OpenRoads Designer User Manual

U.S. Department of Transportation
Federal Highway Administration

Chapter 13

DESIGN ITERATIONS

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Chapter 13 Design Iterations

The first part of this chapter provides guidance for approaching the preliminary design phase of a typical FLH project. The overall design workflow and ORD Files needed for preliminary design are discussed.

The greater part of this chapter explains consequences that result from modifying design elements (i.e., minor changes to the mainline Alignment). In each design milestone (i.e., 70%,95%, 100%), there is typically modifications to the Alignment, Profile, or Corridor. As a result, Plan Production elements (i.e., Named Boundaries) or other ancillary design elements may need to be re-created or adjusted.

TABLE OF CONTENTS

13A – Preliminary Design – Overall Workflow 13-2

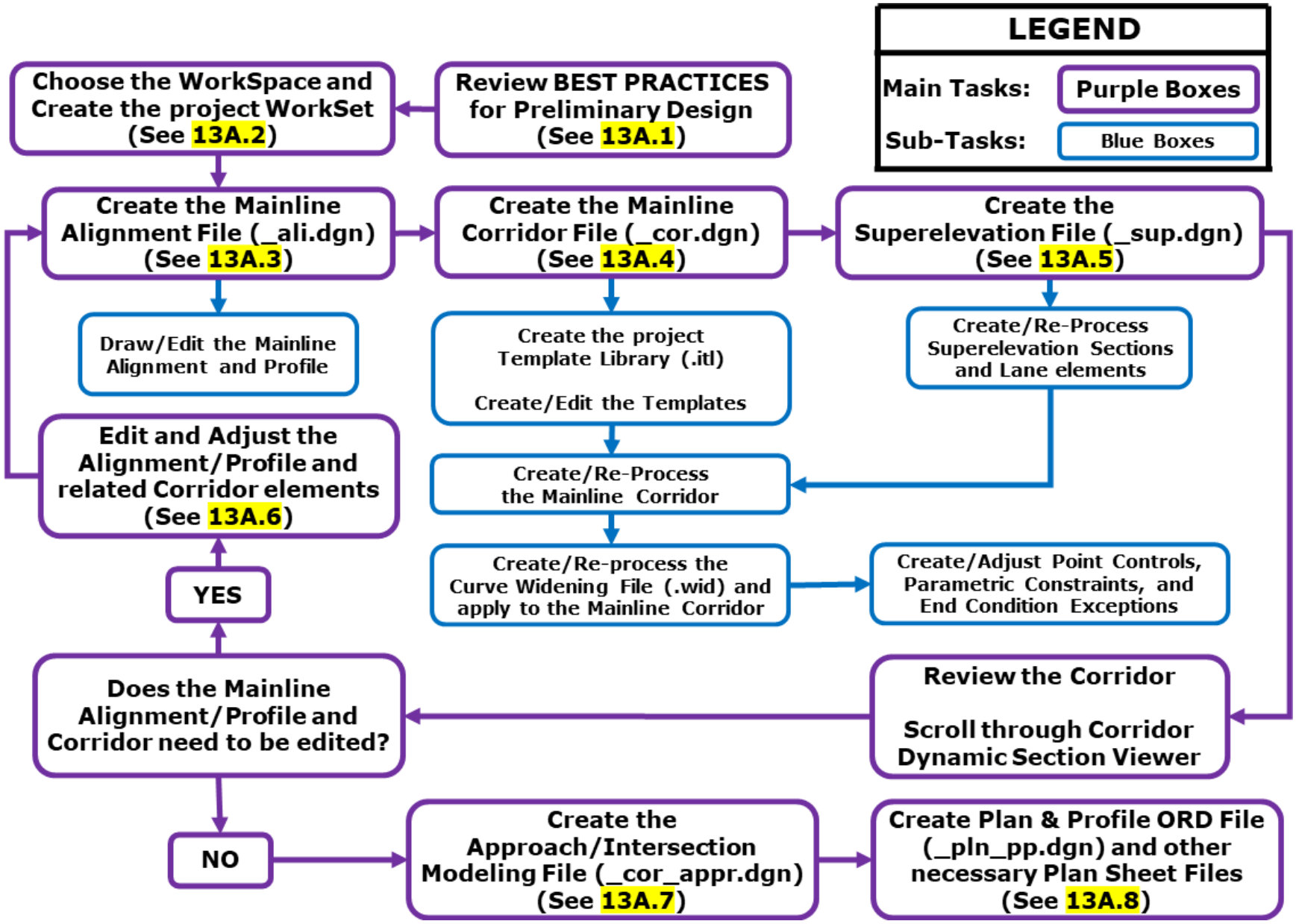
13A.1 BEST PRACTICES for Preliminary Design 13-3
13A.2 Select the FLH Workspace and create the Project WorkSet 13-3
13A.3 Mainline Alignment and Profile 13-4
13A.4 Corridor and Modeling Best Practices 13-5
13A.4.a Template Library (.itl) and Corridor Templates 13-6
13A.4.b Curve Widening 13-6
13A.4.c Corridor Objects: Point Controls, End Condition Exceptions, Parametric Constraints, and Key Stations 13-6
13A.5 Superelevation 13-7
13A.6 Effects of Modeling Iterations 13-7
13A.6.a Guardrail Shoulder Widening Example 13-8
13A.7 Approach/Intersection and Site Models 13-9
13A.8 Plan Sheet Production and Alignment/Profile Annotation Labeling 13-9
13A.9 Quantities in the Preliminary Design Phase 13-9

13B – Iterations at Design Milestones 13-10

13B.1 Overall Workflow for Addressing Design Iterations 13-11
13B.2 Approach/Intersections and Site Models 13-12
13B.3 Affects to Named Boundaries and Plan Sheets after Design Iterations 13-14
13B.3.a PLAN Named Boundary Adjustments 13-20
13B.3.b PROFILE Named Boundary Adjustments 13-25
13B.3.c CROSS SECTION Named Boundary WARNING 13-27
13B.4 Alignment and Profile Annotations after Design Iterations 13-28
13B.5 Cross Section Annotations after Design Iterations 13-28
13B.6 Quantities after Design Iterations 13-29

13A – PRELIMINARY DESIGN – OVERALL WORKFLOW

This section discusses the recommended design workflow and ORD Files needed for creating the Preliminary Plans (i.e., 30% design milestone). The flowchart below shows the recommended sequence for the modeling and plan set production for a typical FLH project.



13A.1 BEST PRACTICES for Preliminary Design

To minimize re-work, consider the following guidelines in the Preliminary Design phase:

BEST PRACTICE: Do NOT create Plan & Profile sheets until the mainline Alignment is finalized. PLAN Named Boundary elements do NOT dynamically rotate or move when the Alignment is edited. However, if the mainline Alignment is edited after sheet production, then readjust PLAN and PROFILE Named Boundaries as shown in *13B.3 Affects to Named Boundaries and Plan Sheets after Design Iterations*.

BEST PRACTICE: Do NOT re-position or edit Alignment (Stationing) or Profile annotation labels until the Alignment and Profile is finalized. If any part of the Alignment or Profile is edited, then some of the Annotation Labels will revert to the default position, which requires the re-positioning process to be repeated. Finalize the Alignment and Profile before shifting around stationing and profile annotation Labels. For more information on repositioning Annotations, see *15D.4 Reposition Alignment Annotation Labels*.

BEST PRACTICE: If required for the project, ensure that Curve Widening and Superelevation are applied to the mainline Corridor in the early stages of modeling. A common mistake is to proceed with design modeling (i.e., approach/intersection modeling) before Curve Widening and Superelevation is applied. For example, if an approach/intersection is located on a horizontal curve, then superelevation may affect the vertical position of both the mainline and approach/intersection models.

BEST PRACTICE: Do NOT place the approach/intersection models in the same Design ORD File as the mainline Corridor. Create a separate Design ORD File specifically for approach/intersection modeling. When calculating quantities, it is very difficult or impossible to separate mainline Corridor from Approach quantities if modeled in the same Design ORD File. See *Chapter 20 – Quantities*.

BEST PRACTICE: When creating the mainline Corridor Templates, start from a standard road Template in the FLH Template Library. The standard road Templates include Display Rules, which are used to eliminate the shoulder and end components of the Corridor in the vicinity of approaches, intersections and driveways. Using Display Rules to accommodate approaches is discussed in *11A.5 Use a Template containing Display Rules to Address Overlap*.

If a custom Template needs to be created for the Corridor, then program Display Rules into the Template to eliminate the shoulder/end condition components in the vicinity of approaches. See *8F.4 Mainline Road Template with Display Rules for Managing Approaches*. ***WARNING:*** Avoiding Corridor Clipping to accommodate Approaches. Clipped Corridors produces inaccurate quantities when the *Component Quantities* tool is used. Also, Corridor Clipping can only occur 5-10 times before the Corridor processing times dramatically increase.

13A.2 Select the FLH Workspace and create the Project WorkSet

When starting a new project, a new WorkSet must be created using the FLH WorkSpace. All ORD Files to be created for the project must be assigned to the appropriate project WorkSet.

Set up of the WorkSpace and WorkSets is discussed in *Chapter 2 – Project Setup*.

13A.3 Mainline Alignment and Profile

Create the Alignment ORD File. Typically, the mainline Alignment ORD File ONLY contains the Alignment/Profile elements and Alignment annotation labels (i.e., Stationing). Do NOT create the Corridor in the Alignment ORD File.

Consider the following ***BEST PRACTICES*** when creating the mainline Alignment and Profile:

BEST PRACTICE: Break Long Alignments into 2-Mile segments for optimal processing speeds. Do NOT create a single Alignment element longer than 2-miles. See *2F.2.a Alignment and Corridor Maximum Length Recommendation*.

BEST PRACTICE: Avoid beginning the Alignment or Profile with a Curve segment. Alignment and Profiles that begin with a Curve are NOT considered "PI-Based", which means the resulting Alignment/Profile may NOT contain PI grip-edit handles and CANNOT be edited with the *Table Editor* tool. Always begin Alignments and Profiles with a Line (tangent) segment. If the Alignment needs to start on a Curve, create a very small Line tangent (i.e., 0.1' length) before the beginning of the curve.

BEST PRACTICE: Immediately after creation of the Alignment and Profile, use the *Simplify Geometry* tool. In editing, Alignments and Profile behave more intuitively after they have been "Simplified". See *7C.3.b Simplify Geometry Tip*.

BEST PRACTICE: Immediately after Alignment creation, specify the start station value (i.e., 13+00.00) with the *Start Station* tool. See *7E.4.a Start Station.*

BEST PRACTICE: In the Alignment ORD File, set the Annotation Scale to match the Design Scale to be used for the Plan and Profile sheets. For example, if the plan and profile sheet is to be shown at a 100' Design Scale, change the Annotation Scale to 1"=100'. The Annotation Scale multiplier affects the text height of the stationing annotations labels. See *15A.2 Annotation Scale*.

WARNING: Typically, the Alignment and Profile will require fine-tune edits after the creation of the Corridor, Superelevation, Curve Widening, and Approach/Intersection elements. Finalizing the mainline Alignment, Profile, and Corridor is an iterative process. The rippling effects of Alignment/Profile edits are discussed in *13A.6 Effects of Modeling Iterations*. As a general rule, do NOT move on to sheet production tasks until modeling elements (i.e. Alignment, Profile, Corridor) are reviewed and finalized.

13A.4 Corridor and Modeling Best Practices

Place the mainline Corridor in its own dedicated Corridor Modeling File. Do NOT place the Alignment and Corridor in the same ORD File.

Observe the following ***BEST PRACTICES*** when creating and modifying the mainline Corridor.

WARNING: Do NOT put approach/intersection models in the Corridor Modeling File (_cor.dgn). Create a separate ORD File for modeling approaches.

BEST PRACTICE: If a Corridor requires multiple Templates, do NOT copy a Template Drop and override it - as shown in *9E.6 Edit (Override) Template Drop tool*. As a general rule, avoid editing Templates directly from the Corridor. Instead, create and edit Templates in the Template Editor. Edits made in the Template Editor are applied to the Corridor with the *Synchronize with Library* tool. See *9E.8 Synchronize with Library tool*. When approaching the 100% final submittal, overriding Templates is acceptable, but should still be approached with caution. As a general rule, keep the Corridor Templates in sync with the Template Library for as long as possible.

> ***TIP:*** In the *Corridor Objects* menu, Templates Drop sections that are NOT "synced" with the currently loaded Template Library are shown with red text. For more information, see *9E.8.a Template Synchronization in the Corridor Objects Menu*.

BEST PRACTICE: In preliminary design, avoid Single Station Cross Section edits with the *Edit Station* tool, as shown in *9F.5 Single Station Template Override (Edit Station tool)*. The Cross Section will be frozen in the overridden position even when modifications are made to the Alignment, Profile, or Template. Instead of override edits, use the *Parametric Constraints* or *End Condition Exceptions* tools to address undesirable fluctuations in the Corridor, such as a sliver fill.

> ***EXPLANATION:*** Overridden Templates and Single Station Cross Section edits are difficult to identify and decipher in later design milestones (i.e., 70%, 95%, 100%). For other Users, it may be extremely difficult to sort out and understand the custom overrides made to the design in earlier design milestones.

BEST PRACTICE: Do NOT modify the Corridor with the *Point Controls*, *Parametric Constraints*, and/or *End Condition Exceptions* tools until **Curve Widening** and **Superelevation** have been applied. Do NOT proceed to Approach/Intersection design until **Curve Widening** and **Superelevation** have been applied.

