Bridge Design Details 5.1 June 2025

Foundation Plan

A FOUNDATION PLAN sheet is a detailed map showing the existing features, utilities, and topographic information critical to a project. FOUNDATION PLAN sheets are prepared by the Bridge Design Preliminary Investigations Branch (PI). When PI receives bridge site data from the district, it triggers the creation of the FOUNDATION PLAN sheets. The structure design branch should contact PI to confirm receipt of bridge site data.

FOUNDATION PLAN sheets may not be created by PI for:

- Emergency Projects (if time permits quick FOUNDATION PLAN sheets can be created with basic information)
- Projects with no foundation modifications (e.g., retrofit, strengthening, etc.)
- Urban areas that do not have contours lines or existing utilities. In this case, a FOOTING PLAN shall be detailed on the ABUTMENT LAYOUT or BENT LAYOUT sheets with the same layout information that would be on a typical FOUNDATION PLAN sheet.

Once a Bridge Design Branch receives the FOUNDATION PLAN sheet from PI, the FOUNDATION PLAN sheet is modified to show all the foundation elements and the bottom of footing elevations.

The following instructions provide general guidelines and standards for modifying FOUNDATION PLANS for most structure projects.

1. Do not use "drop out" line style to show existing contours. Grade changes and final grading information are typically shown in ROADWAY PLANS.
2. Clip or mask contour lines that interfere with footing outlines, dimensions, stations, or bearings.
3. Relocate any pertinent information and text provided by PI that describes existing features that interfere with footing outlines. The only exception is for existing and relocated utilities, where feature lines shall be fully shown.
    - If it is discovered that existing utilities are missing after Design Branch adds footing outlines – PI may request latest dgns to use as a starting point, add the missing utilities and send back to Design Branch to prevent rework.
4. Show North arrow.
5. Show names of nearest towns or cities.
6. Show PILE DATA TABLE; alternative location for this information is the INDEX TO PLANS sheet.
7. Draw footings to scale, but do NOT dimension sizes of footings. The bottom of footing elevations shall be shown to the nearest 0.1 foot (e.g.,120.0)

- The bottom of footing or bottom of abutment elevation for end diaphragm type abutments is not required if it is a constant depth and detailed on the ABUTMENT LAYOUT sheet.

8. Do NOT show all piles in a footing; instead show a few piles to indicate footings have piles, see 5A Footing Layout Information (Exception: Column pile extension layouts shall be shown).
9. Show all bearings of abutment, bent, and pier centerlines. If supports are parallel, the bearing may be noted as such. Identify the stations where the support centerlines and bridge layout line intersect.
10. Only the GENERAL PLAN and FOUNDATION PLAN sheets should contain layout information such as bearings, stations, and curve data.
    - Bridge Design Branch should coordinate any alignment changes with District that happen after Bridge Site Submittal occurs. District should resubmit any alignment changes to PI drop box to ensure all units involved are using the same alignments.
    - PI Branch or Design Branch will correct alignment and layout information shown on the FOUNDATION PLAN. If alignment stationing, curvature or other layouts features do not change a resubmission is not required (e.g., changes to ends of retaining walls described below).
11. Layout information shall be sufficient for the survey crews to stake out hubs for the contractor's use during construction.
    - Show adjacent retaining wall or wingwall retaining wall layout lines and footings. When adjacent wall details are provided in separate set of structure plans, the FOUNDATION PLAN sheets shall be similar between structures.
12. If stripping excavation is required, show the limits of stripping and the necessary sections needed to show limits of payment for the stripping excavation.
13. The layout line on the FOUNDATION PLAN sheet shall be the same line used on the GENERAL PLAN and other detail sheets.
    - The alignments should be fully shown on both GENERAL PLAN and FOUNDATION PLAN sheets (e.g., if the District provides a longer alignment than needed for a retaining wall - the full alignment should be shown, instead of cutting the curve data to a modified alignment or curve length).

- There are two layout methods by which alignments can be shown on FOUNDATION PLANS:
    - Alignment method (preferred): is required for all curved alignments but will work for all types of alignments. (e.g., District provides an alignment that starts at 10+00.00 for a retaining wall. Any subsequent changes the Design Branch makes to locate the wall based on actual topography and profile, would add or subtract from that initial stationing without effecting downstream stationing. If the beginning of wall is moved 2 feet, the new beginning station would become 10+02.00 or in opposite direction 9+98.00)
    - Offset method: an alternative option for parallel straight walls or bridges, to provide a consistent offset feature line without stations. Stationing and length would derive from mainline alignment.

      (e.g., BEGIN WALL 48' Rt 10+00.00 "A" LINE)
- With either method, key components along alignment or offset feature lines would be called out such as BEGIN WALL, END WALL, change in wall types.

14. Other items such as HYDROLOGIC SUMMARY table (Figure 5.1.2) or SCOUR DATA TABLE (Figure 5.1.3) shall be added for structures over water.

