

## Union Pacific Public Projects – Survey Requirements

*The survey guidelines below are the minimum requirements for survey collected to complete track and civil design for UPRR review on Public Projects that impact UPRR track alignments. These requirements should be referenced as a minimum for track design and are not intended to define the total scope of survey required for Agency project. Requirements are written based on traditional survey collection; however aerial survey may be used if it meets or exceeds the criteria defined below.*

Survey date and datum information, including zone and scale factor, shall be included in the SURVEY NOTES section of the UPRR general sheets. Survey must be completed within 5 years of project construction. Survey older than 5 years will require a new survey of horizontal and vertical track alignments to verify the plans still accurately represent the existing track alignments. Survey older than 10 years will require completely new survey and update of existing plans with new survey data.

All surveys will use US Survey Feet. Vertical tolerance on top of rail shots will be plus or minus 0.05 foot and plus or minus 0.1 foot on ground shots.

Control points shall be set 500 feet to 800 feet apart, along base alignment with sufficient ties to allow construction crews to re-establish, when construction begins. The consultant will provide field notes sufficient to recover control points. Control points will be rebar, 5/8" of an inch in diameter and 24 inches long with colored ribbon tied to the rebar and marked with surveyor's lath. Control points shall be tied to a horizontal and vertical datum.

Surveys shall be taken in direction of increasing engineering stations based on the area VAL map. Coordinate with the project Public Project PM to obtain a copy of the area VAL map(s). Identify a monument point (ie: low MP end of a bridge backway) on the VAL map and utilize the stationing from the VAL map to establish project stationing. Monument point shall be noted in the Control Points section of the UPRR general sheets. One hundred stations shall be measured at centerline of track and marked on the outside of the rail, with white "Paintstik" (or similar white permanent marking device) on the construction side of the project, throughout the survey project.

When collecting topographic data, the primary objective is to provide an accurate representation of ground terrain. The terrain model will be defined by break lines and topography shots. Shots will be taken at the ballast shoulder, toe of ballast, subgrade shoulder and toe of subgrade. Break lines will also be taken at any other discontinuity of terrain such as creeks, canals, bridges, bridge backwalls, retaining walls, etc. Break lines and drain lines running parallel to the baseline track will be shot on the even 100 foot stations and at other locations to fully describe the terrain. Break lines and drain lines must not cross. In large areas, where additional terrain data is needed to increase the accuracy of the digital terrain model (DTM), spot elevations will be taken on a grid not to exceed 100 feet in spacing.

Shoot the centerline of track every 500 feet on tangent, every 50 feet on curves. Curves sharper than 12 degrees should be shot every 25'. Each section of tangent should have at least 2 POT shots (point on tangent). Each curve should have at least 3 POC shots (point on curve) in the body of the curve. Additionally, between tangents and curves, a shot should be taken at the best guess locations of PS (point of spiral), PSC (point of spiral to curve), PCS (point of curve to spiral) and PT (point of tangent). Each spiral should include at least one additional POS shot (point on spiral). **Do not end the survey in the middle of a horizontal or vertical curve.** Shoot 500 feet into tangent beyond the end of curve to establish proper line and a good grade. Shoot top of rail at each 100 foot station and opposite every shot taken on the centerline of track (PSW – point of switch, PF – point of frog, PS, POT, etc.). On curves, the top of rail is always taken on the grade rail (low rail). On tangents the top of rail is taken on the north rail (East - West running track), or the west rail (North - South running track). Top of rail shots may cross from side to side only when necessary to keep them on the grade rail. Top of rail & centerline shots will extend 1000 feet beyond the proposed construction limits.

Shoot the centerline of track, opposite the PSW (point of switch) and opposite the PF (point of frog), indicating the weight of rail, type of switch (hand thrown, power operated, electric lock, etc.), note the size and type of frog (spring, jump, self guarded, rail bound manganese or movable).

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Indicate the weight of rail at the beginning and end of the survey project, including any changes in rail weight within the survey limits (i.e. compromise joints, compromise welds, taper rails, etc.).

In addition to break line and topographic features, shoot vertical clearances on all existing wire line crossings (indicate the voltage) and overhead structures. High water marks (where applicable) should be shot as well. In addition to overhead structures, structures and buildings within 25' of the proposed track location should be surveyed for evaluation of clearance. Shoot signals and poles on the side closest to the existing tracks for elevation and clearance offset. All four corners of signal houses shall be shot.

Locate culverts with a shot at each invert for elevation and direction of flow. Indicate the size in inches and type of pipe. Shoot the inside face of each bridge backwall at centerline (EBW, WBW, SBW or NBW), for location. Locate the backwall itself by shooting a break line along the top and bottom. Extra care should be taken when shooting bridge columns or piers. Enough shots need to be taken to fully outline the structure. Enter as many field notes as necessary to describe the general shape and layout of piers, columns and crash walls (including wall height).

A utility "one-call" shall be completed prior to mark any utilities prior to survey so all pertinent locations of any these facilities will be shown in the drawing. In addition to the utility "one-call", the UPRR signal team needs to be called at 800-336-9193 to mark UPRR signal utilities as they will not be contacted as part of the "one-call" process.

Jan. 27<sup>th</sup>, 2025