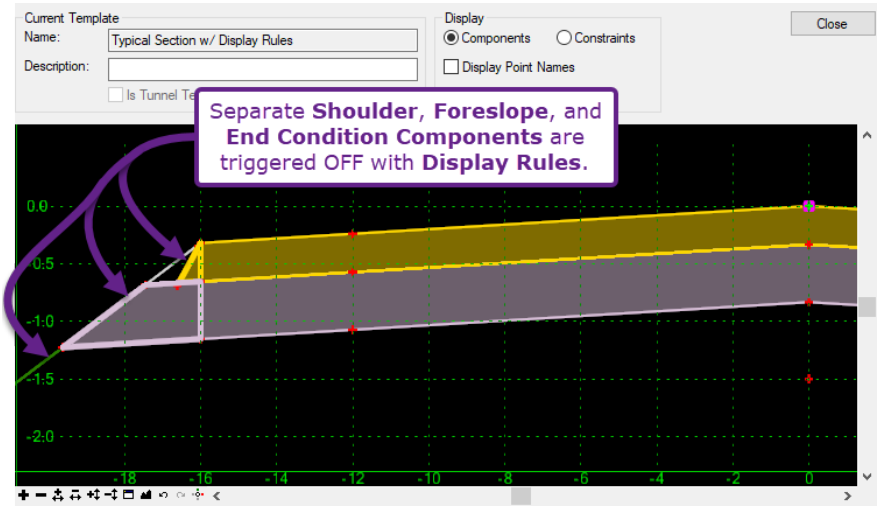
13A.4.a Template Library (.itl) and Corridor Templates

Each project should have a unique Template Library. The project Template Library stores all Corridor Templates. The project Template Library is created by copying out the FLH Template Library as shown in *2E. Create the Project Template Library*.

After the project Template Library is created, then Corridor Templates can be created. **Only make modifications to the project Template Library. Never directly edit the FLH Template Library.**

IMPORTANT: For a typical project, the mainline Corridor will need to accommodate adjacent Approach/Intersection models. When creating the mainline Corridor Templates, start from a standard road Template in the FLH Template Library. The standard road Templates include Display Rules, which are used to eliminate the shoulder and end components of the Corridor in the vicinity of approaches, intersections and driveways. Using Display Rules to accommodate approaches is discussed in *11A.5 Use a Template containing Display Rules to Address Overlap*.

If a custom Template needs to be created for the Corridor, then program Display Rules into the Template to eliminate the shoulder/end condition components in the vicinity of approaches. See *8F.4 Mainline Road Template with Display Rules for Managing Approaches*. ***WARNING:*** Avoiding Corridor Clipping to accommodate Approaches. Clipped Corridors produces inaccurate quantities when the *Component Quantities* tool is used. Also, Corridor Clipping can only occur 5-10 times before the Corridor processing times dramatically increase.



13A.4.b Curve Widening

If applicable to the project, apply Curve Widening directly after the initial creation of the mainline Corridor.

The procedure for building Curve Widening into the Corridor is shown in *9G.7 Curve Widening*.

NOTE: Curve Widening will automatically update when the Alignment is edited. This can be problematic if the stations for Curve Widening transitions were manually overridden.

13A.4.c Corridor Objects: Point Controls, End Condition Exceptions, Parametric Constraints, and Key Stations

It is recommended that the mainline Corridor is not significantly modified with Point Controls, End Condition Exceptions, and Parametric until Curve Widening and Superelevation have been applied. Usage of these tools is generally project specific or to remedy problematic areas, such as a sliver fill over a short station range.

13A.5 Superelevation

If applicable to the project, apply Superelevation directly after the initial creation of the mainline Corridor.

The process for creating Superelevation elements is shown in *Chapter 10 – Superelevation*.

13A.6 Effects of Modeling Iterations

Thoroughly review the Corridor before advancing to Approach/Intersection modeling and Sheet Production If the Horizontal Alignment or Profile needs to be edited, the following rippling affects may occur to ancillary modeling features:

Edits to the Horizontal Alignment: The Profile and Corridor-related design elements (i.e., superelevation) are directly linked to Alignment stationing values. When the Alignment is edited, stationing values ahead of the edits will be altered. To compensate for the alteration in stationing, the following design elements need to be reviewed and potentially adjusted:

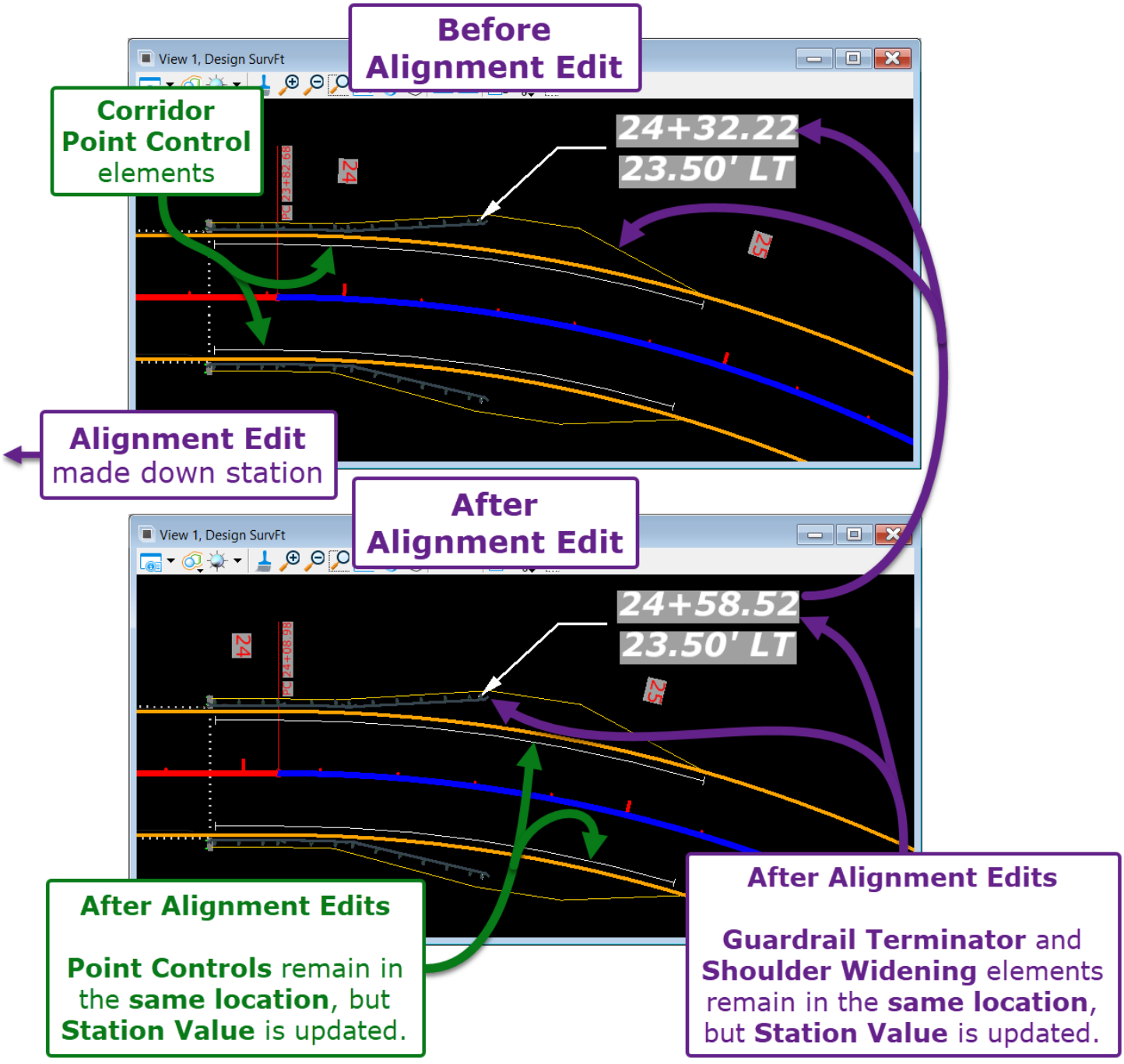
- **Profile:** Making an edit to the Alignment will affect the station values of VPIs. Ahead station Vertical Curve Length and VPI elevations are typically unaffected. However, if the edit is made in the vicinity of a Vertical Curve, the length and VPI elevation maybe automatically altered. Behavior of the Profile after an edit is made to the alignment is discussed in *7E.6 Effect of Horizontal Edits on Profile Elements*. In general, review the Profile after edits are made to the Alignment.
- **Superelevation:** If superelevation has already been applied to the Corridor, the Superelevation rates (e-values) and superelevation runoff lengths (located ahead station of the alignment edit) need to be re-calculated. This is accomplished by opening the Superelevation ORD File. Superelevation rates and runoff lengths are automatically re-calculated when the Superelevation File is opened. Next, open the Corridor File and re-process the Corridor for the re-calculated Superelevation Rates and runoff lengths to take effect.
- **Curve Widening:** After Alignment edits, Curve Widening will automatically update when the Corridor is re-processed. Curve Widening values and transition lengths are re-calculated based on criteria set in the .wid file, which is analyzed for each horizontal curve radius.
- **Template Drops:** Template Drop locations are automatically adjusted after Alignment edits. Template Drop locations ahead station of the Alignment will attempt to compensate with new stationing values. However, the resulting Template Drop locations may NOT be in the intended horizontal position. Review Template Drop locations after Alignment edits are made.
- **Corridor Objects (Key Station, Point Control, End Condition Exception, Parametric Constraints):** Corridor Objects used to manipulate the Corridor are initially set by station value. After an Alignment edit, the station value will compensate and keep the Corridor Object in the intended location. Corridor Objects located ahead station of the Alignment Edit will contain a different, compensated, station value – but should be located in the exact, original location. See **Guardrail Shoulder Widening Example** on the next page.
- **PLAN, PROFILE, and CROSS SECTION Sheet Models** : For affects to Sheet Production elements after edits to the Alignment/Profile, see *13B.3 Affects to Named Boundaries and Plan Sheets after Design Iterations*.

Edits to the Profile: Edits made ONLY to the Profile are less consequentially than edits to the Alignment. Edits made ONLY to the Profile do NOT affect horizontal stationing, so stationing dependent features (i.e., Superelevation, Curve Widening, Template Drops, etc.) are unaffected. After editing Profile, it is necessary to review the Corridor cross-sections in the vicinity of the Profile edits.

13A.6.a Guardrail Shoulder Widening Example

The graphic below shows how Guardrail Shoulder Widening elements are affected after a down-station Alignment edit. The **Corridor Point Controls** (which is considered a Corridor Object), remains in the same location, but the station is updated to reflect the down station Alignment Edits.

The **Shoulder Elements** also remain the original location. As seeing by the station callout below, the **Guardrail Terminator** stays in the same relative position, but the station value is updated.



13A.7 Approach/Intersection and Site Models

Do not create Approach/Intersection and Site Models (such as parking lots) until the mainline Alignment, Profile, and Corridor has been finalized should Approach/Intersection Models be created.

The procedure for creating approach models is shown in *11D - Driveway Approach with Culvert – Workflow.*

Keep the following ***BEST PRACTICES*** in mind when modeling Intersection and Approaches.

BEST PRACTICE: Do NOT place Approach/Intersection Models in the Corridor ORD File. Create a separate Design ORD File for the creation of Approach/Intersection Models.

BEST PRACTICE: Do NOT clip the Corridor with the *Add Clipping Reference* tool. Other options for clipping the Corridor is discussed in *11A.5 Overlap Between Corridor and Site Modeling Features*.

13A.8 Plan Sheet Production and Alignment/Profile Annotation Labeling

It is recommended that Plan Sheet Production does NOT occur until modeling is complete, for the following reasons:

- PLAN *Named Boundary* elements do NOT dynamically rotate or move when the Alignment is edited. However, if the mainline Alignment is edited after *Named Boundary* elements are created, then readjustment is possible. See *13B.3 Affects to Named Boundaries and Plan Sheets after Design Iterations*.
- If any part of the Alignment or Profile is edited, then some Alignment (Stationing) and Profile Annotation Labels will be re-created and placed in the default position. For more information, see *15D.4 Reposition Alignment Annotation Labels*.

13A.9 Quantities in the Preliminary Design Phase

The calculations of quantities are discussed in *20 – Quantities*. Changes to the proposed model has the following affects to quantity calculations:

- ***WARNING:*** **Delete and re-create Cut and Fill Meshes -** Cut and Fill Meshes are needed to calculate earthwork with the *Quantities Report By Named Boundary* workflow (*20C – Quantity Report Workflow for Roadway with Approaches*). Cut and Fill Meshes are static and do NOT update when changes to the proposed model are made. **Delete old Cut/Fill Meshes before creating new ones**. See *20B.3 Warning Re-creating Cut and Fill Meshes*.
- **Average Area End Method Earthwork Calculations** – If the Alignment is edited, then this entire process has to be re-done. If the alignment is edited, then CROSS SECTION *Named Boundaries* will be located at uneven stations. See *13B.3.c CROSS SECTION Named Boundary WARNING*.

  If a portion of the proposed model is edited, but the Alignment is NOT moved/edited, then the CROSS SECTION *Named Boundaries* can be salvaged. However, the Cut and Fill Meshes used to calculate earthwork must be deleted and re-created. See *20B.3 Warning Re-creating Cut and Fill Meshes*.