HYDROLOGIC SUMMARY			
Drainage Area: X mi^2			
	Design Flood	Base Flood	Overtopping Flood/ Flood of Record
Frequency	50-yr	100-yr	X-yr/X-yr
Discharge	X cfs	X cfs	X cfs
Water Surface Elevation at Bridge	X ft	X ft	X ft
Flood plain data are based upon information available when the plans were prepared and are shown to meet federal requirements. The accuracy of said information is not warranted by the State and interested or affected parties should make their own investigation.			

Figure 5.1.2 Hydrologic Summary Table

SCOUR DATA TABLE		
Support Location	Long Term (Degradation and Contraction) Scour Elevation (ft)	Short Term (Local) Scour Depth (ft)
Abut 1	-	-
Pier 2	-	-
Pier 3	-	-
Abut 4	-	-

Figure 5.1.3 Scour Data Table

Before adding or changing any of the details provided by PI on a FOUNDATION PLAN sheet, a copy should be made. Before working on a FOUNDATION PLAN sheet, consider the following:

- FOUNDATION PLAN sheets are drawn using master units (feet) and sub-units (tenths); structure plan detail sheets are drawn using master units (feet) and sub- units (inches).
- The FOUNDATION PLAN sheet is based on a "real-world" coordinate system and shall NOT be manipulated in any way that would change the coordinate value of any element on the map. The graphical elements, lines, points, and curves are located by their Northing and Easting coordinates.
- The features of the project and display of its alignment across the sheet shall be shown from left to right. If necessary, rotate the FOUNDATION PLAN sheet.

Confirm the FOUNDATION SHEET provided by PI has the following:

- Survey data block in the lower left-hand corner will match survey information sheet provided by District Surveys in the Bridge Site Data Submittal (BSDS). Common datums may include:
    - The vertical datum shown shall be NGVD 29 or NAVD 88.
    - The horizontal datum shall be NAD 27, NAD 83 or CCS 83.
- A minimum of two benchmark points shown; for survey control, the two monuments closest to the limits of the project shall be given.
    - The description of these monuments shall include the name, description, station, northing and easting coordinates, elevation, and relative offset location from the structure layout line.
- The following disclaimer: "SURVEY MONUMENTS SHOWN ON THE FOUNDATION PLAN ARE FOR DESIGN PURPOSES ONLY. FOR THE COMPLETE LIST OF SURVEY MONUMENTS FOR THIS PROJECT, SEE ROADWAY PLANS.
- The locations and elevations of the existing bridge or structure.
    - A table of elevations and offset locations where the paving notch and curb intersect is typically provided.
- For overhead structures, the soffit elevation shall also be provided to ensure minimum vertical clearance is provided from the bottom of the structure to the top of rail (railroads) or to the top of pavement (roadway) below.

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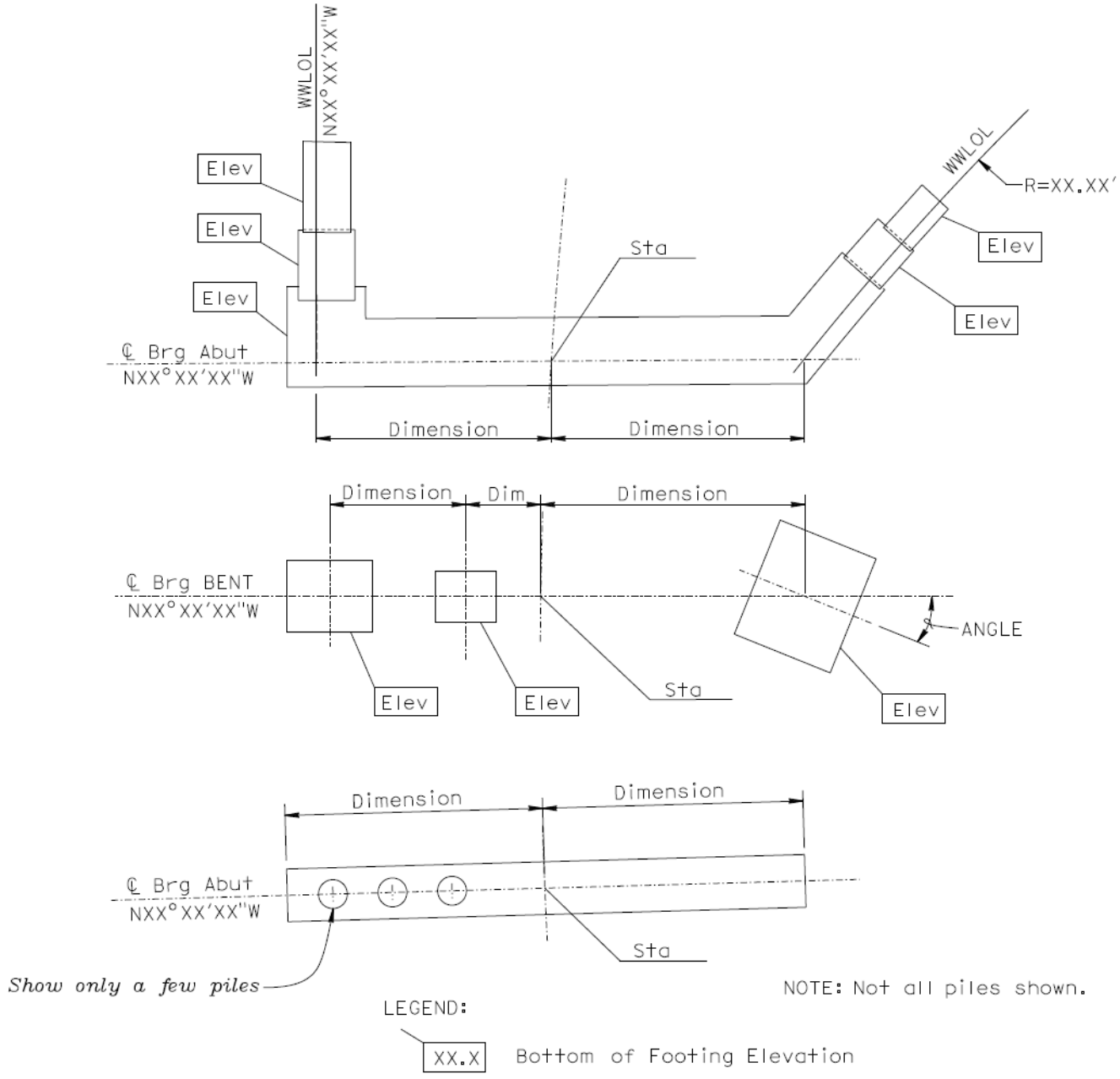


