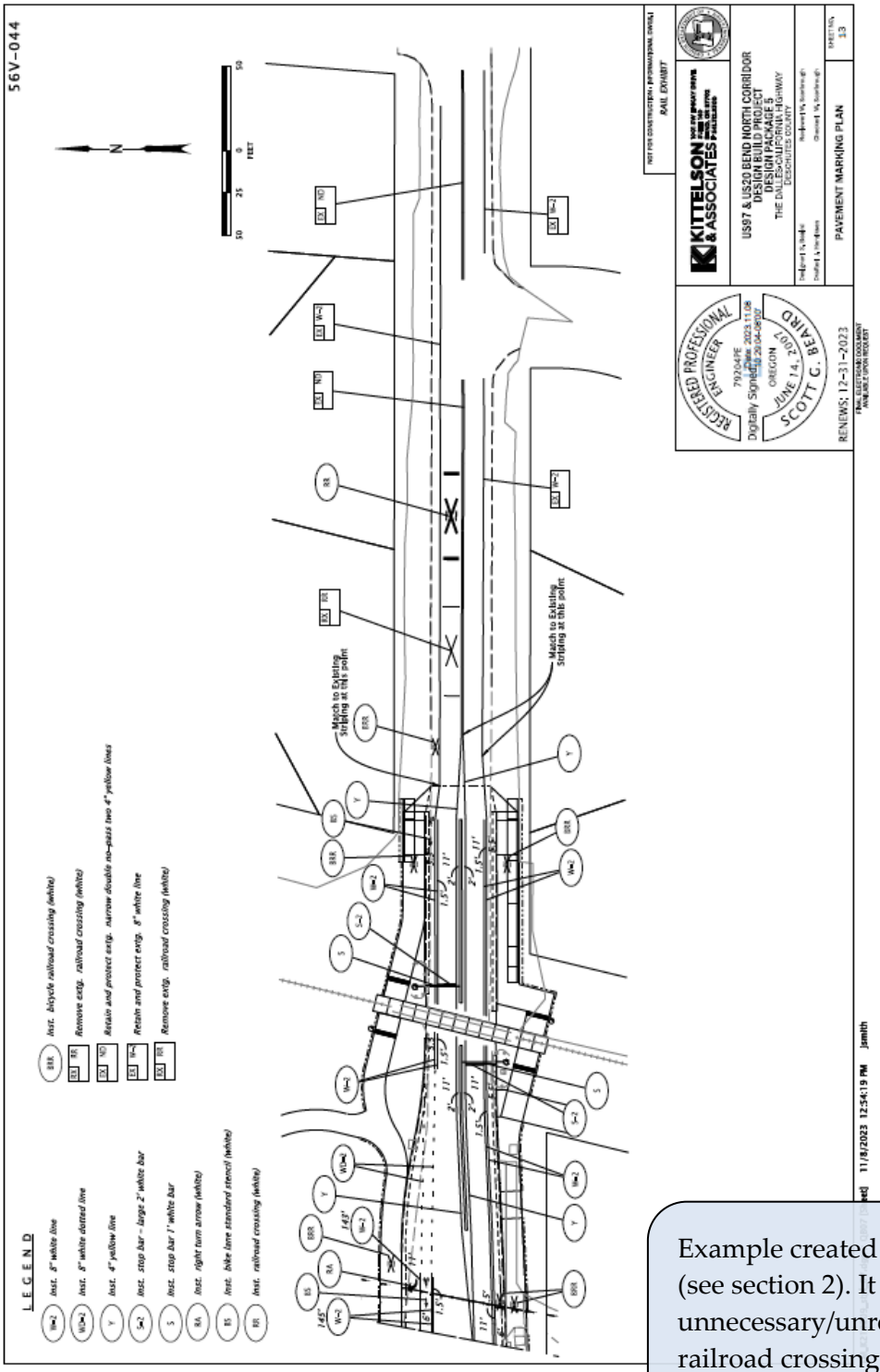


Figure 4-10 | Pavement Marking Plan Content Example 2



Example created using method 2 (see section 2). It does contain unnecessary/unrelated info to the railroad crossing that is better off being omitted or not labeled.