13B – ITERATIONS AT DESIGN MILESTONES

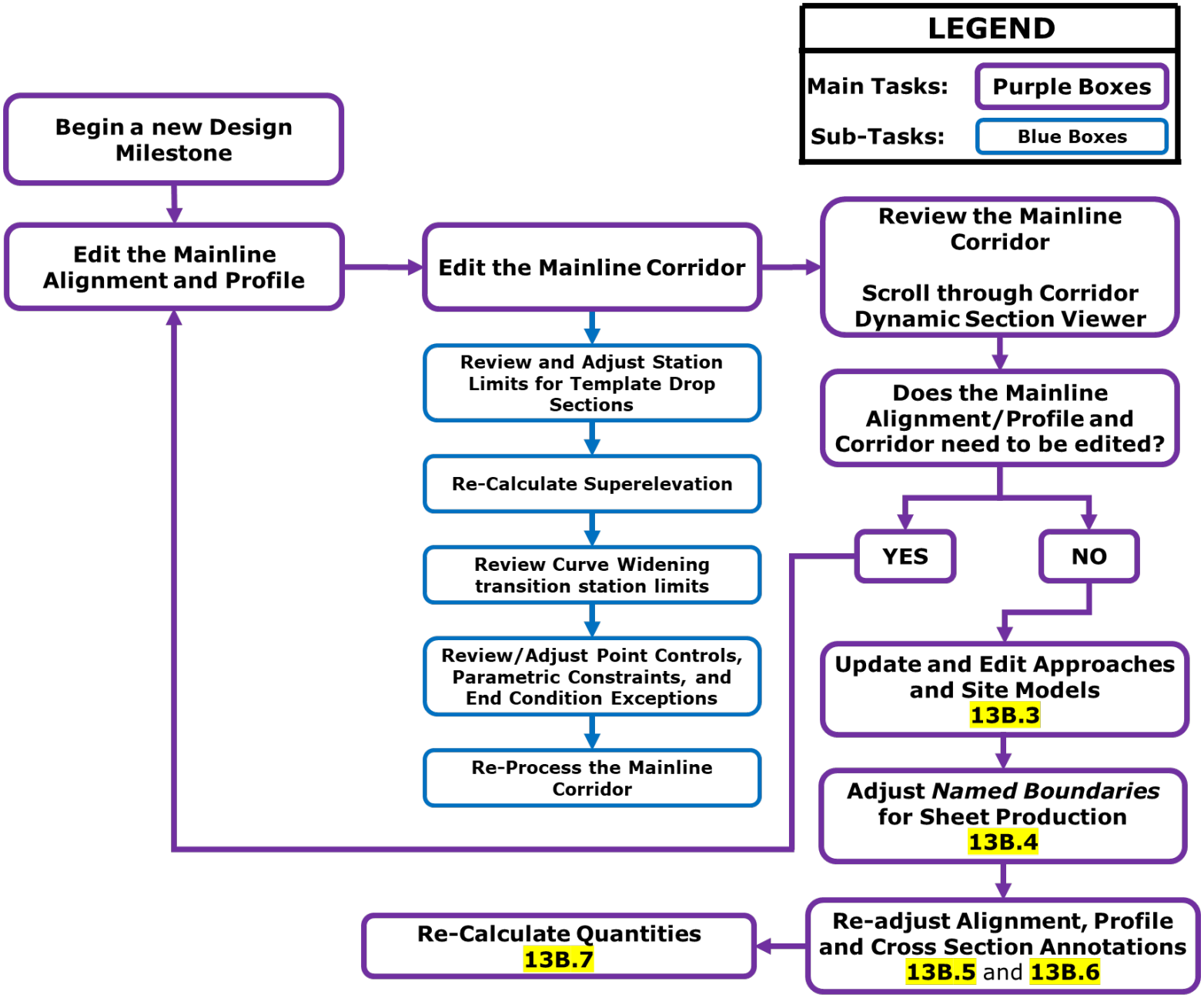
This section details the cause-and-effect relationships resulting from edits to a design. This section provides insights for the level of effort necessary to advance a design to the next milestone (i.e., 70%, 95%, 100%) after edits have been made to the Alignment, Profile, and Corridor.

When beginning a new design milestone, the first and most important task is editing and finalizing the mainline Alignment, Profile, and Corridor. Most design and plan sheet production elements directly depend on the mainline Alignment stationing.

EXPLANATION: When the Alignment is edited, internal stationing values in the vicinity and ahead of the edits will be altered. Therefore, editing and finalizing the mainline Alignment and Corridor should take priority before editing site design elements and plan sheet production elements.

13B.1 Overall Workflow for Addressing Design Iterations

When beginning a new design milestone, the recommended sequence for adjusting model and plan sheets is as follows:



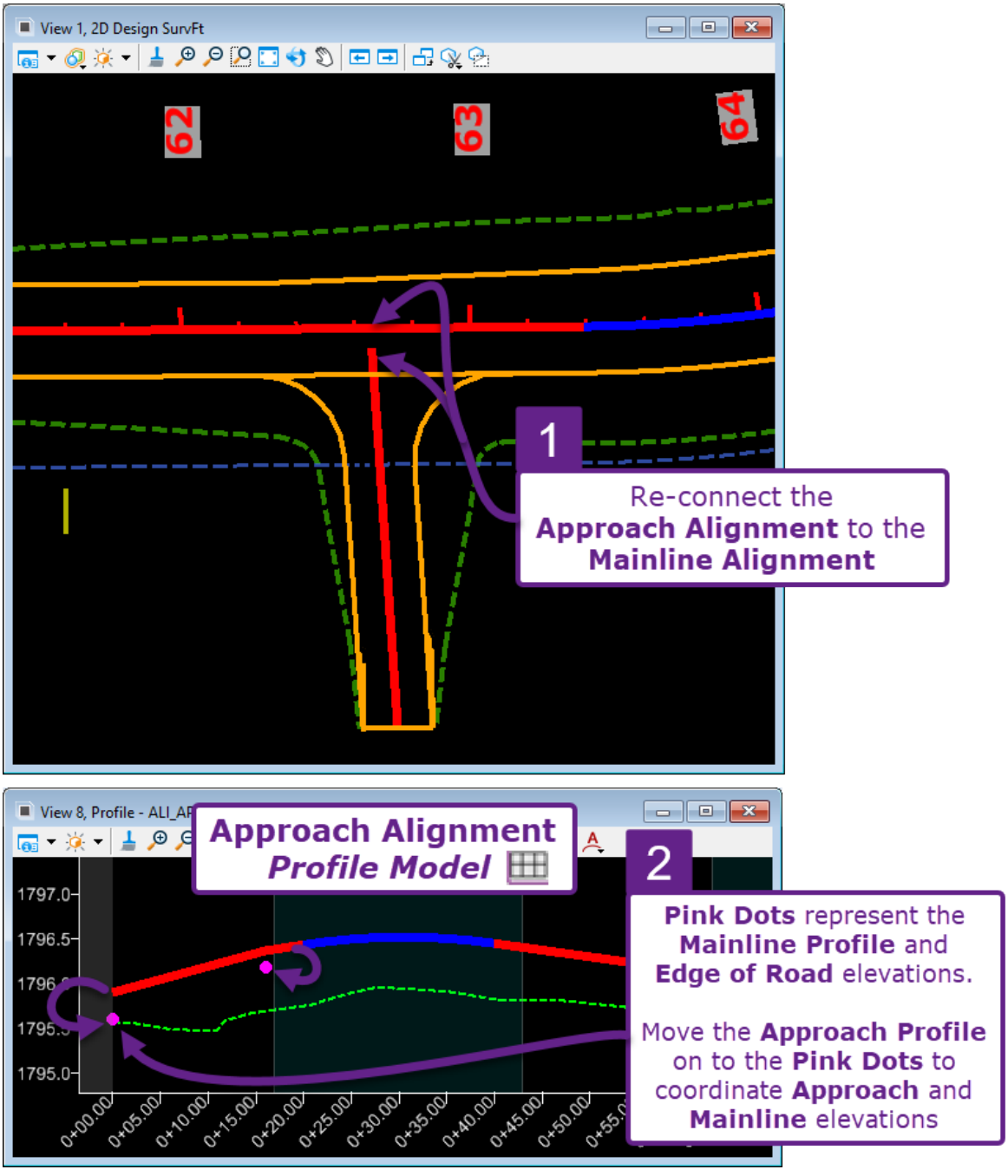
IMPORTANT: Edits to the Alignment, Profile, and Corridor affects ancillary modeling features and *Sheet Models*. See *13A.6 Effects of Modeling Iterations* and *13B.3 Affects to Named Boundaries and Plan Sheets*.

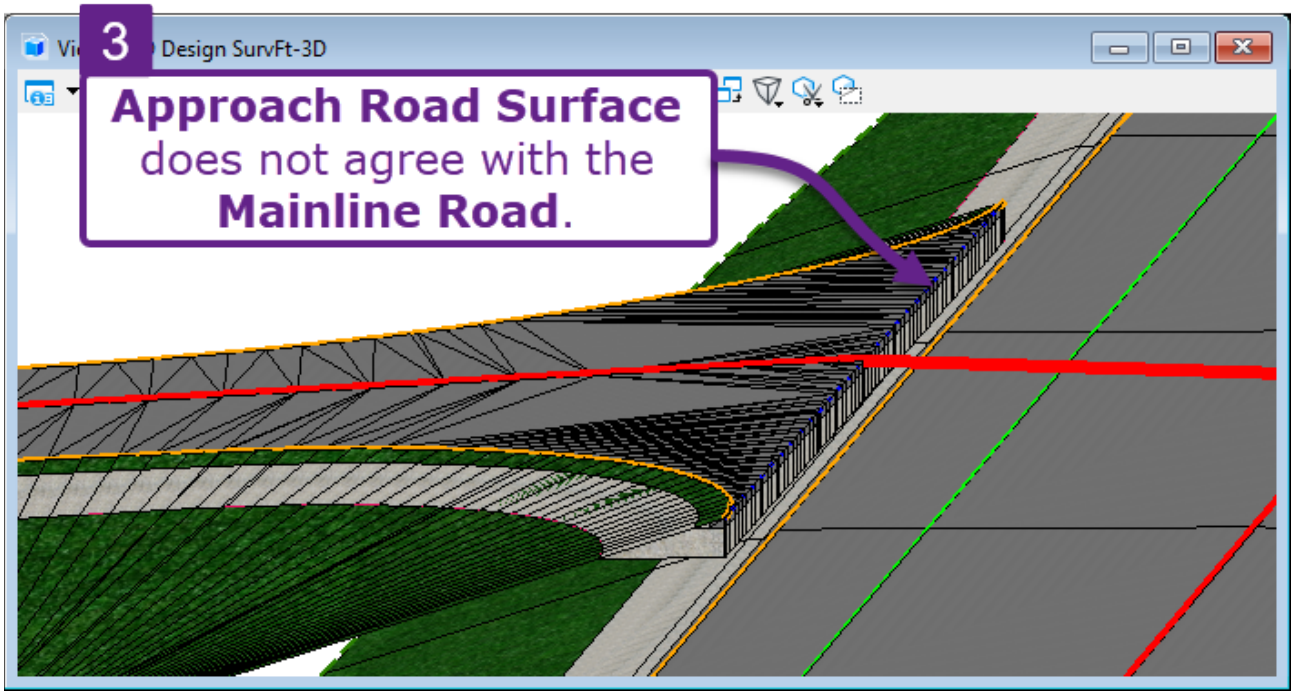
13B.2 Approach/Intersections and Site Models

Site design models – such as approaches, intersections, parking lots, bridges, and other structural models should NOT be rectified or re-created until mainline Corridor is finalized. Typically, site design models require precise coordination with the mainline Alignment and Corridor.

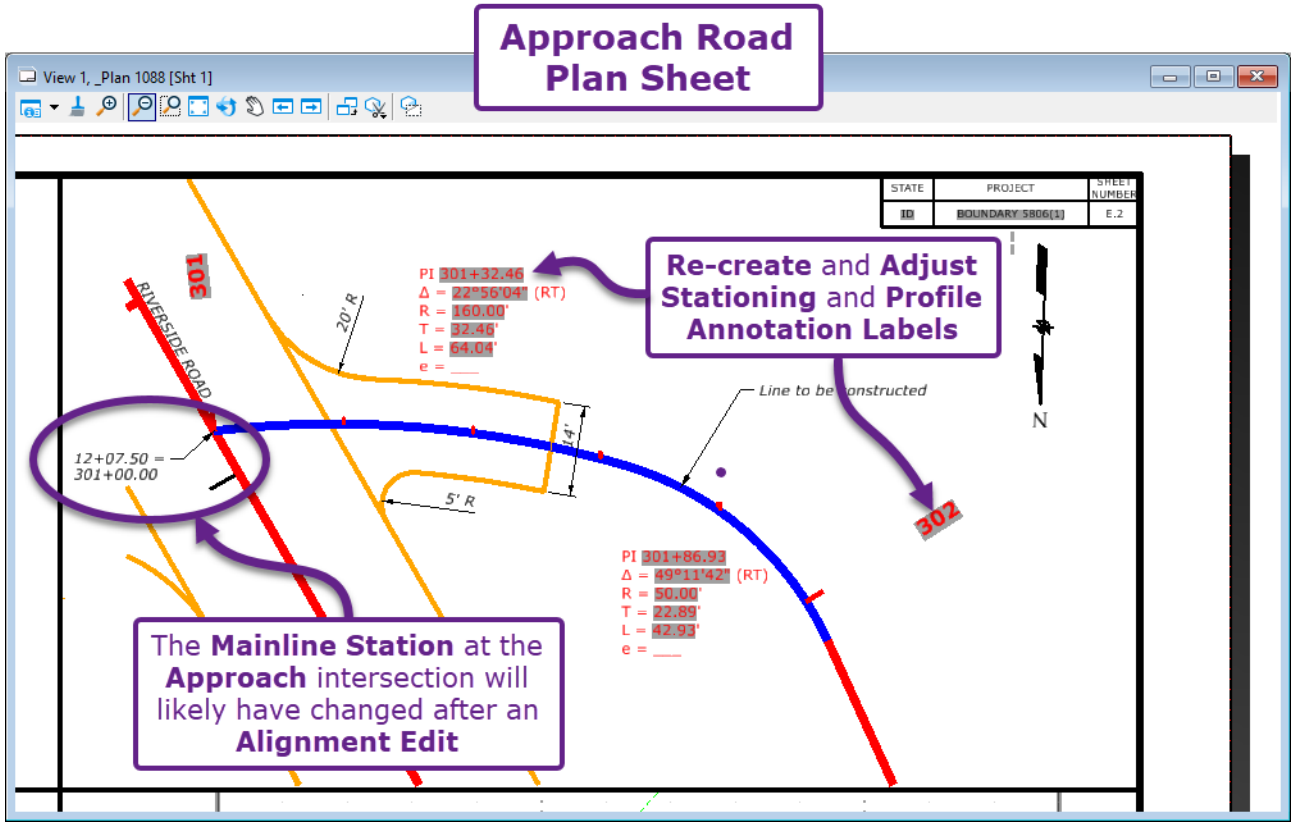
In the example of an approach, make the following checks after edits to the mainline Alignment and Corridor.

1	Ensure that Approach Alignment intersects with the Mainline Alignment.
2	Check the *Profile Model* of the Approach Alignment to ensure that Approach Profile is drawn in coordination with the Mainline Profile and Corridor elevations.





3	Ensure that horizontal and vertical positions of the edge-of-approach linework aligns with the Mainline. Edit the elevations of the Approach linework as needed to agree with the edited Mainline Corridor.
4	Update the Approach Plan and Profile Annotation Labels and Sheets as necessary. For example, the Mainline Station of the Approach may have changed.

