

## **Habitat Concepts to consider for Clear Creek in Twin Tunnels project area.**

This document addresses the potential for habitat enhancements in Clear Creek in the Twin Tunnels Project area. It follows the SWEEP guidelines for CDOT to investigate stream enhancement opportunities in CDOT project areas. It is not intended as mitigation for the Twin Tunnels Project since no impacts to stream habitat are expected from the Twin Tunnels Project.

There are two dominant stream channel types in the project area. 1) a straight channel with relatively high gradient, high water velocity and confined by steep banks. 2) lower gradient sections that are 70 feet wide or greater with uniform depths with little instream cover from velocity and very little winter refuge habitat.

Objective – increase juvenile refuge in swift sections and overwinter trout habitat in sections where widths exceed 70 feet.

A habitat reference for the area is a section of stream upstream of I-70 on the upper end of the study area (Polygon A – Attached Sheet 2). This area is approximately 60 feet wide from grass line to grass line with approximately 40 feet of width at base flow. The stream has a deepened thalweg with boulders which provide velocity shelter. The greater depth, approximately 2-3 feet deep, provides low flow and winter refuge habitat. This stream section has a point bar on one bank that is overtopped at high flow but functions to narrow the stream width at lower flows (Figure 1). This habitat reference could be used as the pattern for stream improvement in the widened lower gradient stream locations. Examples of areas where this concept could be applied are Polygons C and D (Sheet 4, Figure 2), Polygon E and F (Sheet 7, Figure 3, Figure 4) and Polygon G (Sheet 10). There may be other locations as well. The examples are included to illustrate potential improvement areas. A full inventory of the study area is recommended prior to making the selection for habitat improvement sites.

The improvement site would ideally have a downstream riffle that provides a hydraulic control (Figure 5). The objective for this habitat concept is to create a deepened thalweg and use the material to create a shallow point bar on the side of the channel (Figure 6). The improvement should not alter the cross section to a point where the downstream water surface changes at lower flows. The improvements should include gradual bed surface changes in stream contours without hard breaks. The changes to depth would be excavation that creates a maximum low flow depth of approximately 2-3 feet at the deepest location and tapering to existing grade on the upstream and downstream section lines. After the bed is contoured, boulder clusters could be placed to create velocity shelters.



Figure 1. Reference habitat section upstream of I-70 bridge near Idaho Springs (Polygon A). Note the point bar on the opposite bank and deepened thalweg with boulders.





Figure 2. Potential habitat improvement site upstream of Dog House Bridge (Polygon C).

Subject to Revision



Figure 3. Potential habitat improvement site upstream from Central City parkway (Polygon E).





Figure 4. Potential habitat improvement site downstream from Hidden Valley exit (Polygon F).