4.9 Railroad – Railroad Equipment Plan

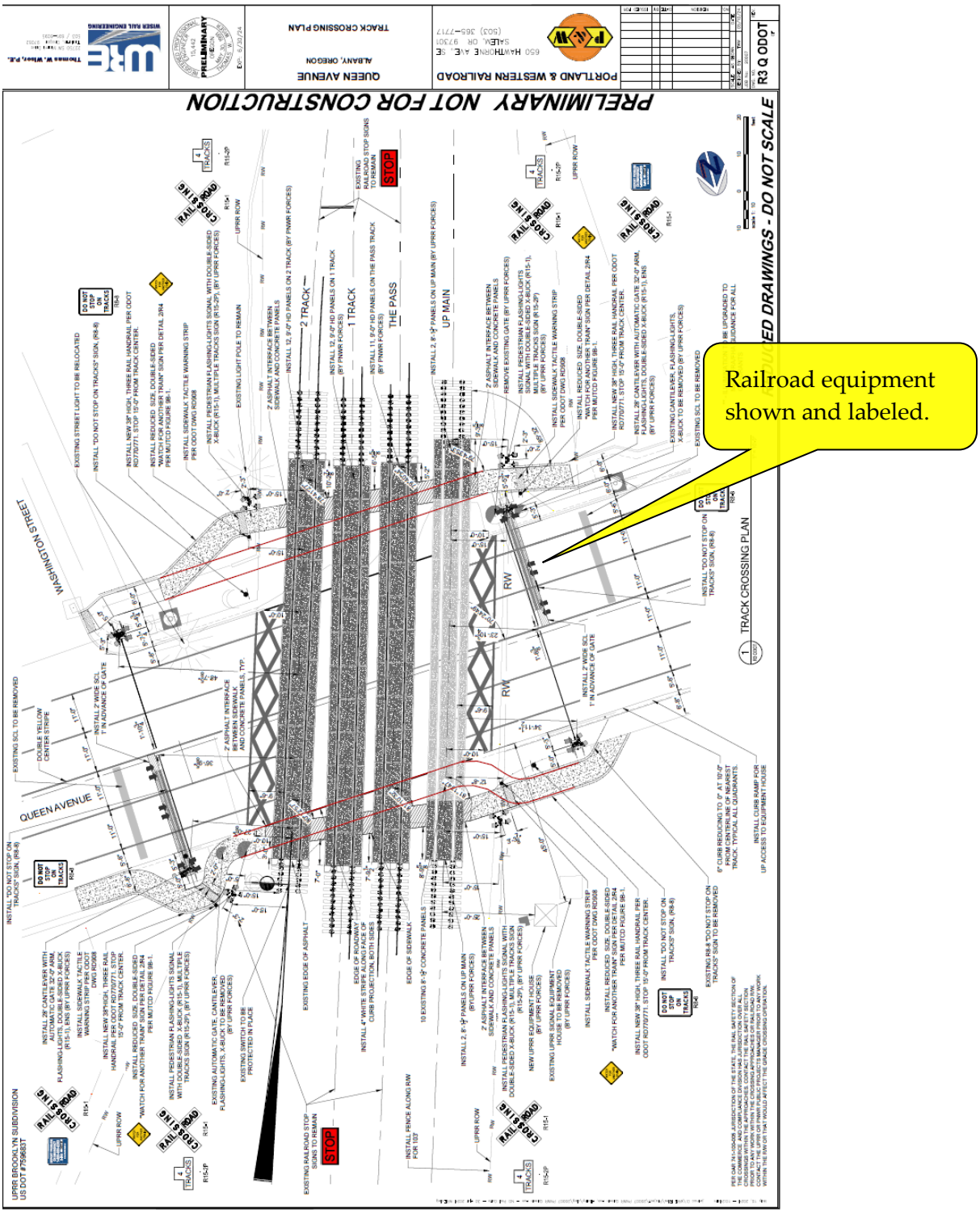
The railroad equipment on a project is typically designed by a consultant hired by the railroad owner. These design features are ordinarily furnished and installed by a separate contract and referenced as "installed by others" in the highway work contract.

The railroad equipment plan should show and label all equipment and features that will be owned or maintained by the railroad owner:

- Railroad right of way and distance from centerline of track to right-of way
- Railroad gate arms, including length (note 32 feet is typically the maximum allowed)
- Railroad flashing lights
- Railroad cantilevers
- Railroad crossbuck sign (and associated STOP, YIELD, and Emergency Notification System sign)
- Track panels
- Railroad track profiles
- Rail crossing surface type
- Label offset distances for critical features as requested

See Figure 4-11 for example.