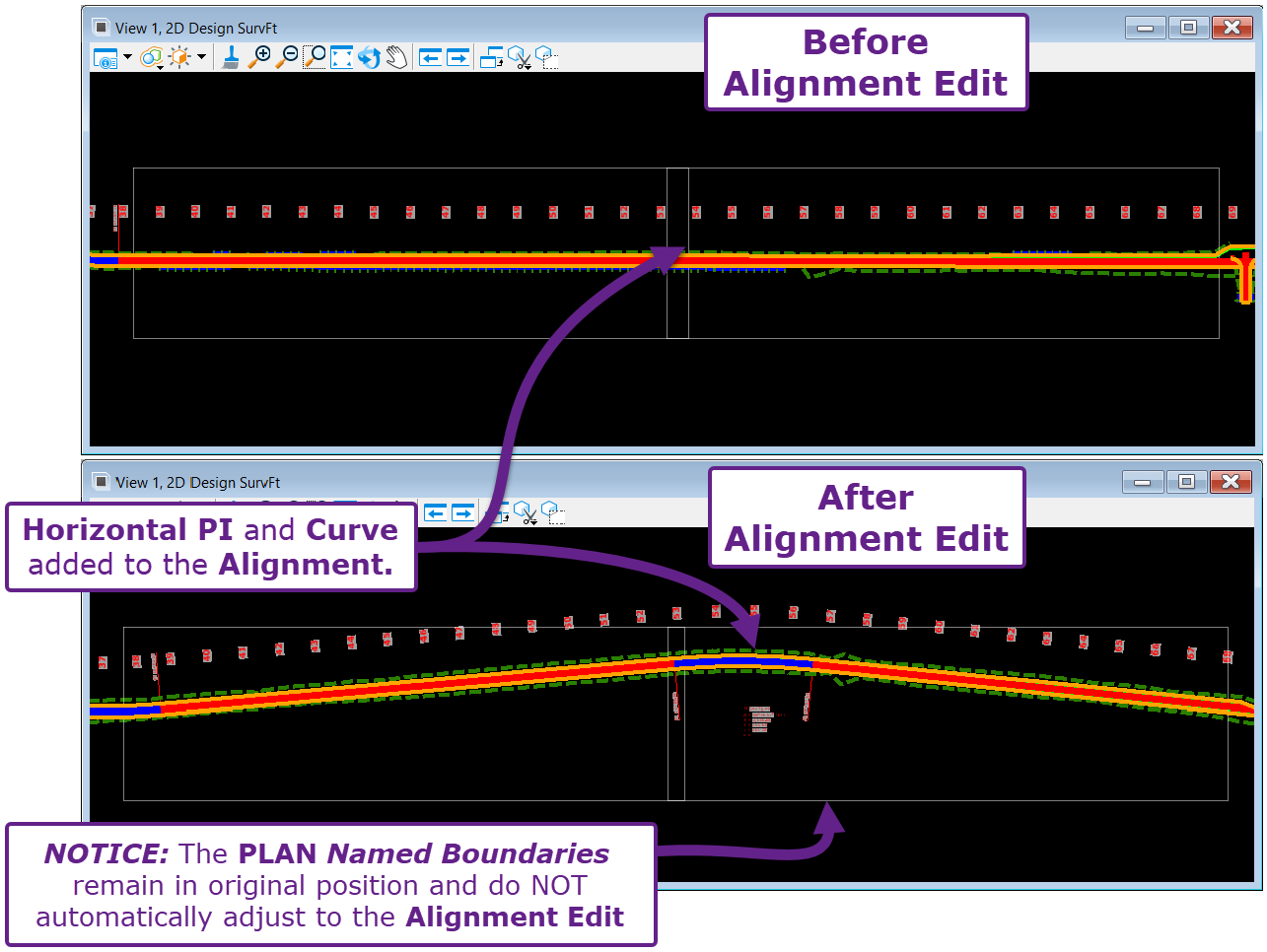


13B.3 Affects to Named Boundaries and Plan Sheets after Design Iterations

After edits are made to the Alignment/Profile, adjustments to the PLAN and PROFILE *Named Boundaries* may be necessary to salvage Plan and Profile sheets.

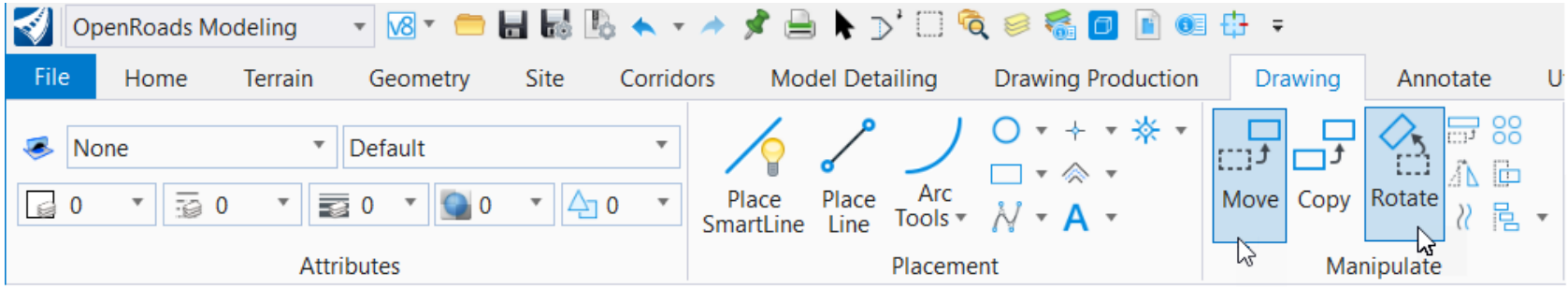
> ***WARNING:*** If major realignment edits are made to the Alignment, then it may be easier to re-create PLAN and PROFILE *Named Boundaries*. The procedures shown below are intended for relatively minor edits to the Alignment.

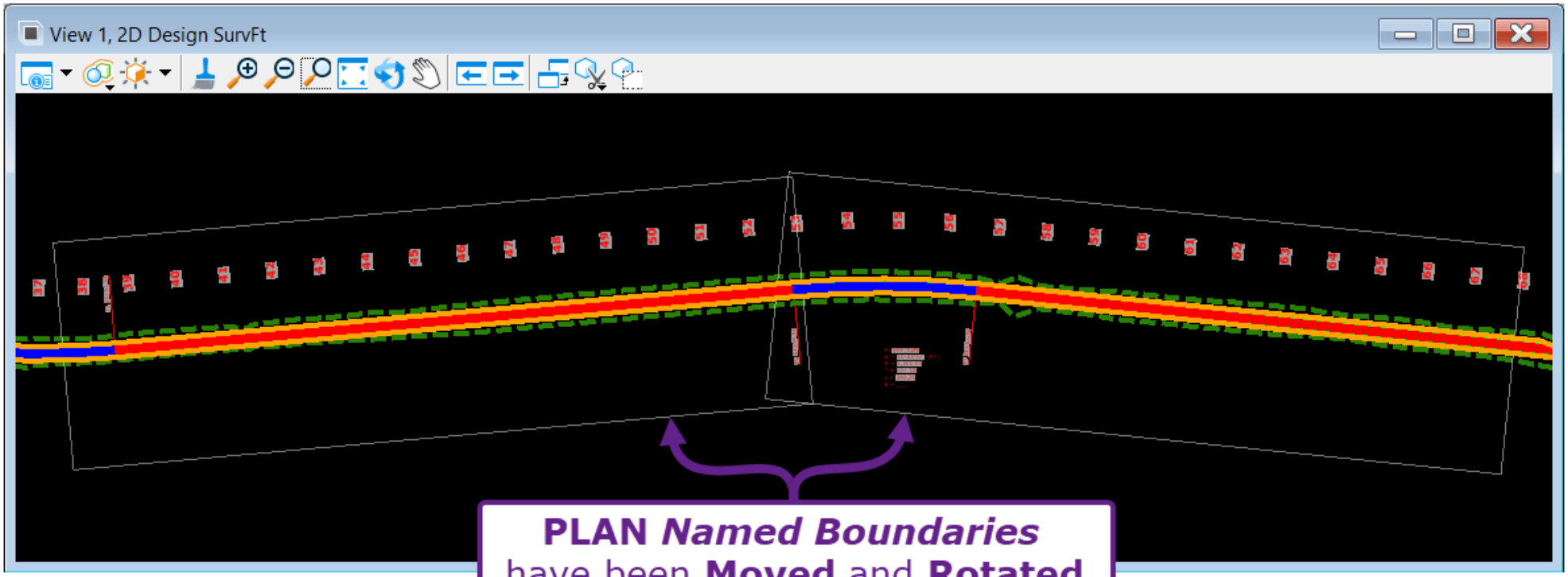
PLAN *Named Boundaries* do NOT automatically re-position after changes are made to the Alignment. However, the User can manually **Move** and **Rotate** the PLAN *Named Boundaries* to the appropriate locations along the edited Alignment. A detailed workflow for this process is shown in *13B.3.a PLAN Named Boundary Adjustments*.



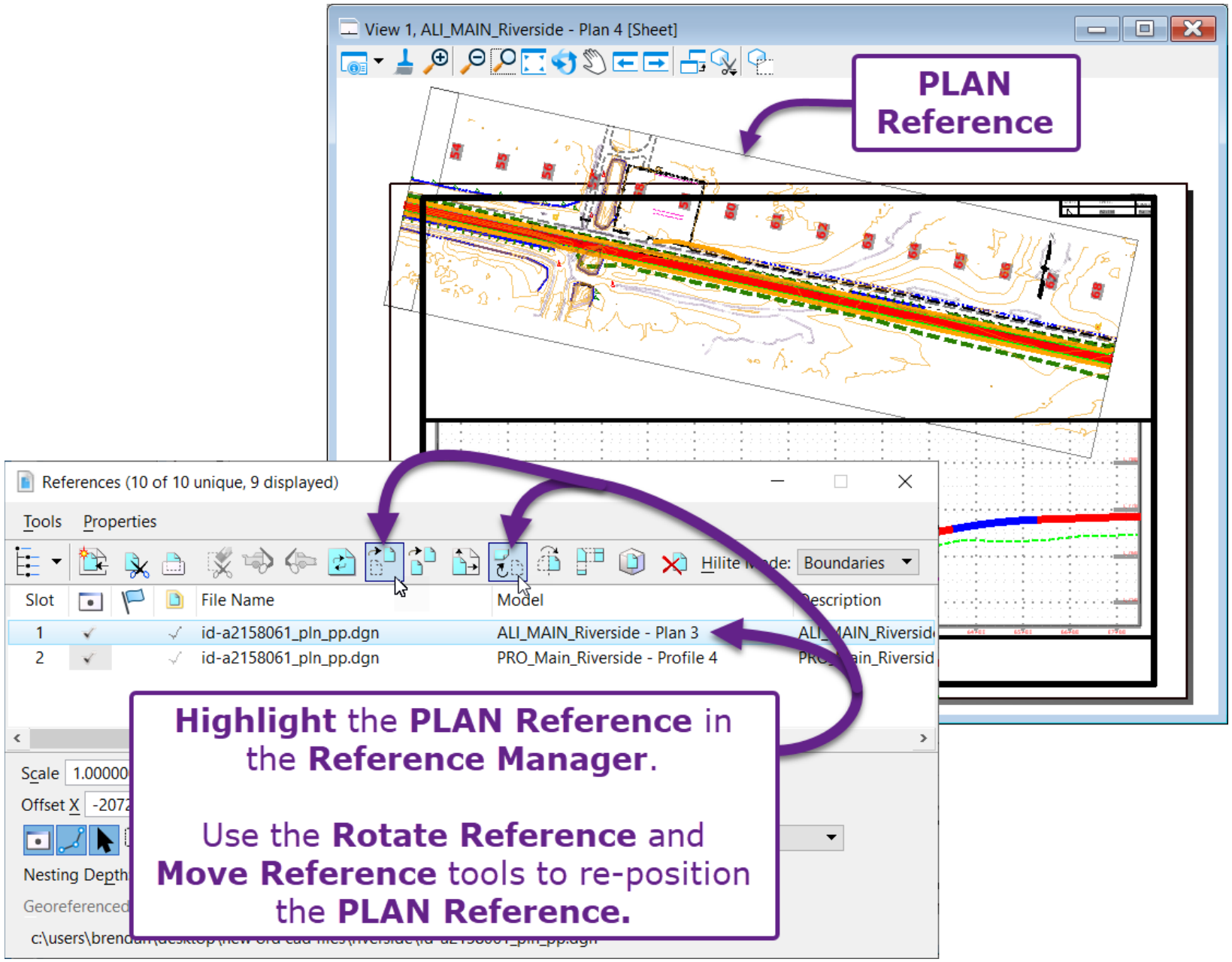
Using the *Move* and *Rotate* tools, the PLAN *Named Boundary* elements can be re-positioned around the edited Alignment.

IMPORTANT: After moving and rotating the PLAN *Named Boundaries*, there may be adjustments needed in the corresponding *Sheet Models*. When **ROTATING** a PLAN *Named Boundary*, the PLAN reference in the *Sheet Model* needs to be rotated to match. See the next page. **MOVING** a PLAN *Named Boundary* requires no adjustment in the *Sheet Model*.





As shown below, after **rotating** a PLAN *Named Boundary*, the PLAN reference in the *Sheet Model* becomes unoriented with the Sheet Border. This is rectified by rotating and moving the PLAN reference with the *Rotate Reference* and *Move Reference* tools found in the Reference Manager. Moving and Rotating is shown in detail in *14E.1 Rotate and Move Plan Views*.