Figure 5A.A.1 Footing Layout

Figure 5A.B.1 Foundation Plan Detailing Example 1

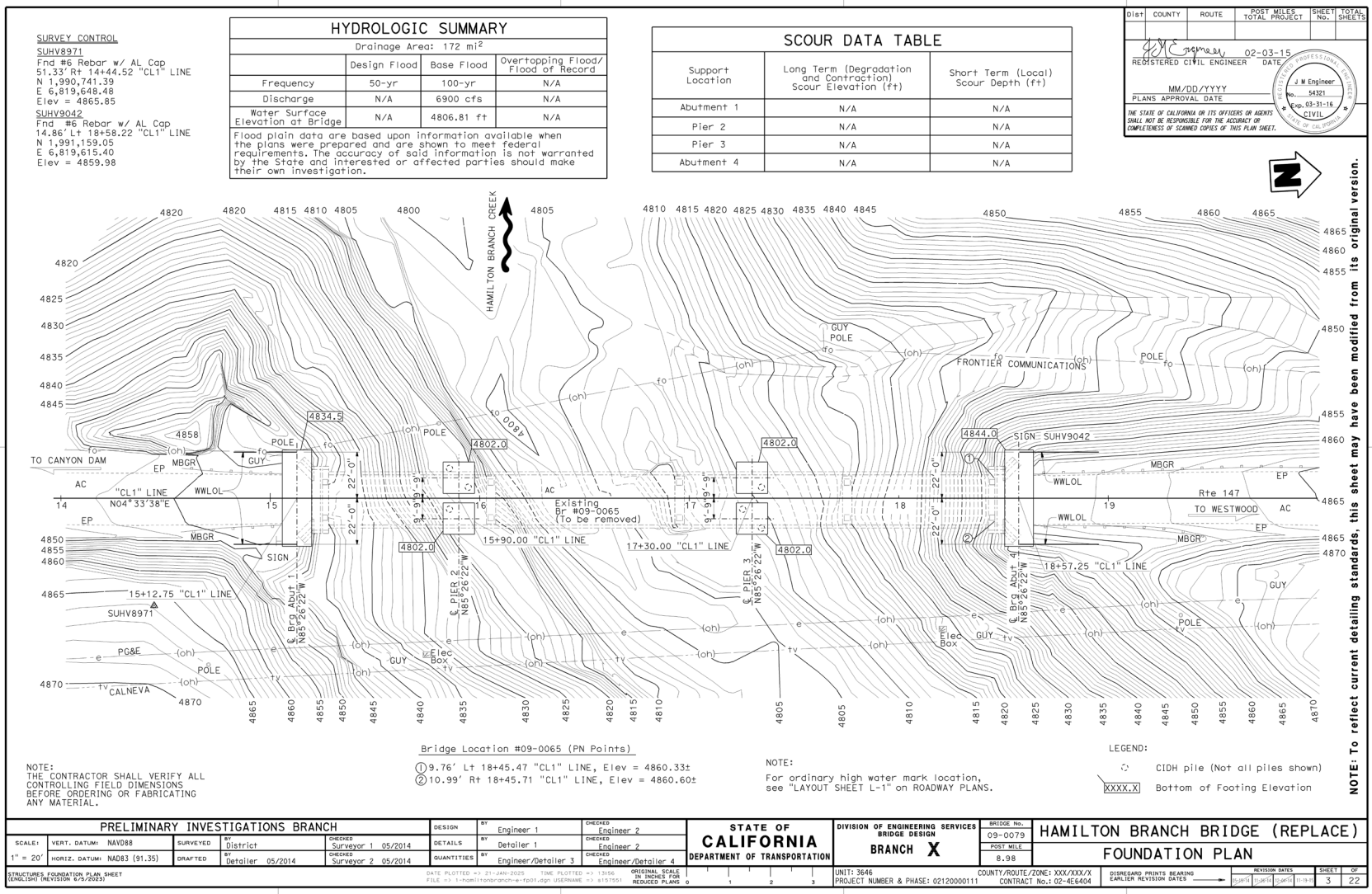