Figure 4-11 | Railroad Equipment Plan Content Example



5 Details Plan Sheets

The details plan sheets may contain any unique items that need to be shown for each any discipline. The two examples in Figure 5-1 and Figure 5-2 show the content of a railroad equipment details plan sheet and a roadway details plan sheet.

Figure 5-1 | Railroad Equipment Details Content Example

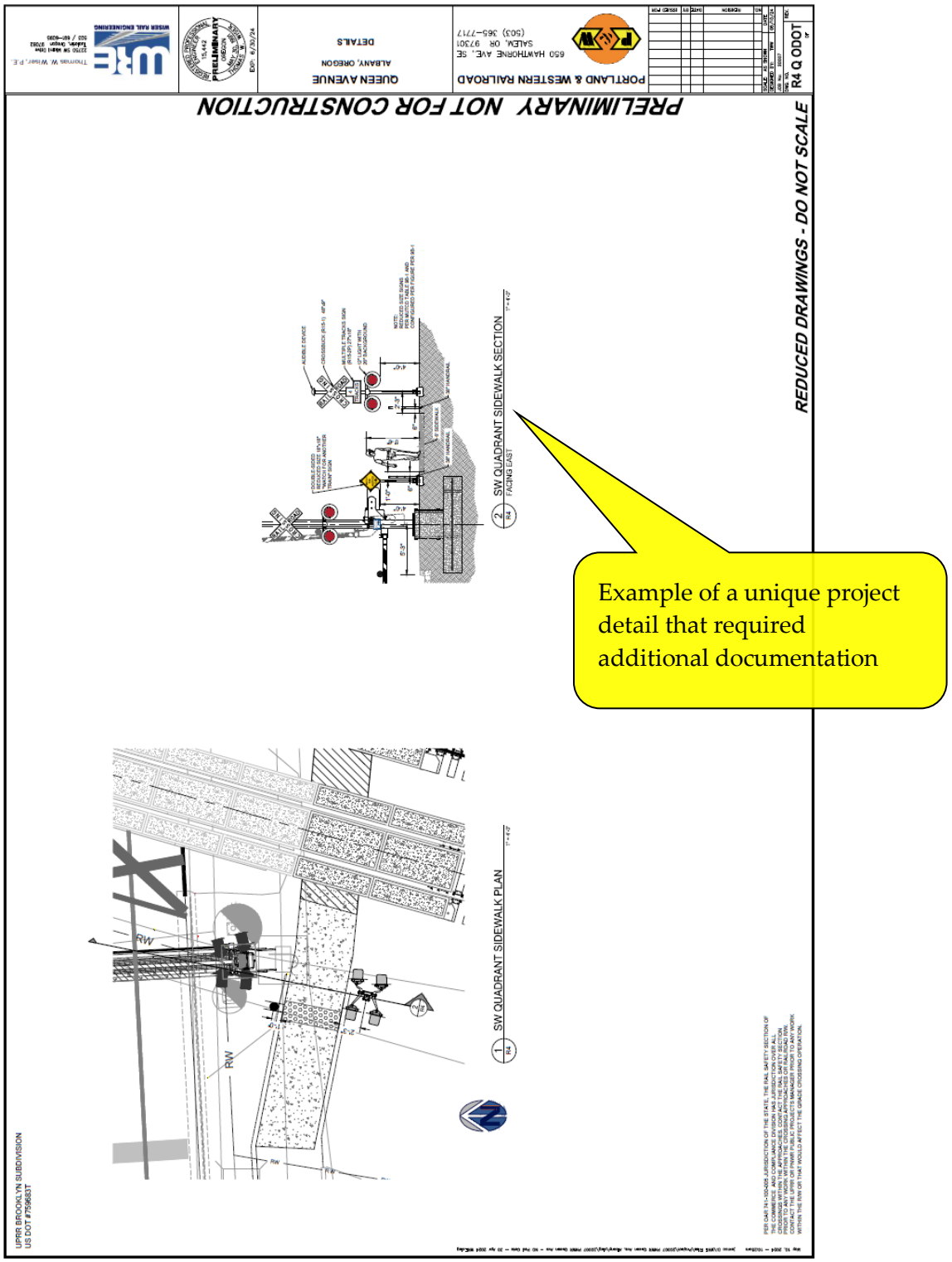


Figure 5-2 | Roadway Details Content Example