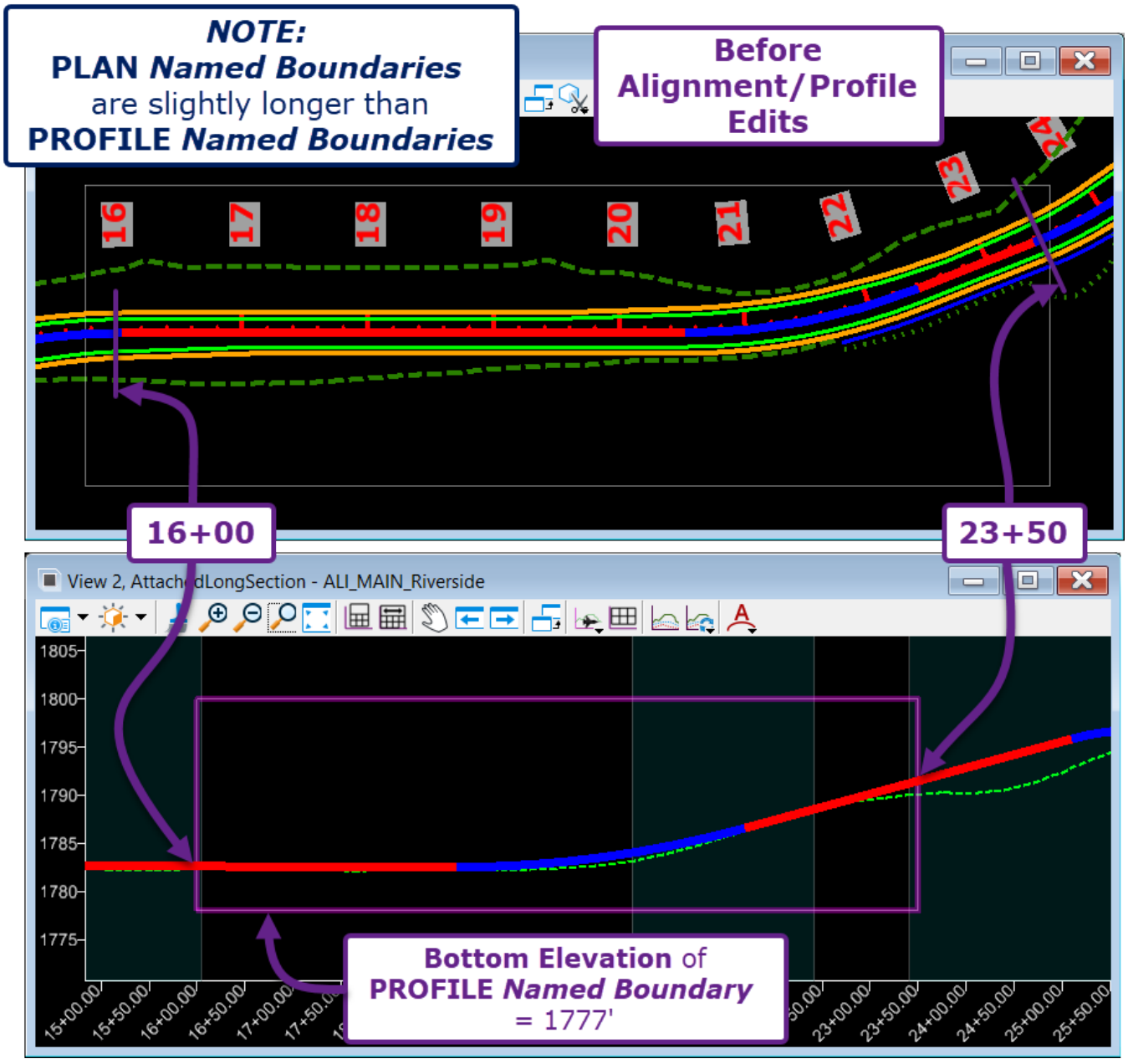


PROFILE *Named Boundaries* behave differently than PLAN *Named Boundaries*. The Profile and Existing Ground linework automatically re-positions as expected and the PROFILE *Named Boundaries* remain attached to the original station limits, which are typically even, round values (i.e., STA 13+00 to 15+50).

TIP: Since PROFILE *Named Boundaries* remain attached to the original station limit, it is typically unnecessary to adjust them.

WARNING: The station limits of a PROFILE *Named Boundary* CANNOT be modified. In other words, PROFILE *Named Boundaries* CANNOT be moved horizontally in the *Profile Model* or lengthened. DO NOT use the *Move* tool or perform grip-edits to PROFILE *Named Boundaries* (as might be done with PLAN *Named Boundaries*). The Profile Grid will NOT adjust when these methods are used. ONLY the *Adjust Named Boundary* tool can be used to modify PROFILE *Named Boundaries*. A detailed workflow for adjustments with this tool is shown in *13B.3.b PROFILE Named Boundary Adjustments*.

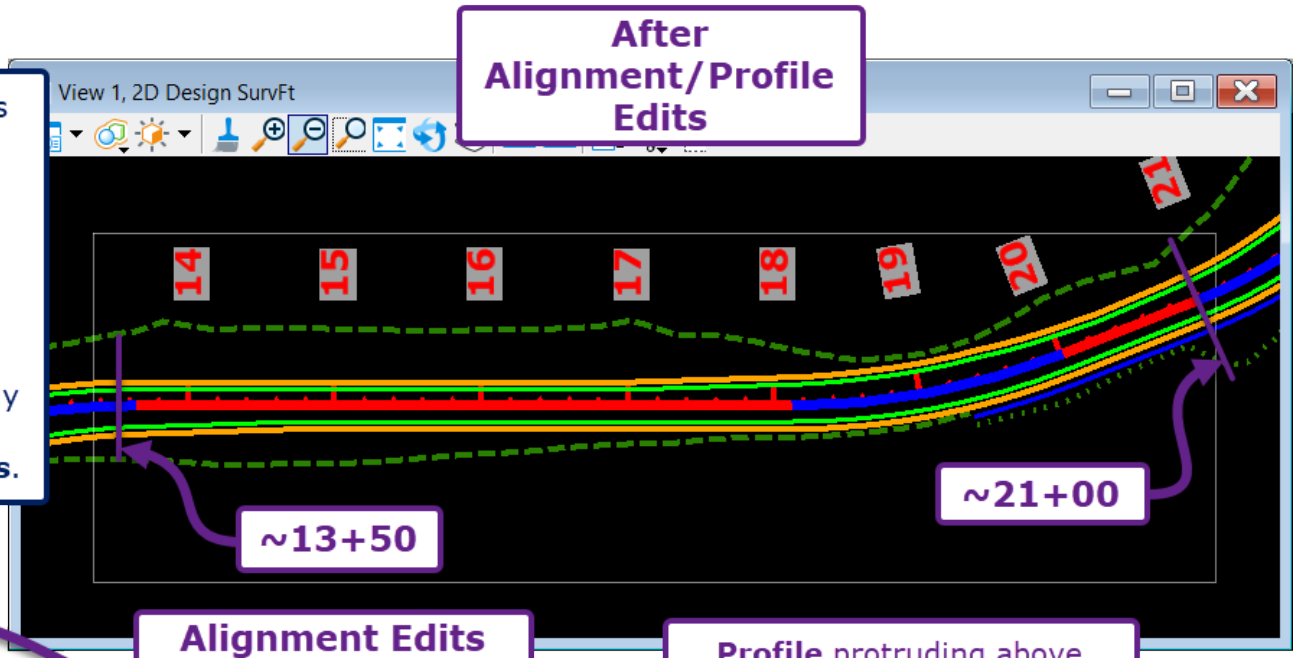
To demonstrate the mechanics of PROFILE *Named Boundary* elements, a major Alignment/Profile edits is made back station of the PLAN/PROFILE *Named Boundaries* elements shown below.



NOTICE: The **PLAN *Named Boundary*** does NOT re-position after the edit.

However, the **Alignment Stationing** has changed and does NOT agree with the **PROFILE *Named Boundary***.

To salvage the Plan and Profile sheets, **PLAN *Named Boundaries*** must be manually re-positioned to align with the **PROFILE *Named Boundary* Station Limits**.



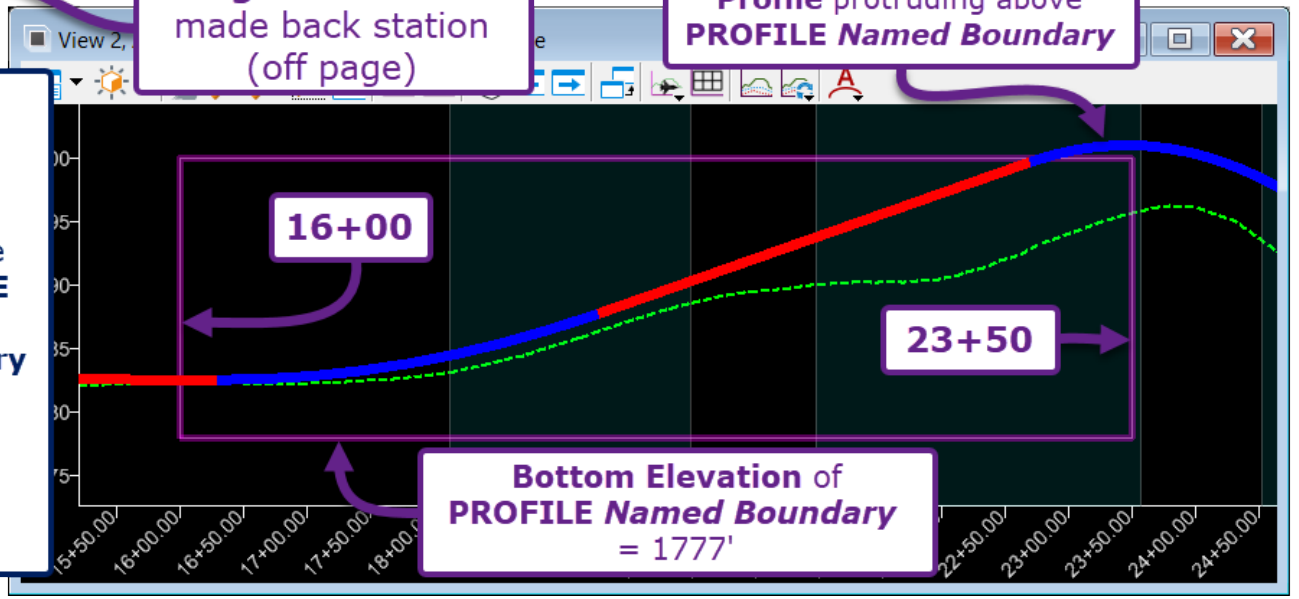
Alignment Edits made back station (off page)

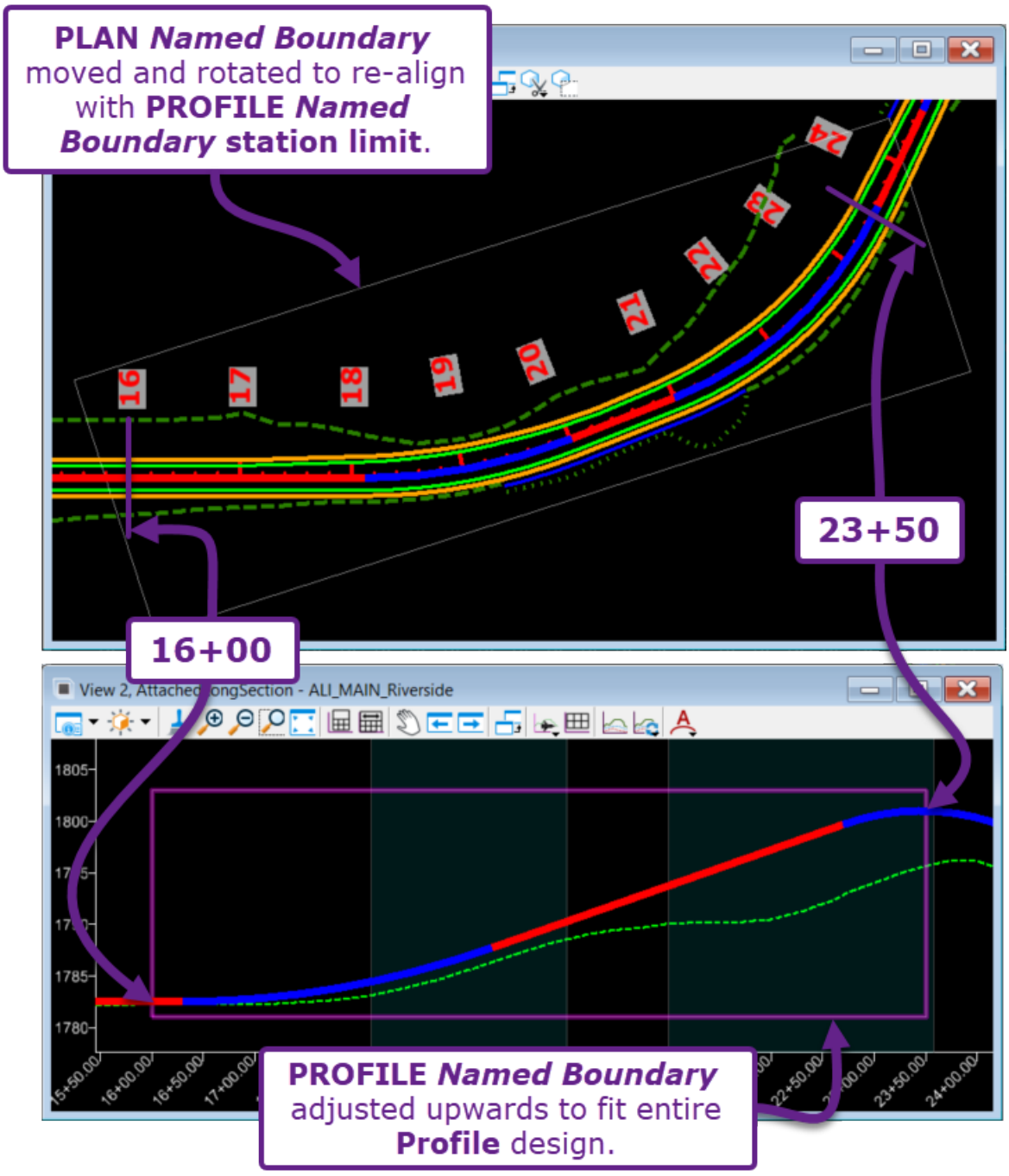
Profile protruding above **PROFILE *Named Boundary***

NOTICE: The **Station Limits** and **Bottom Elevation** of the **PROFILE *Named Boundary*** is the same after the edit.

However, the **Profile** is protruding above the **PROFILE *Named Boundary***. The **PROFILE *Named Boundary*** can be shifted up and down using **Adjust Profile Named Boundary** tool.

WARNING: The **Station Limits** of a **PROFILE *Named Boundary* CANNOT** be modified.



