

**US 50 West: Purcell Boulevard to Wills Boulevard (Milepost 309 to
Milepost 313) and McCulloch Boulevard Intersection
Improvements (Milepost 307)**

Project Number: STA 050A-022

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Water Quality and Floodplains Technical Report

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List of Acronyms and Abbreviations

µg/L	micrograms per liter
Ave.	Avenue
BFE	Base Flood Elevation
Blvd.	Boulevard
BMPs	Best management practices
CDPHE	Colorado Department of Public Health and Environment
CDOT	Colorado Department of Transportation
CDPS	Colorado Discharge Permit System
CLOMR	Conditional Letter of Map Revision
EA	environmental assessment
EDB	Extended detention basin
FHAD	Flood Hazard Area Delineation
FHU	Felsburg Holt & Ullevig
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
MS4	Municipal Separate Storm Sewer System
PEL	Planning and Environmental Linkages
Rd.	Road
ROW	Right-of-way
Se	Selenium
SWMP	Stormwater Management Plan
TSS	total suspended solids
WQCV	Water Quality Capture Volume
WSE	Water Surface Elevation

1. Introduction

The Colorado Department of Transportation (CDOT) is conducting an Environmental Assessment (EA) for proposed improvements to US Highway 50 (US 50) from Purcell Boulevard (Blvd.) to Wills Blvd. and the intersections of US 50 and Purcell Blvd., Pueblo Blvd., and McCulloch Blvd. (i.e., US 50 West EA) (**Figure 1** and **Figure 2**).

The Proposed Action includes elements of the recommended Preferred Alternative identified in the *US 50 West Planning and Environmental Linkages (PEL) Study (US 50 West PEL Study)* (2012a). The PEL recommended Preferred Alternative identified improvements to address peak-hour congestion and above average crash rates along US 50 from Swallows Road (Rd.) to Baltimore Avenue (Ave.) (**Figure 3**). Appendix A2, *US 50 West PEL Study* (CDOT, 2012a), and A3 of the EA, *US 50 West Implementation Plan* (CDOT, 2012b), include additional information on the PEL Preferred Alternative.

A water quality and floodplain assessment was conducted for the US 50 West Project in support of the EA. This technical report describes the water quality and floodplains of creeks within and adjacent to the project area, evaluates the potential for impacts as a result of the Proposed Action and No Action Alternative, and identifies proposed mitigation measures.

1.1 Project Description

1.1.1 Proposed Action

The Proposed Action would include widening 3.4 miles of US 50 to include a third eastbound lane from Purcell Blvd. to Wills Blvd. The Proposed Action would also provide intersection improvements at the Purcell Blvd./US 50, Pueblo Blvd./US 50, and McCulloch Blvd./US 50 intersections (**Figure 1** and **Figure 2**). The intersection improvements at Purcell Blvd. and McCulloch Blvd. would modify the northbound to eastbound turn lane geometry to US 50, and add a channelizing curb island for improved traffic flow and pedestrian/bicycle refuge. Intersection improvements at Pueblo Blvd./US 50 would include an eastbound through lane, an eastbound deceleration lane and ramp onto Pueblo Blvd., and a northbound ramp and acceleration lane onto eastbound US 50. The proposed improvements would also include widening the eastbound bridge at Wild Horse Dry Creek (CDOT Structure K-18-CW). The bridge improvements would include extending the existing piers within the Wild Horse Dry Creek drainage area, adding a third eastbound lane, and incorporating a multi-use pedestrian/bicycle trail on the bridge to accommodate a proposed future multi-use trail on the southbound side of US 50. The multi-use trail would be a separate project to be built by others. The Proposed Action would also include drainage improvements and water quality features.

The proposed transportation and water quality improvements would be constructed within the existing CDOT right-of-way (ROW). Permanent easements for drainage would be required in three locations adjacent to CDOT ROW. The main text and figures of the EA provide additional detail about the Proposed Action, while Appendix A1 of the EA includes project drawings.

1.1.2 No Action Alternative

The No Action Alternative would include any transportation projects that have not been built, but for which funding has been committed. As identified in the *US 50 West PEL Study* (CDOT, 2012a), the No Action Alternative assumes that no major capacity improvements would occur along US 50 from Swallows Rd. to Baltimore Ave. (CDOT, 2012a). However, the No Action Alternative would include routine maintenance to keep the existing transportation network in good operating condition. The main text of the EA provides additional detail about the No Action Alternative.