Figure 5A.B.2 Foundation Plan Detailing Example 2

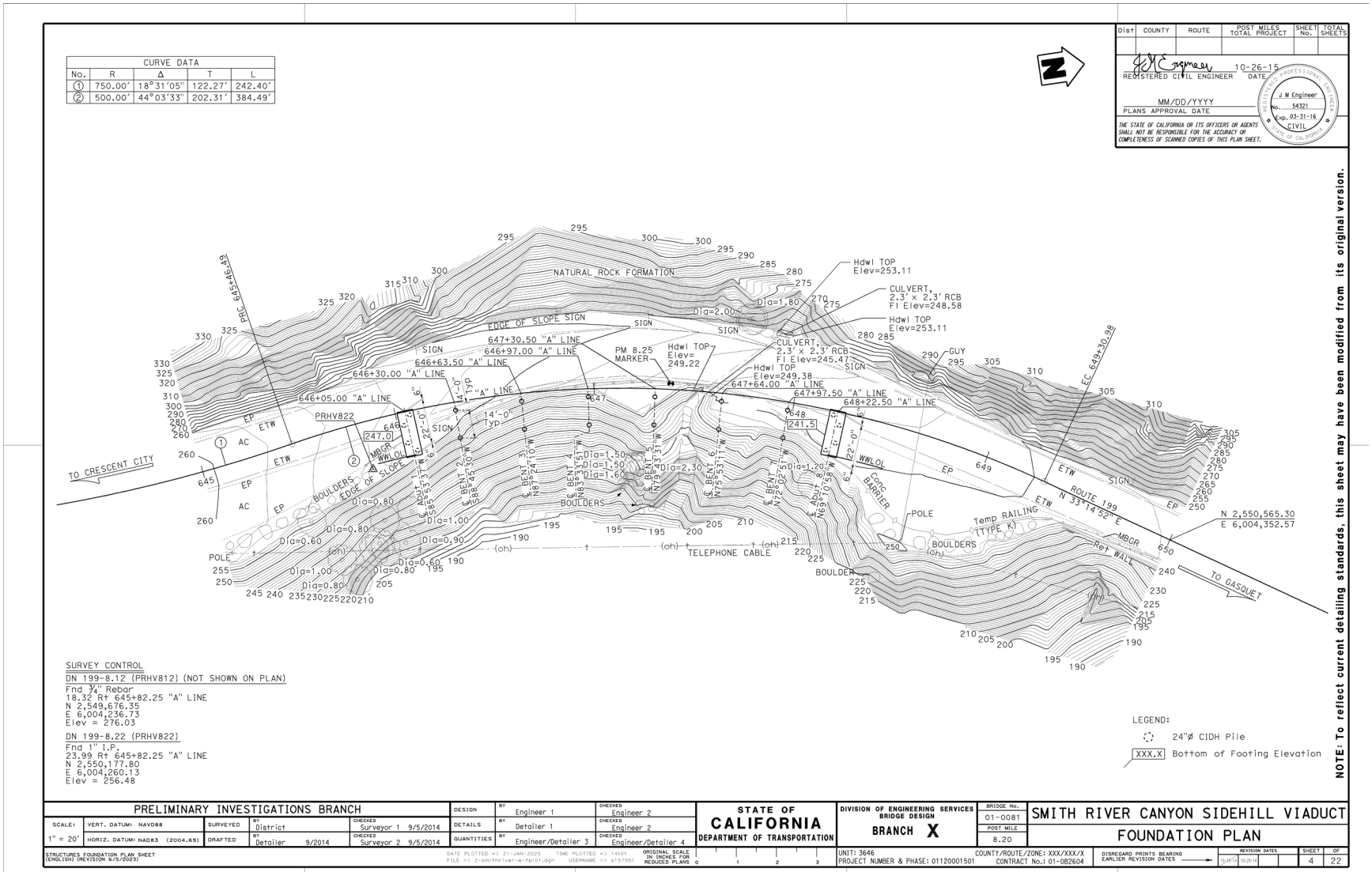