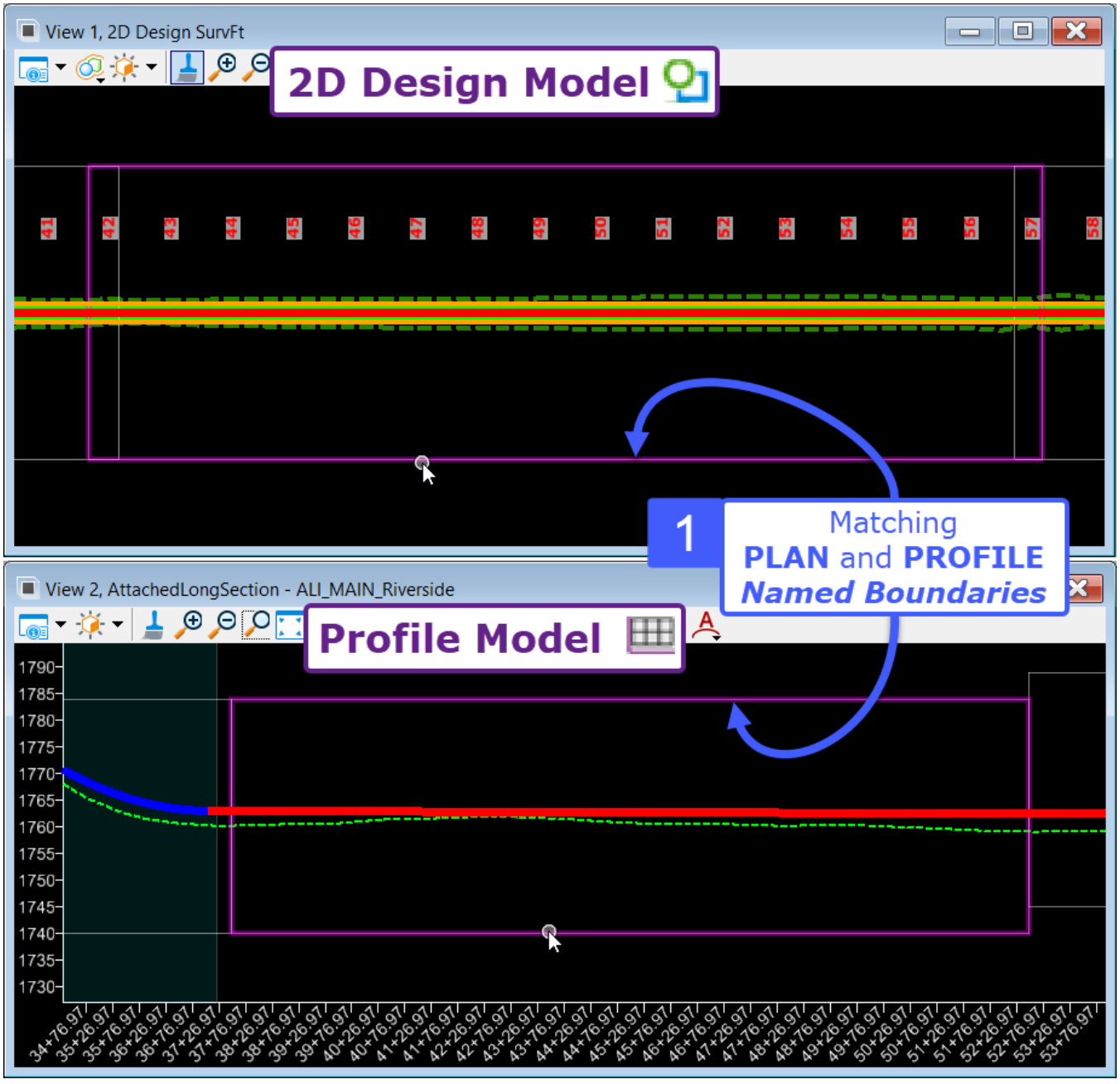

PLAN *Named Boundary* moved and rotated to re-align with **PROFILE *Named Boundary* station limit**.
16
17
18
19
20
21
22
23
24
23+50
16+00
View 2, Attached LongSection - ALI_MAIN_Riverside
1805
1800
1785
1780
PROFILE *Named Boundary* adjusted upwards to fit entire **Profile** design.

13B.3.a PLAN Named Boundary Adjustments

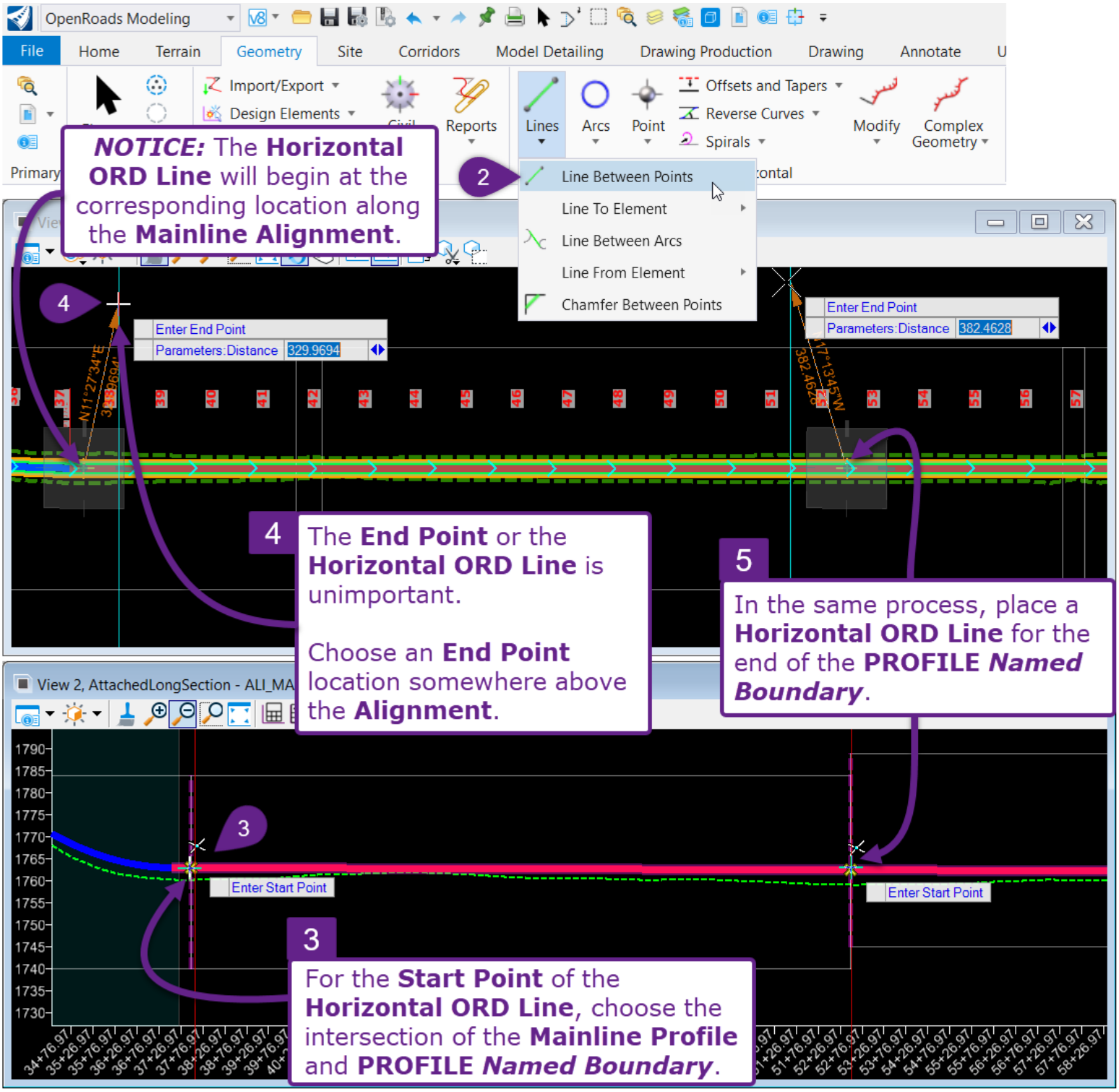
When the mainline Alignment is edited, PLAN *Named Boundaries* do NOT automatically adjust position. However, they can be manually moved or rotated match the edited Alignment.

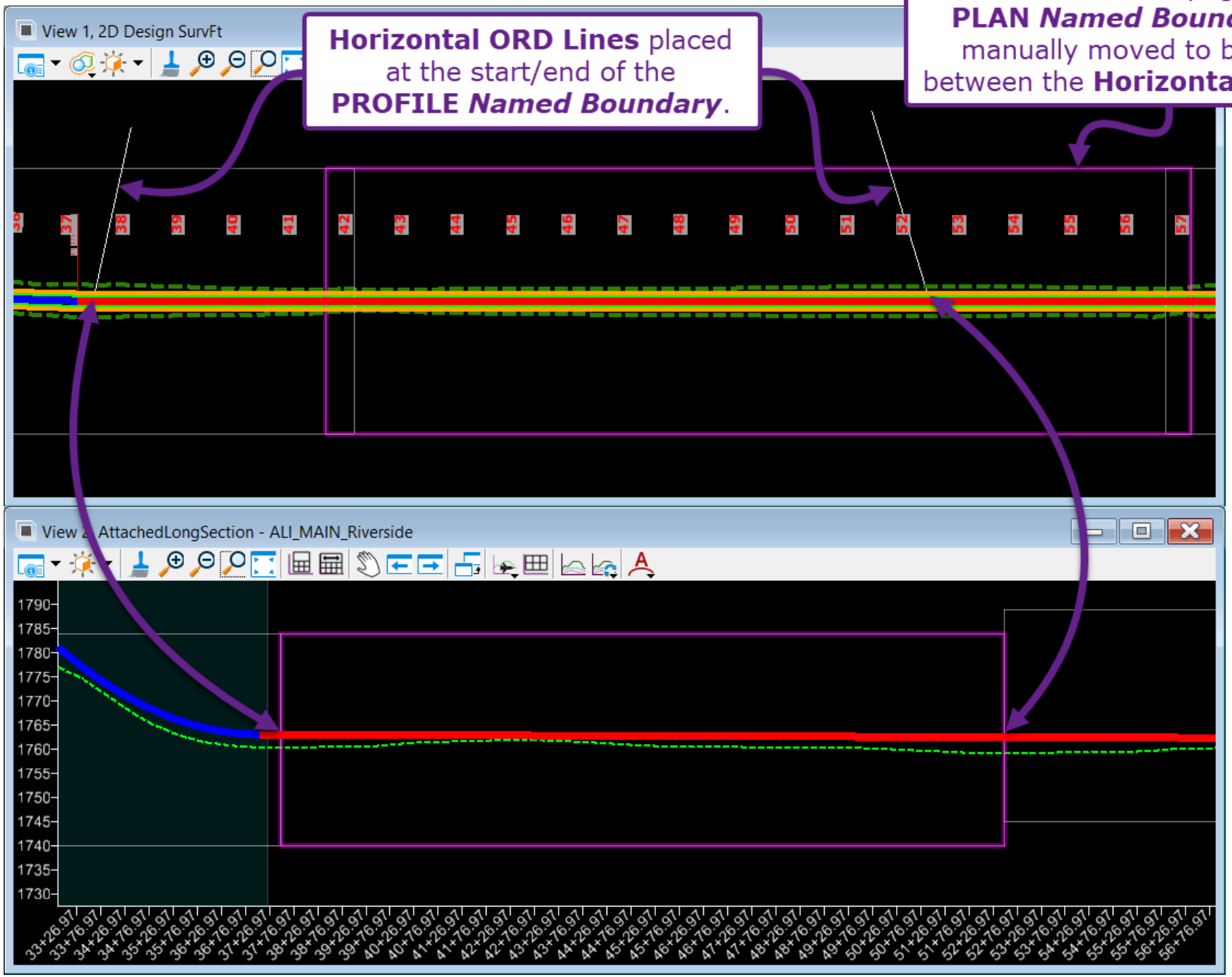
WARNING: The following adjustment procedure does NOT work with PROFILE *Named Boundaries* and should ONLY be performed with PLAN *Named Boundaries*.

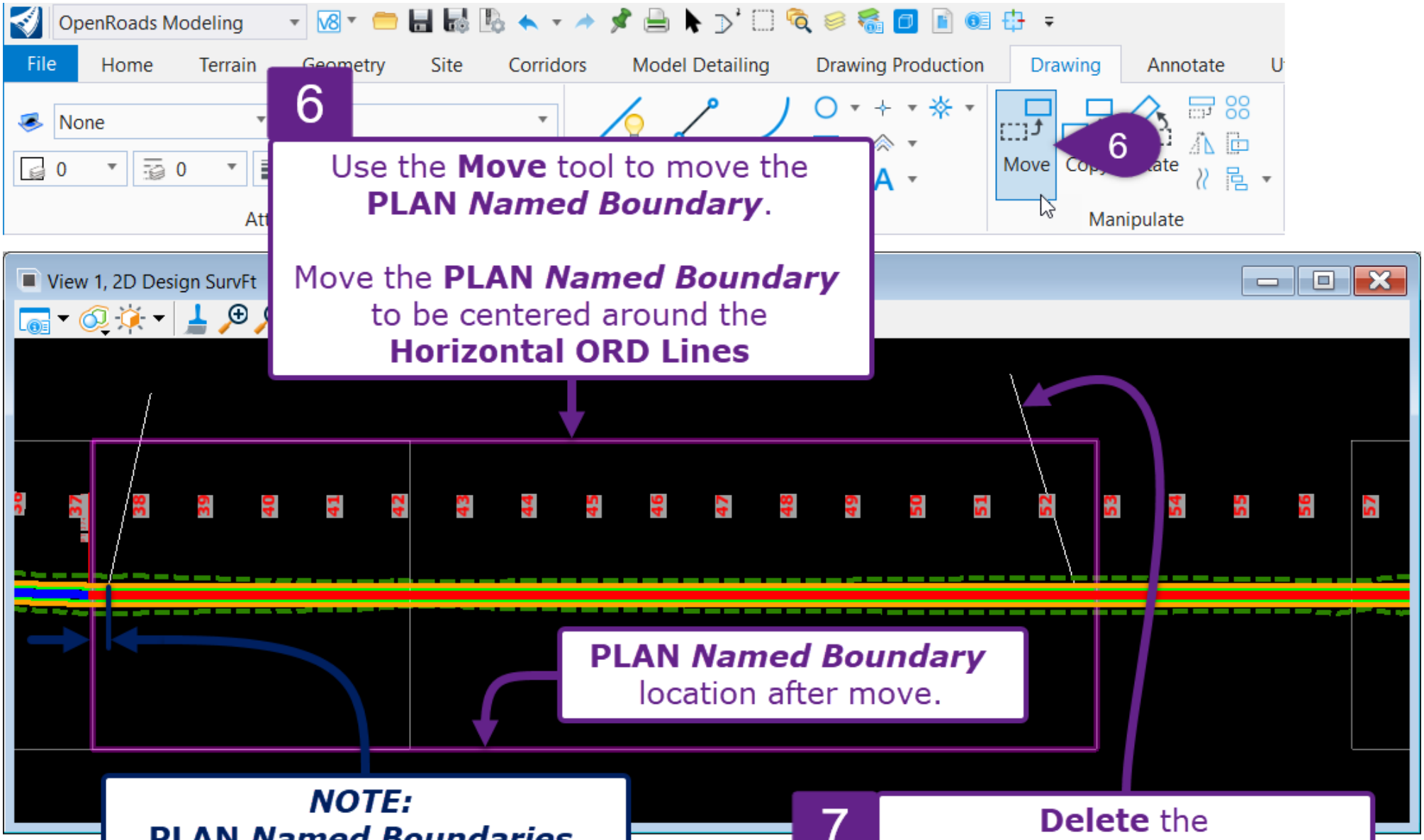
1	In the Road Plan and Profile ORD File (_pln_pp.dgn), open up the *2D Design Model* and *Profile Model* of the Alignment. In the *2D Design Model*, locate the PLAN *Named Boundary* to be adjusted. In the *Profile Model*, locate the matching PROFILE *Named Boundary* element.