Subject to Revision

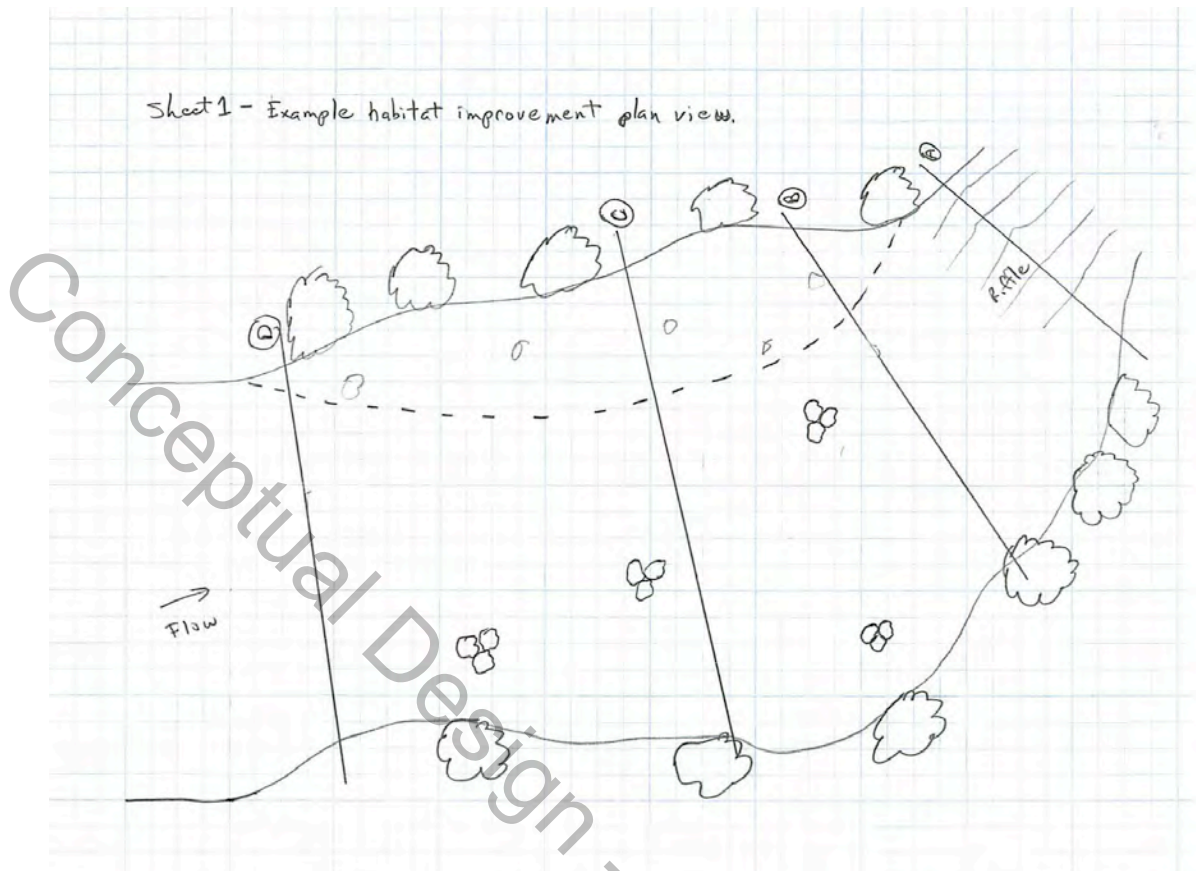


Figure 5. Example habitat improvement plan view in wider stream section. Dotted line represents edge of constructed point bar at low flow.

Sheet 2 - Example habitat improvement - cross section view. Solid line = existing grade, dotted line = future