Figure 5A.B.3 Foundation Plan Detailing Example 3

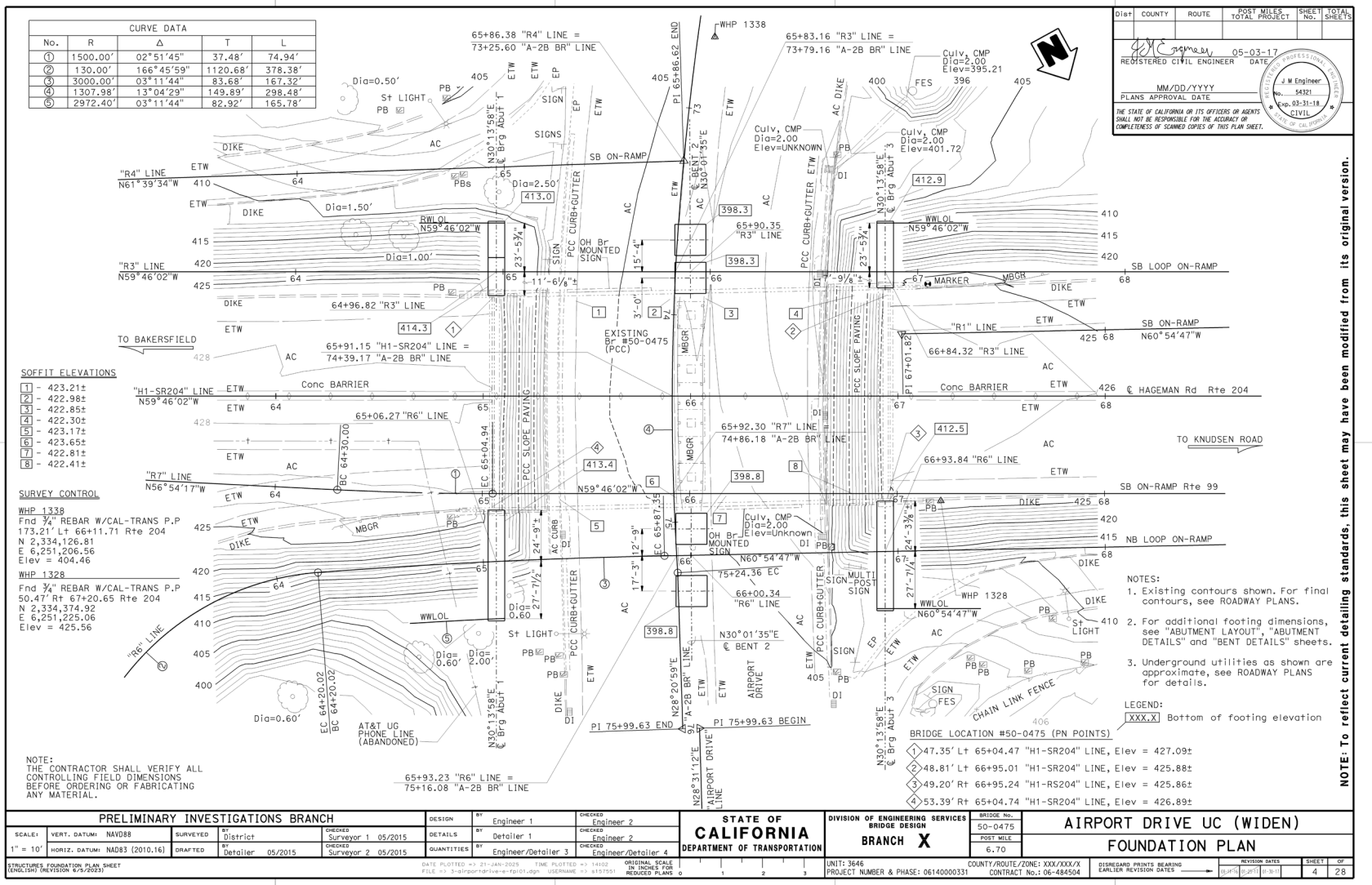