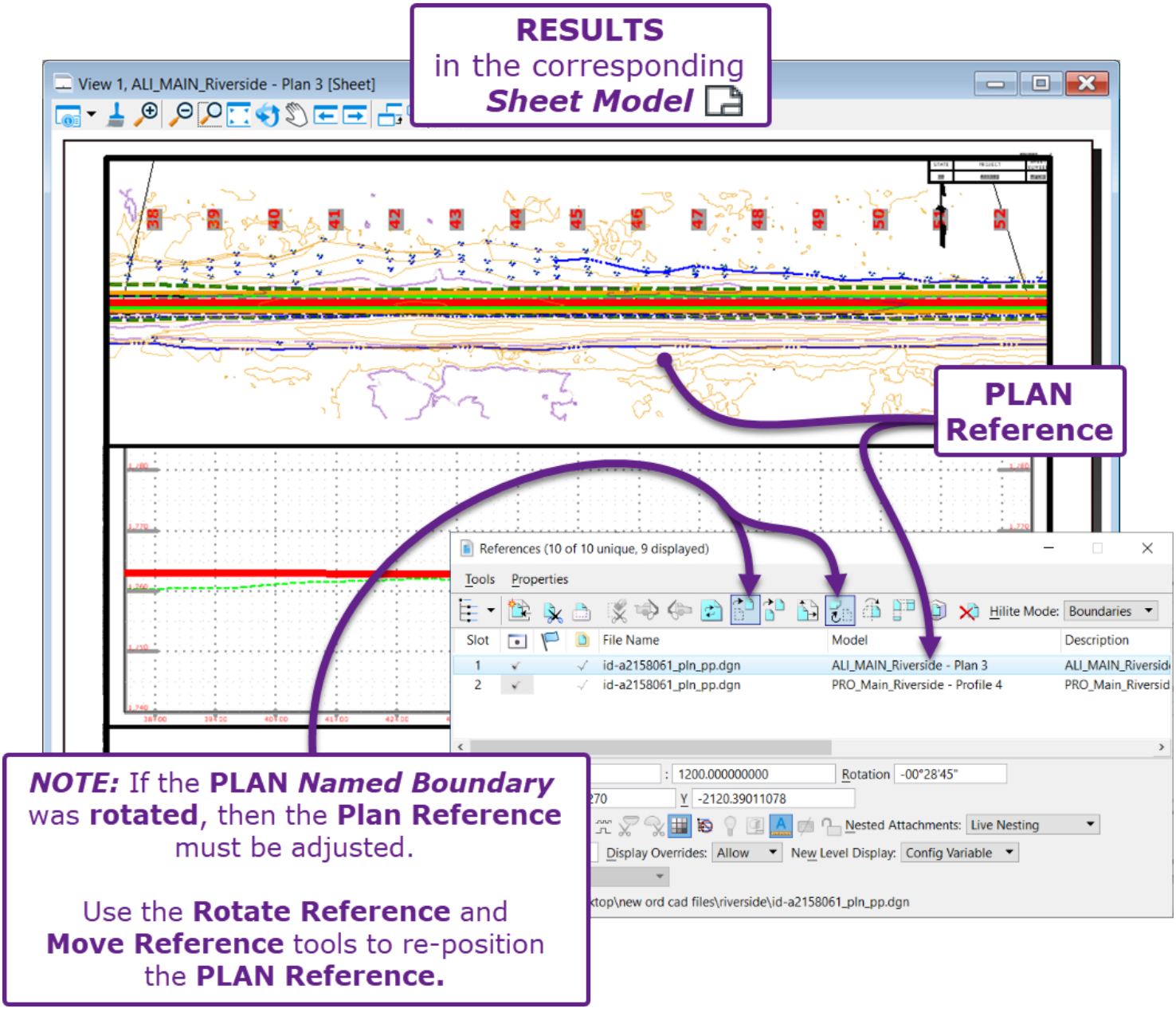
The *Line Between Points* tool (Horizontal ORD Line) can be used to coordinate a location in the *Profile Model* with a corresponding location along the Alignment in the *2D Design Model*. For the "Start Point" of the Horizontal ORD Line, select a location in the *Profile Model*.




View 1, 2D Design SurvFt
Horizontal ORD Lines placed at the start/end of the PROFILE Named Boundary.
On the next page, the PLAN Named Boundary will be manually moved to be centered between the Horizontal ORD Lines.
View 2 AttachedLongSection - ALI_MAIN_Riverside


OpenRoads Modeling
File
Home
Terrain
Geometry
Site
Corridors
Model Detailing
Drawing Production
Drawing
Annotate
None
Move
Manipulate
6
6
Use the **Move** tool to move the **PLAN *Named Boundary***.
Move the **PLAN *Named Boundary*** to be centered around the **Horizontal ORD Lines**
View 1, 2D Design SurvFt
PLAN *Named Boundary* location after move.
NOTE:
PLAN *Named Boundaries* are slightly longer than the corresponding **PROFILE *Named Boundaries***
7
Delete the **Horizontal ORD Lines** after the **PLAN *Named Boundary*** is moved.

As shown below, there is NO adjustment needed in the corresponding *Sheet Model* because the PLAN *Named Boundary* was ONLY moved and NOT rotated. However, if the PLAN *Named Boundary* is **rotated**, then the PLAN reference must be manually rotated and moved to realign with the Sheet Border. Moving and Rotating is shown in detail in *14E.1 Rotate and Move Plan Views*.



NOTE: If the **PLAN *Named Boundary*** was **rotated**, then the **Plan Reference** must be adjusted.

Use the **Rotate Reference** and **Move Reference** tools to re-position the **PLAN Reference.**

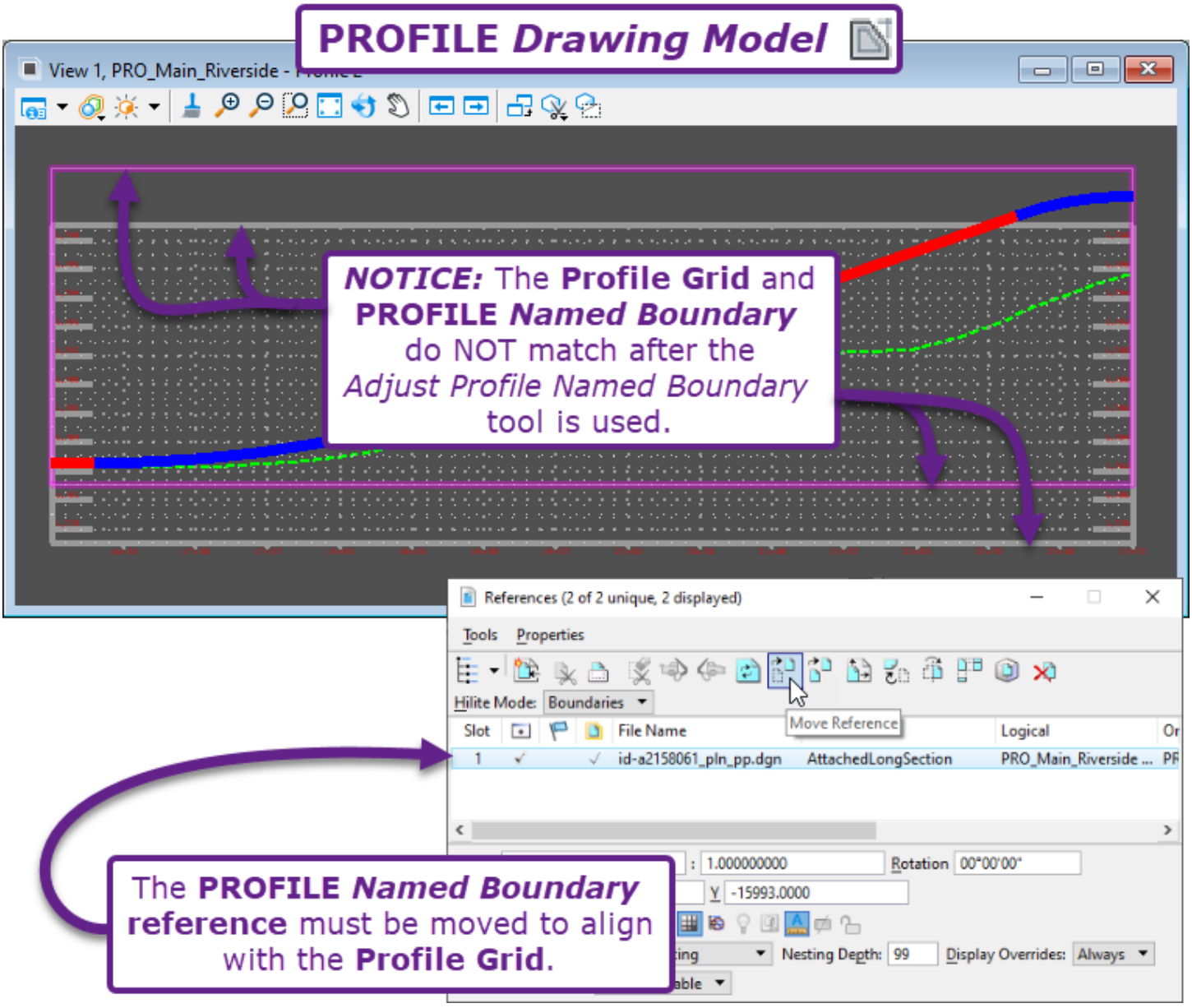
13B.3.b PROFILE Named Boundary Adjustments

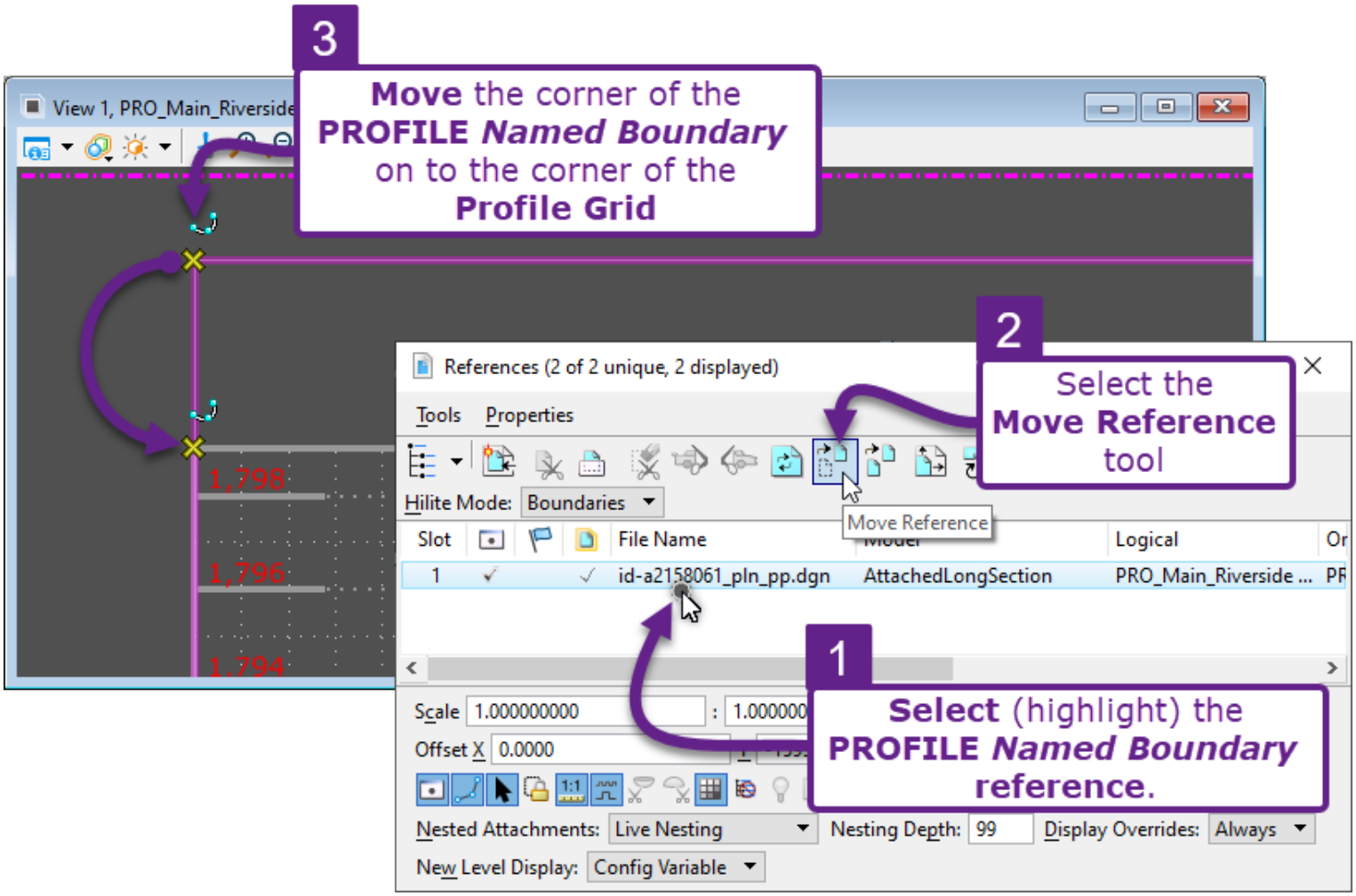
PROFILE *Named Boundary* adjustments can ONLY be made with the *Adjust Profile Named Boundary* tool. This tool has the ability to shift the PROFILE *Named Boundary* vertically (up and down).