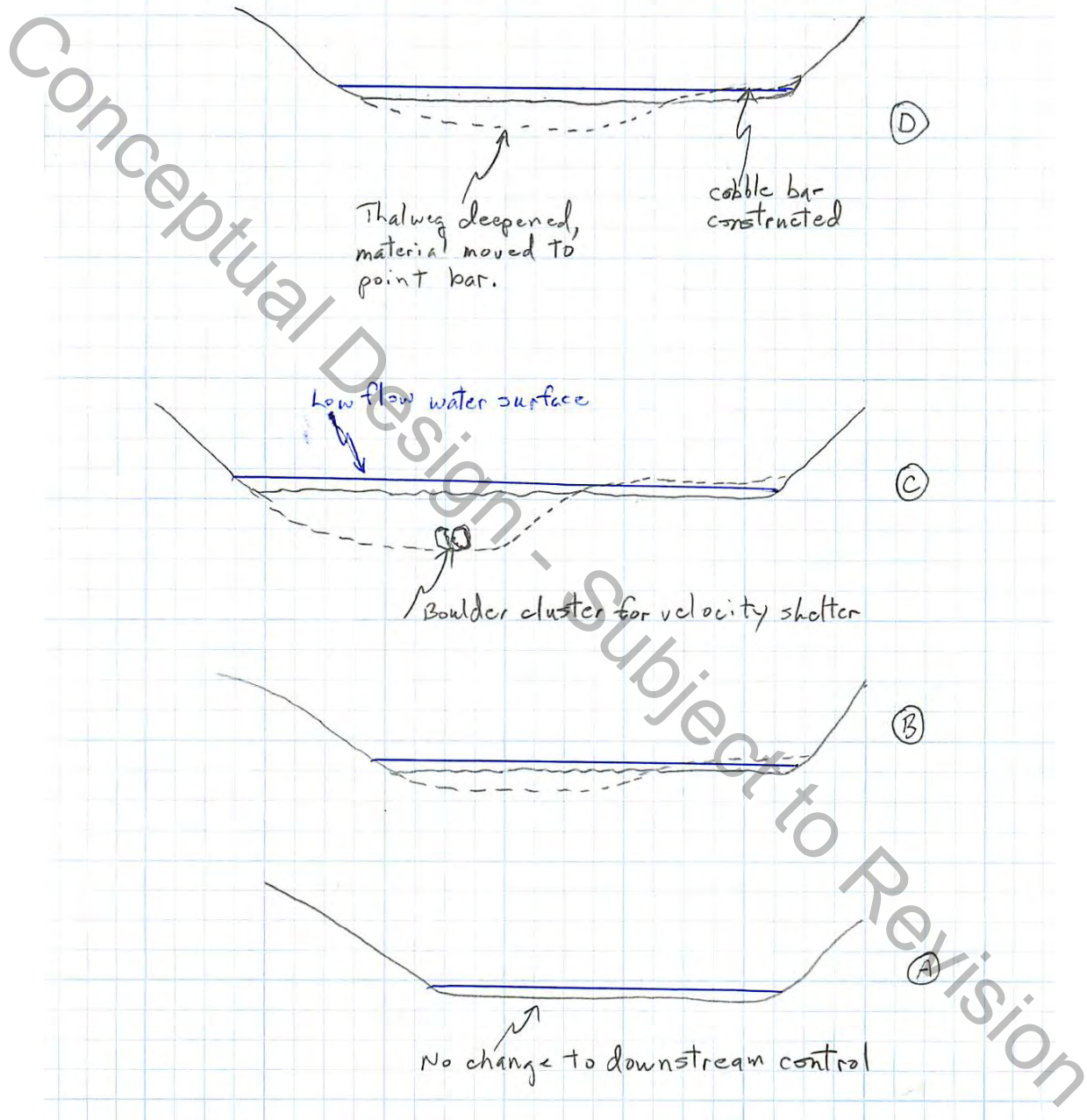
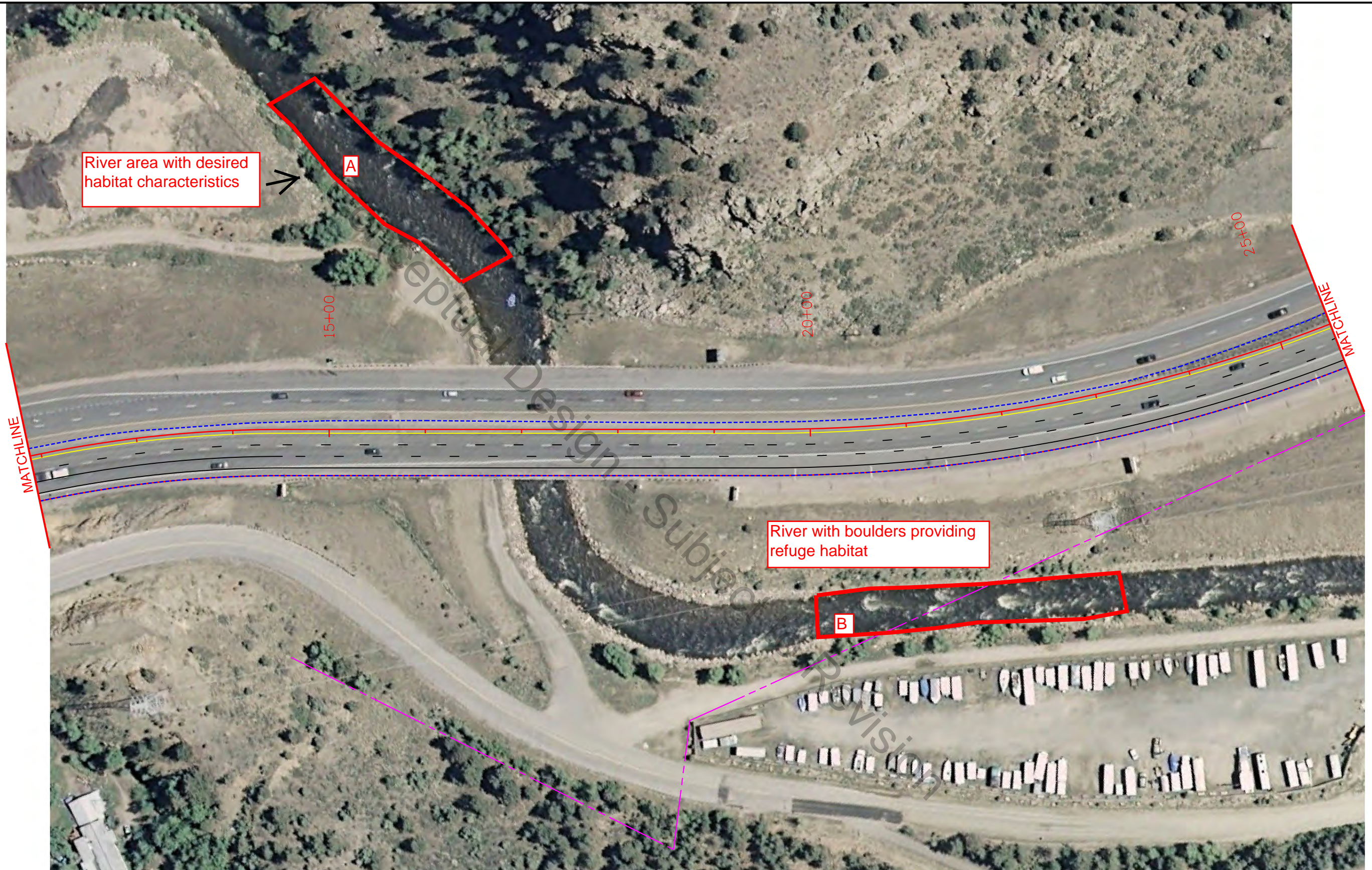