Figure 5A.B.4 Foundation Plan Detailing Example 4

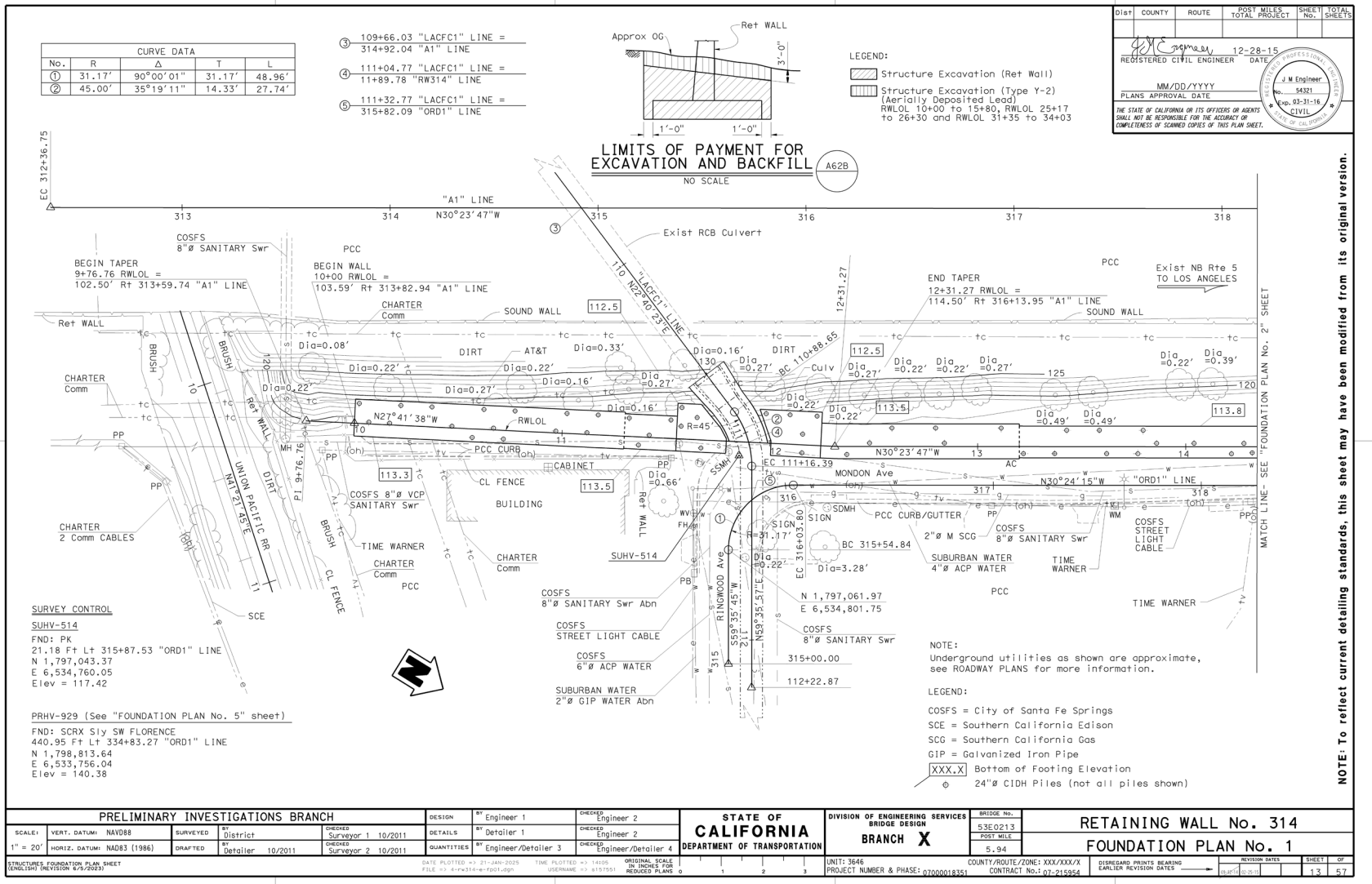


Figure 5A.B.5 Foundation