WARNING: This tool CANNOT be used to shift the PROFILE *Named Boundary* horizontally (left and right) to change the station limits. PROFILE *Named Boundary* station limits CANNOT be modified. The User must delete and re-create a PROFILE *Named Boundary* if the station limits must change.

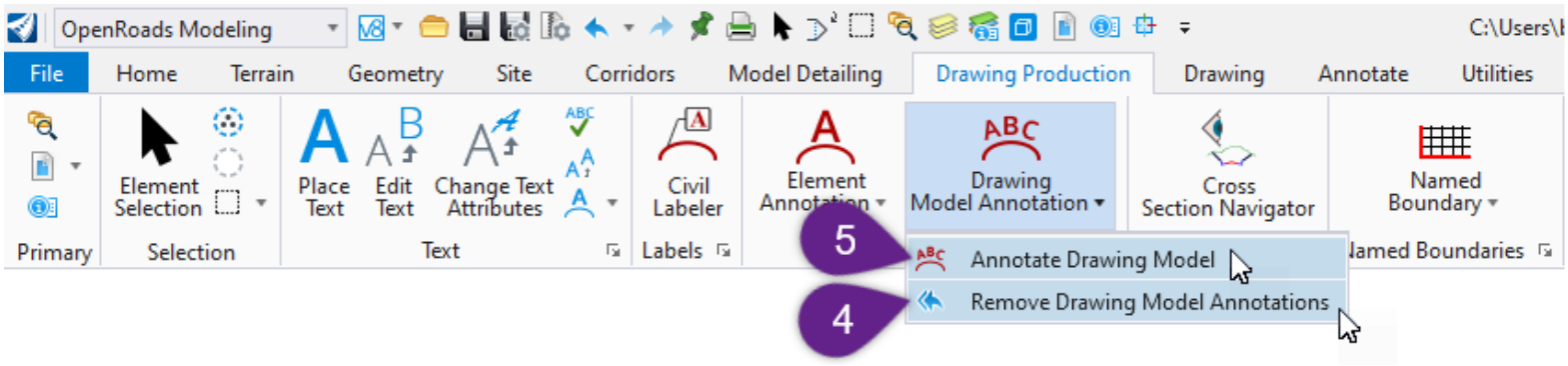
Operation of the *Adjust Profile Named Boundary* tool is shown in *14B.5.c STEP 7: Adjust Vertical Position of PROFILE Named Boundaries*.

WARNING: After the *Adjust Profile Named Boundary* tool is used, the Profile Grid in the PROFILE *Drawing Model* will appear in the wrong position. The PROFILE *Named Boundary* reference must be moved to re-align with the Profile Grid – which is shown on the next page. After moving the PROFILE *Named Boundary* reference, the Profile Grid must be deleted (*Remove Drawing Model Annotations* tool) and re-created (*Annotate Drawing Model* tool).





IMPORTANT: After moving the PROFILE *Named Boundary* reference, the Profile Grid must be deleted (*Remove Drawing Model Annotations* tool) and re-created (*Annotate Drawing Model* tool). See *14E.4.a Remove Model Annotations tool* and *14E.4.b Annotate Model tool*.

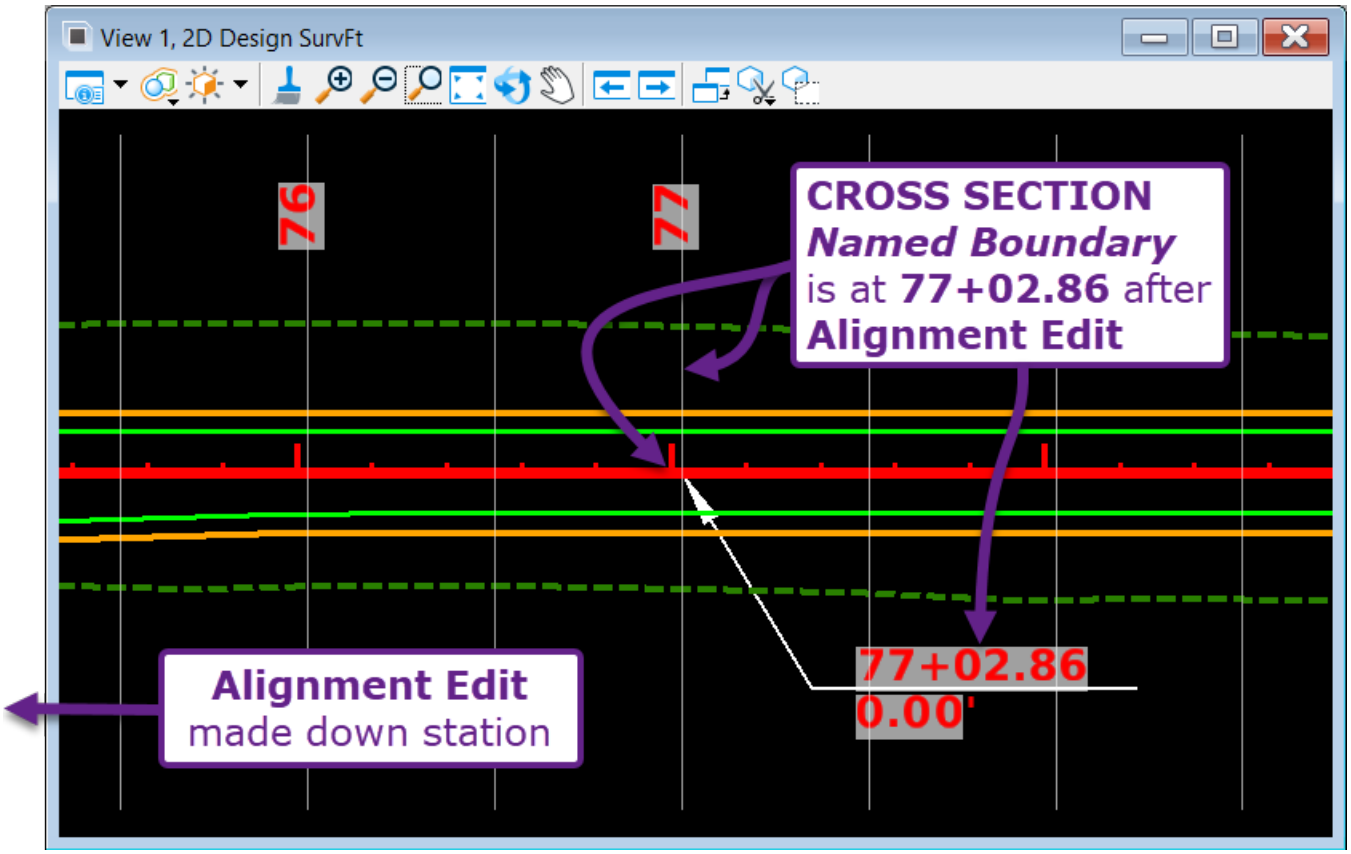


13B.3.c CROSS SECTION Named Boundary WARNING

IMPORTANT WARNING: Cross Sections sheets CANNOT be salvaged after the mainline Alignment has been edited. **Cross Section sheets must be re-created if the mainline Alignment is edited.**

EXPLANATION: CROSS SECTION *Named Boundary* elements are NOT dynamic. When the Alignment is edited, then *Named Boundaries* will remain in their original position, which means *Named Boundaries* located in the vicinity and ahead of the edit will be located at uneven stations.

CROSS SECTION *Named Boundaries* CANNOT be manually moved to even stations after an Alignment edit.



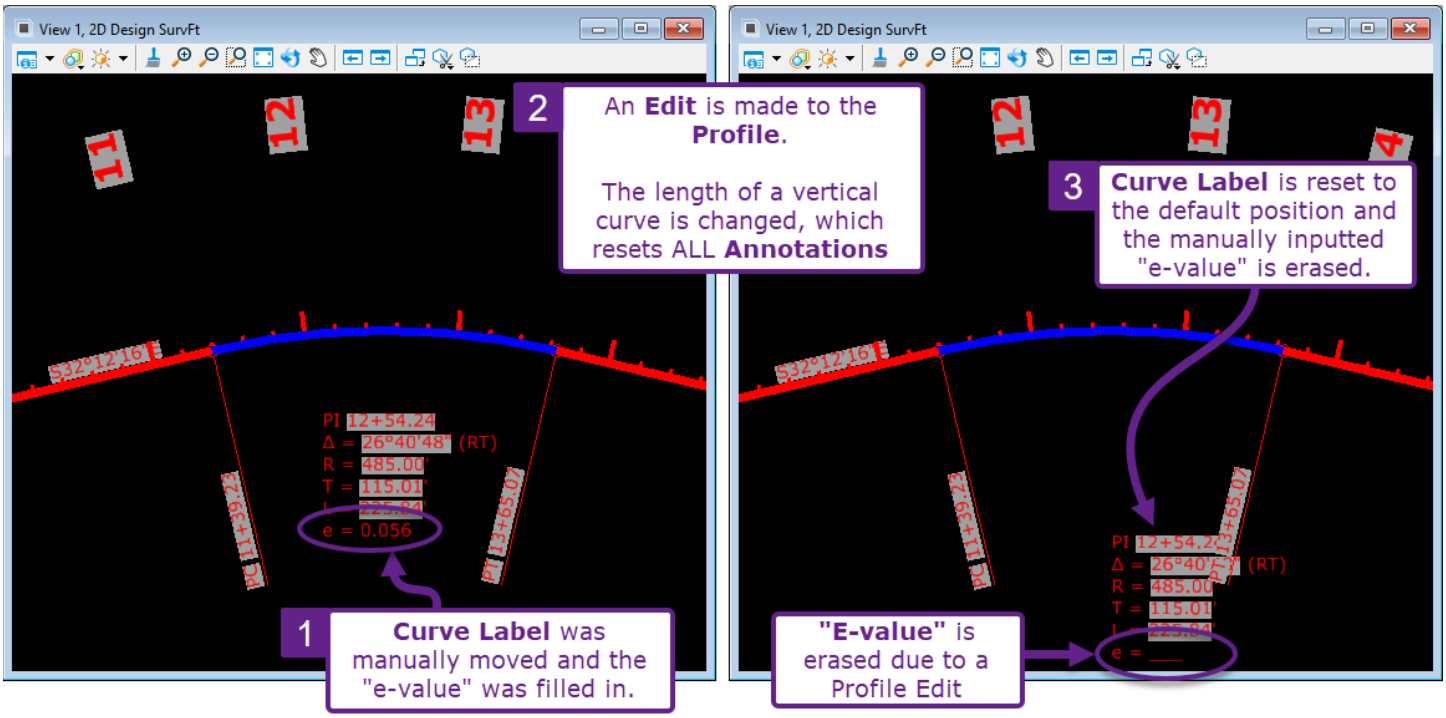
13B.4 Alignment and Profile Annotations after Design Iterations

Do NOT re-position or edit the Alignment (Stationing) and Profile annotations until the mainline Alignment and Profile is finalized.

WARNING: Some Alignment (Stationing) and Profile Annotations will reset to the default position after the Alignment or Profile is edited. If the Alignment or Profile is edited, any Alignment (Stationing) or Profile Annotation Label that is manually re-positioned or edited will reset to the default location and text configuration. For more information, see *15D.4 Reposition Alignment Annotation Labels*

For example, do not fill in the Superelevation ("e = _____") value in Curve Labels until the Alignment and Profile is finalized. The Curve Labels and the corresponding Superelevation value may reset whenever the Alignment or Profile is edited.

In the graphic shown below, a Profile edit is performed (not shown) – which cause the Alignment (stationing) to reset to the default state. For example, changing the length of a vertical curve would cause the Alignment stationing to reset.



13B.5 Cross Section Annotations after Design Iterations

WARNING: Cross Section sheets have to be completely re-done after edits to the mainline Alignment. CROSS SECTION *Named Boundary* elements do NOT readjust to the correct station or position after an Alignment edit. See *13B.3.c CROSS SECTION Named Boundary WARNING*.

IMPORTANT: Cross Section Annotations are NOT dynamic. If the Profile or Corridor is edited (without moving/editing the Alignment), then Cross Section Annotations need to be deleted and re-created. See *16D.2 Create, Remove, and Reapply Cross Section Annotations*.

13B.6 Quantities after Design Iterations

The calculations of quantities are discussed in *20 – Quantities*. The following affects to quantity calculation elements occur after changes to the proposed model:

- **Delete and re-create Cut and Fill Meshes -** Cut and Fill Meshes are needed to calculate earthwork with the *Quantities Report By Named Boundary* workflow (*20C – Quantity Report Workflow for Roadway with Approaches*). Cut and Fill Meshes are static and do NOT update when changes to the proposed model are made. **Delete old Cut/Fill Meshes before creating new ones**. See *20B.3 Warning Re-creating Cut and Fill Meshes*.

  IMPORTANT: The Quantity ORD Files used in previous design milestones can be used ONLY if the previously-created Cut and Fill Meshes are deleted.

- **Average Area End Method Earthwork Calculations** – If the Alignment is edited during the design milestone, then CROSS SECTION *Named Boundaries* need to be re-created. It is often easier to re-do the whole Average Area End Method process, then to try to salvage it.

  IMPORTANT: If the alignment is edited, then CROSS SECTION *Named Boundaries* will be located at uneven stations. See *13B.3.c CROSS SECTION Named Boundary WARNING*.

  CROSS SECTION *Named Boundaries* can ONLY be salvaged if the Alignment is NOT edited in the design milestone. If the CROSS SECTION *Named Boundary* elements are salvageable, then the Cut and Fill Meshes used to calculate earthwork must be deleted and re-created before generating the Average Area End Method Report. See *20B.3 Warning Re-creating Cut and Fill Meshes*.