Figure 6. Example of cross sections in habitat improvement sites. Dotted line represents future bed profile and point bar construction.





River area with desired habitat characteristics

A

River with boulders providing refuge habitat

B

MATCHLINE

MATCHLINE

15+00

20+00

25+00

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-----	Proposed Disturbance Limits
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<b>CONCEPT PACKAGE 2</b>	
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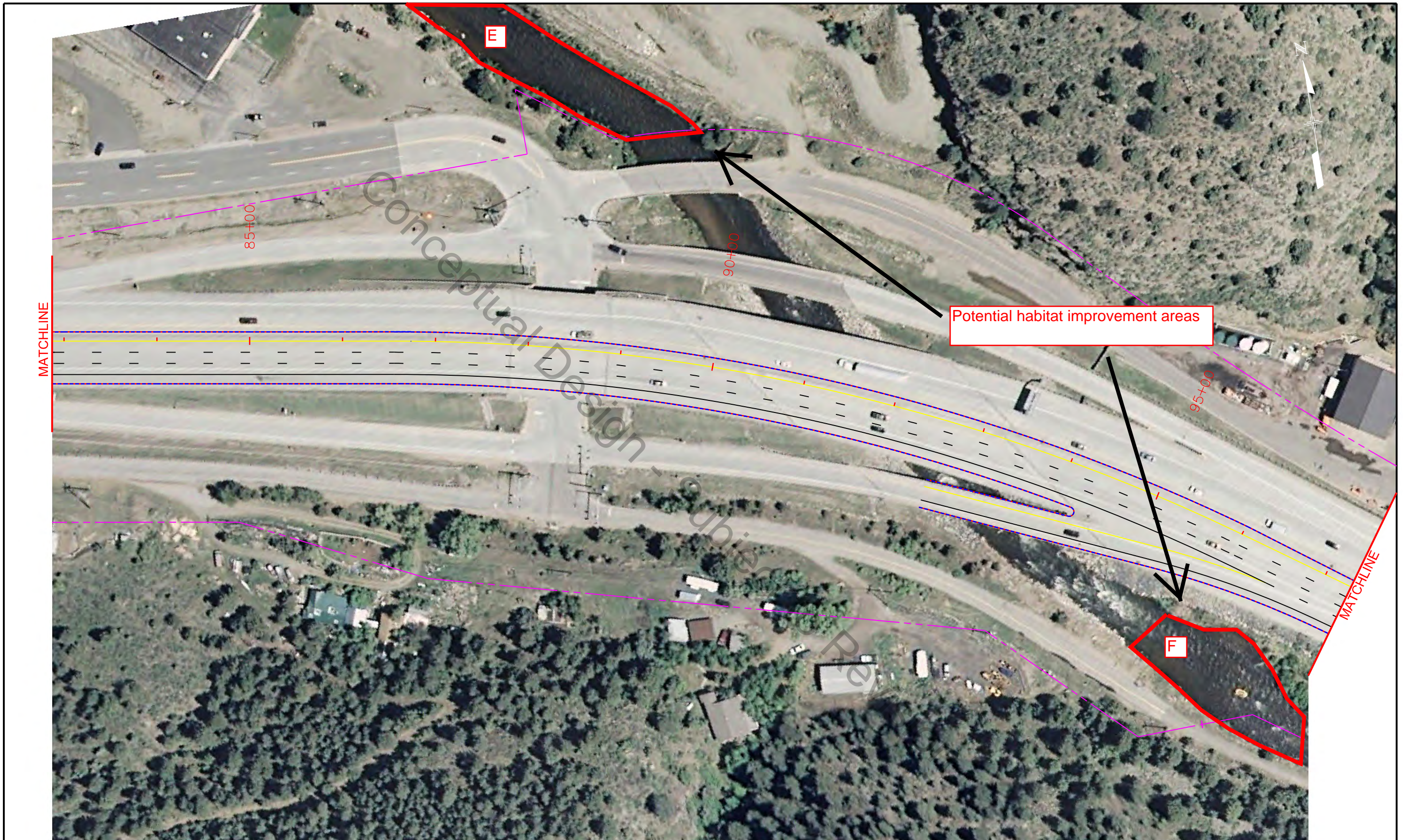
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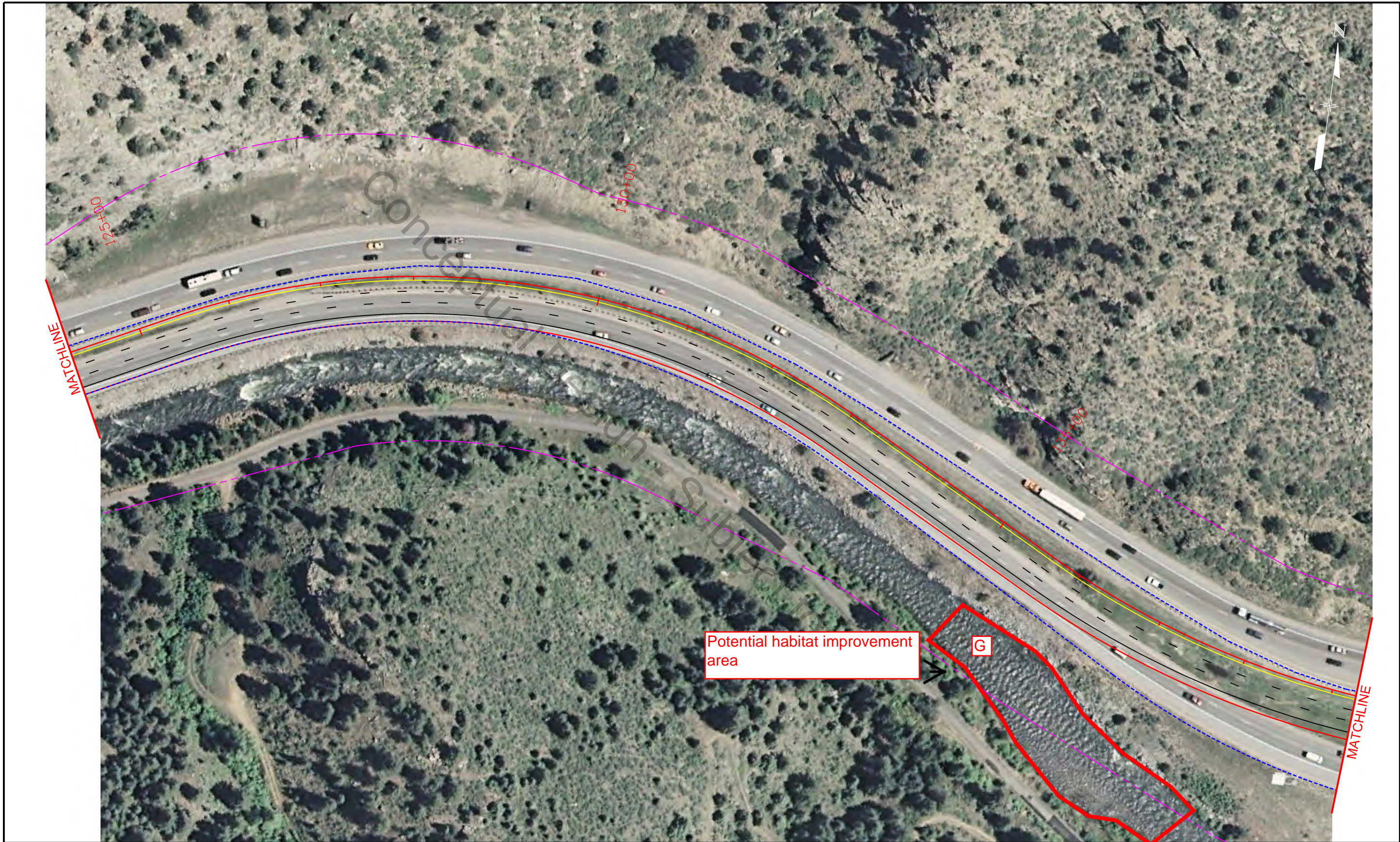


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