Plan Detailing Example 5

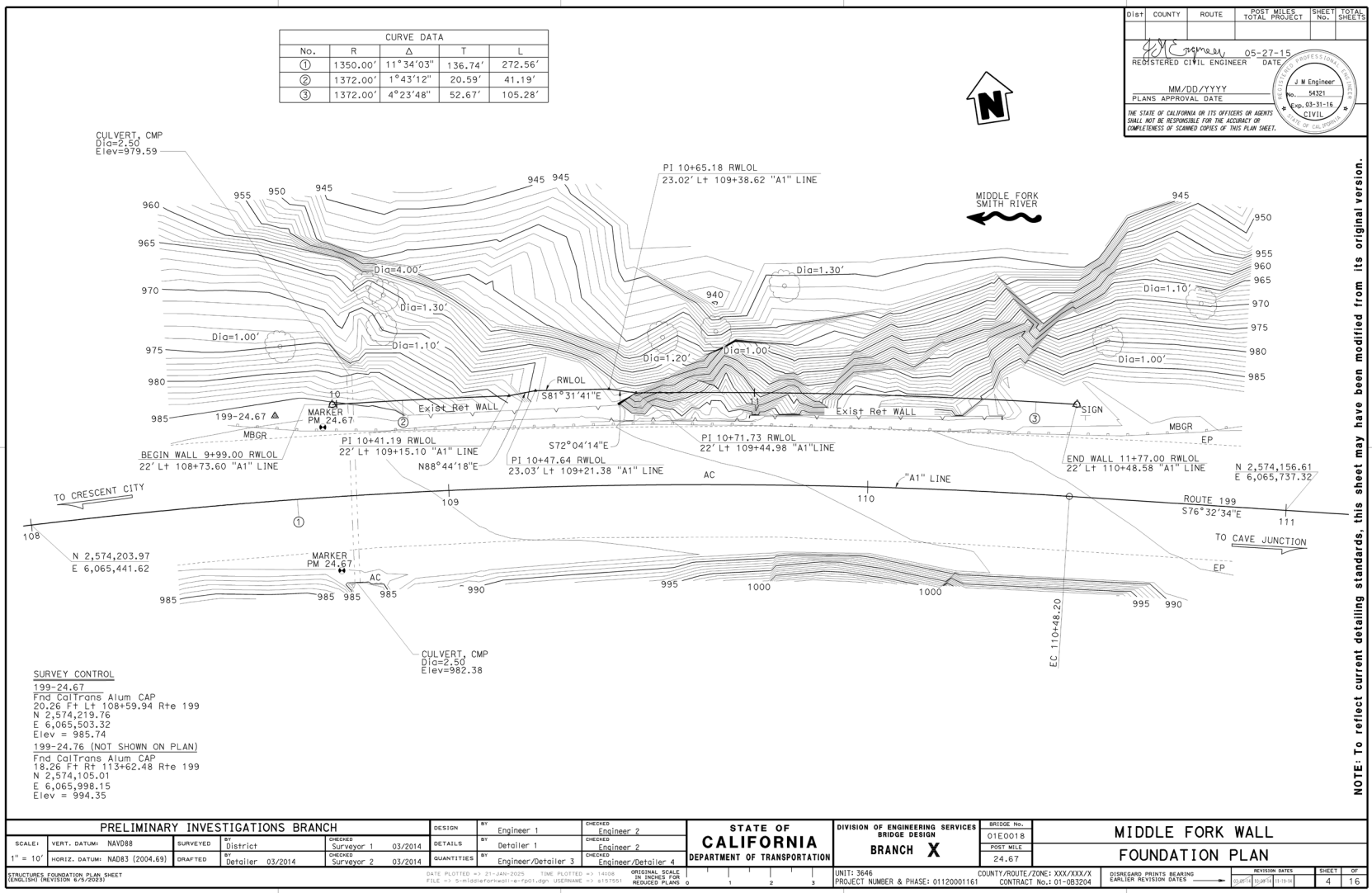
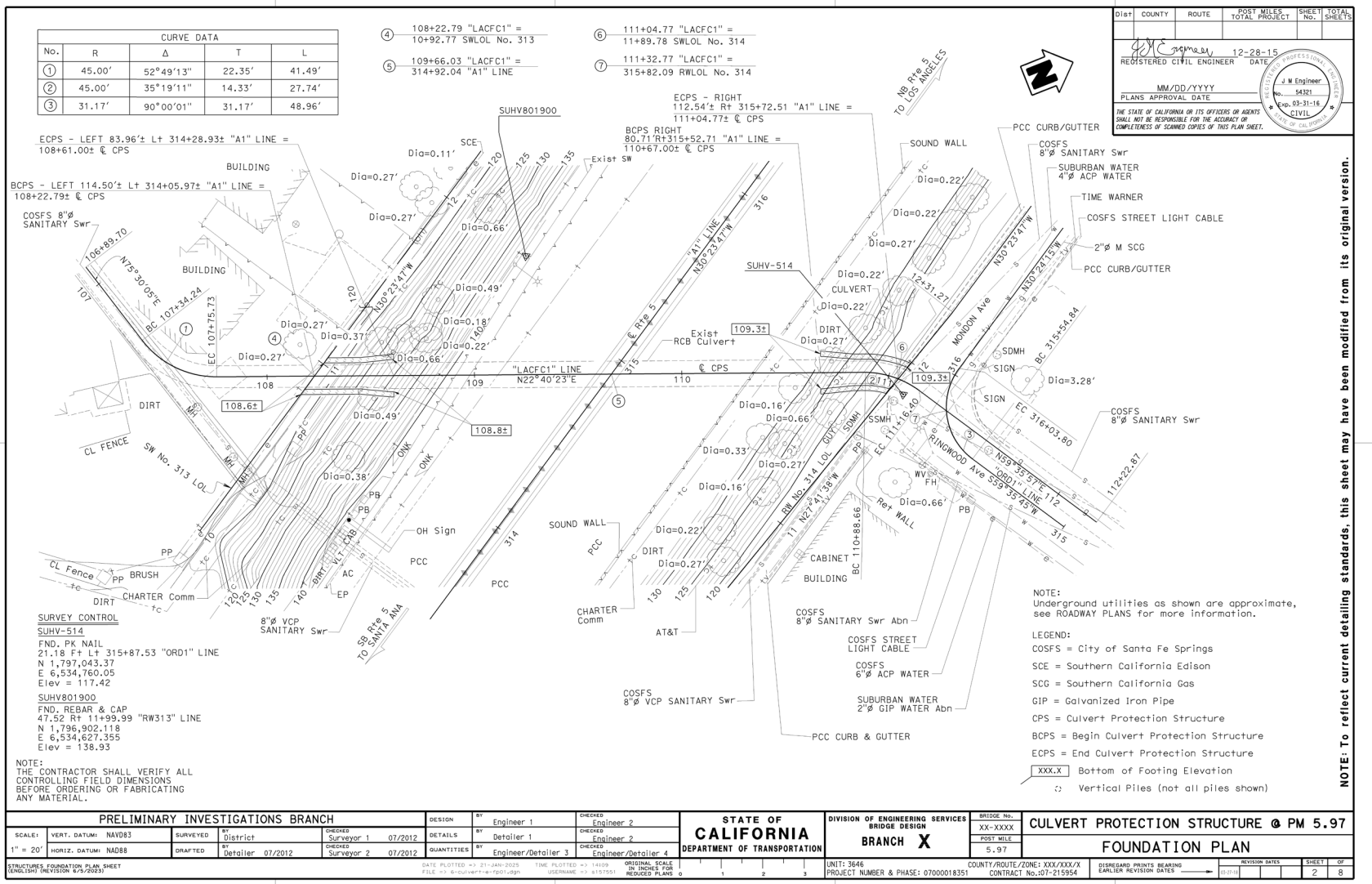


Figure 5A.B.6 Foundation Plan Detailing Example 6



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Special Earthwork

When earthwork not covered in the Standard Plans is required, the horizontal and vertical limits shall be shown on the FOUNDATION PLAN sheet or on the detail sheet that applies. The limits of special earthwork excavation and backfill will be determined by Geotechnical Services.

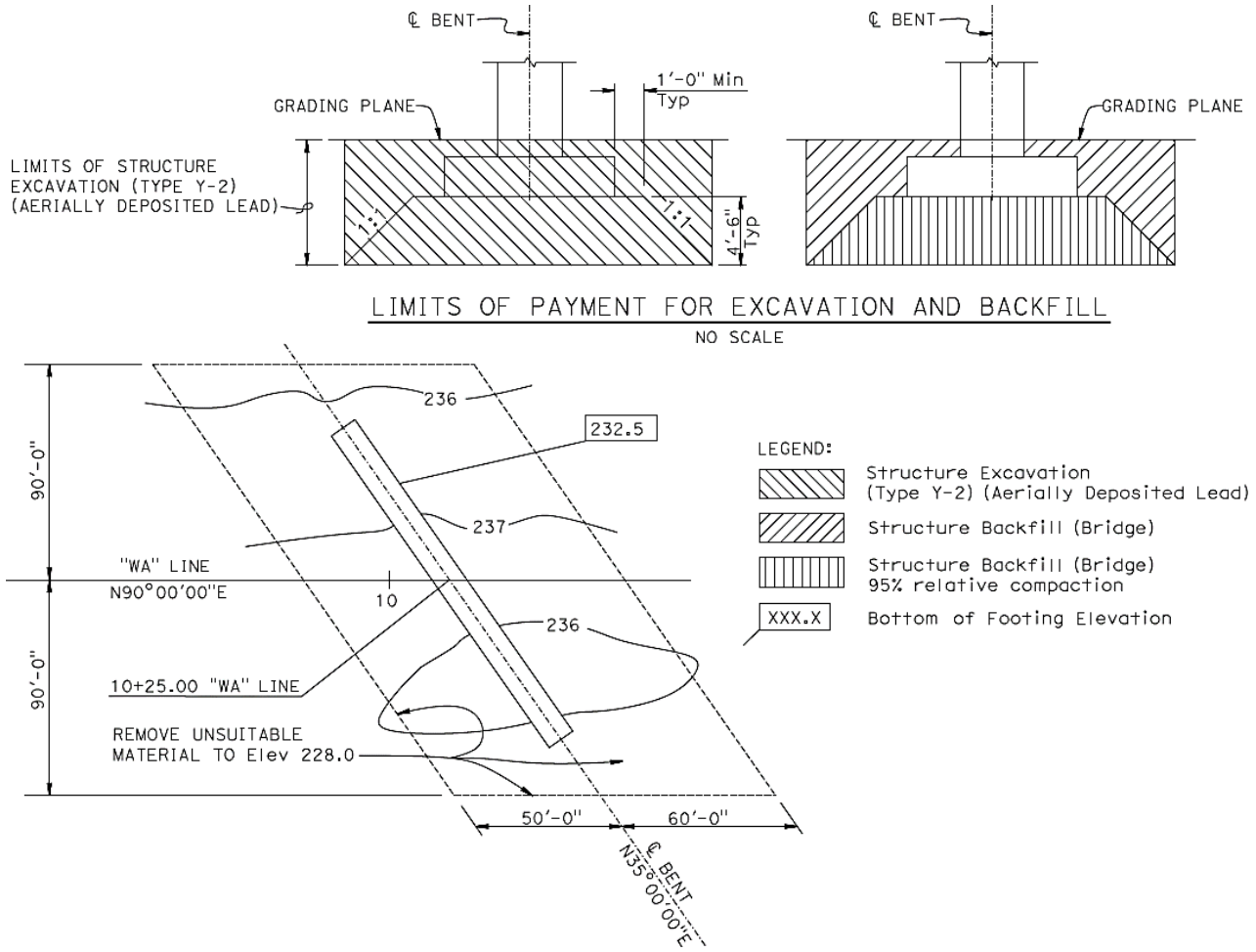

Figure 5.2.1 Special Earthwork