Figure 1. Proposed Action – Purcell Boulevard to Wills Boulevard

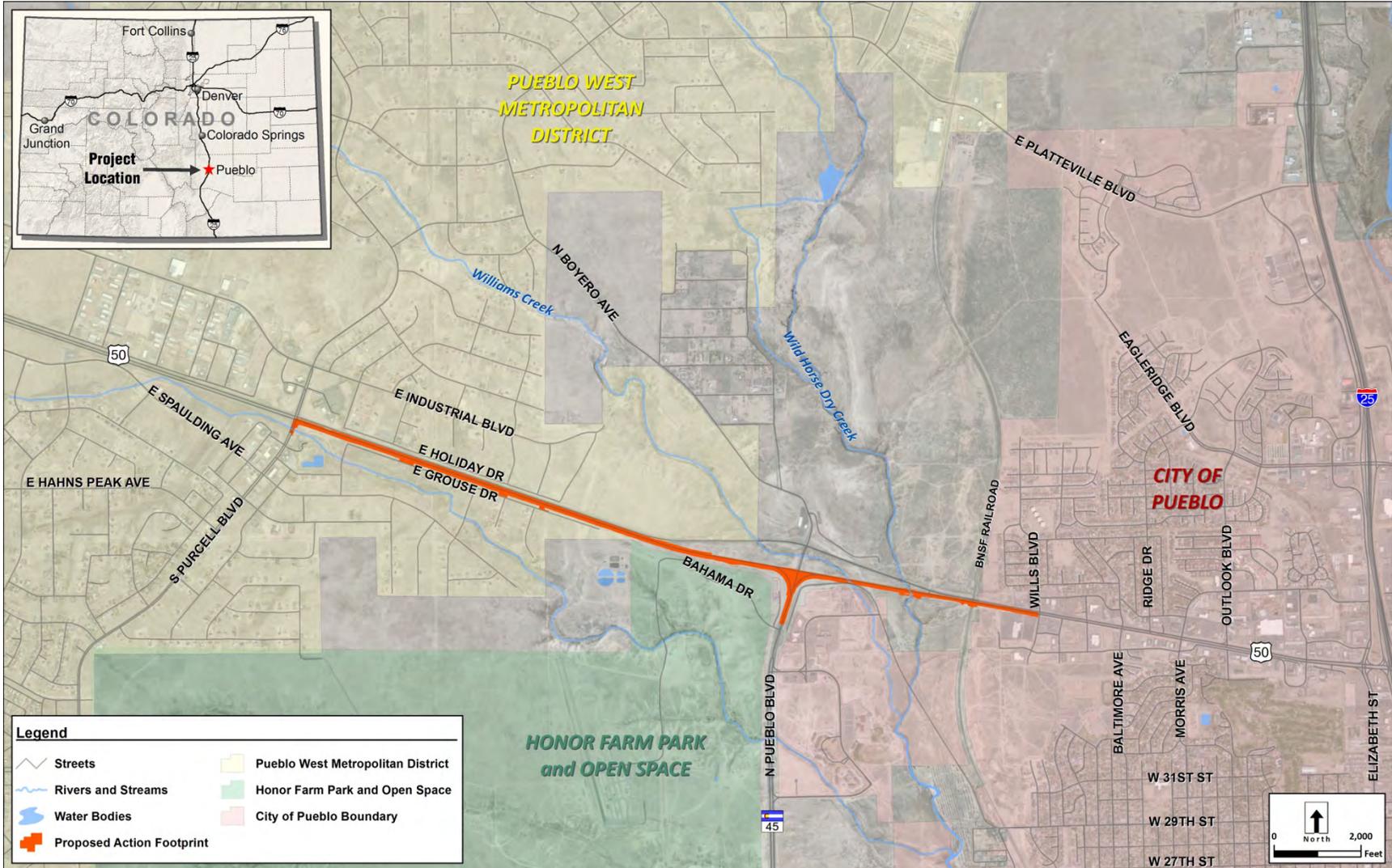
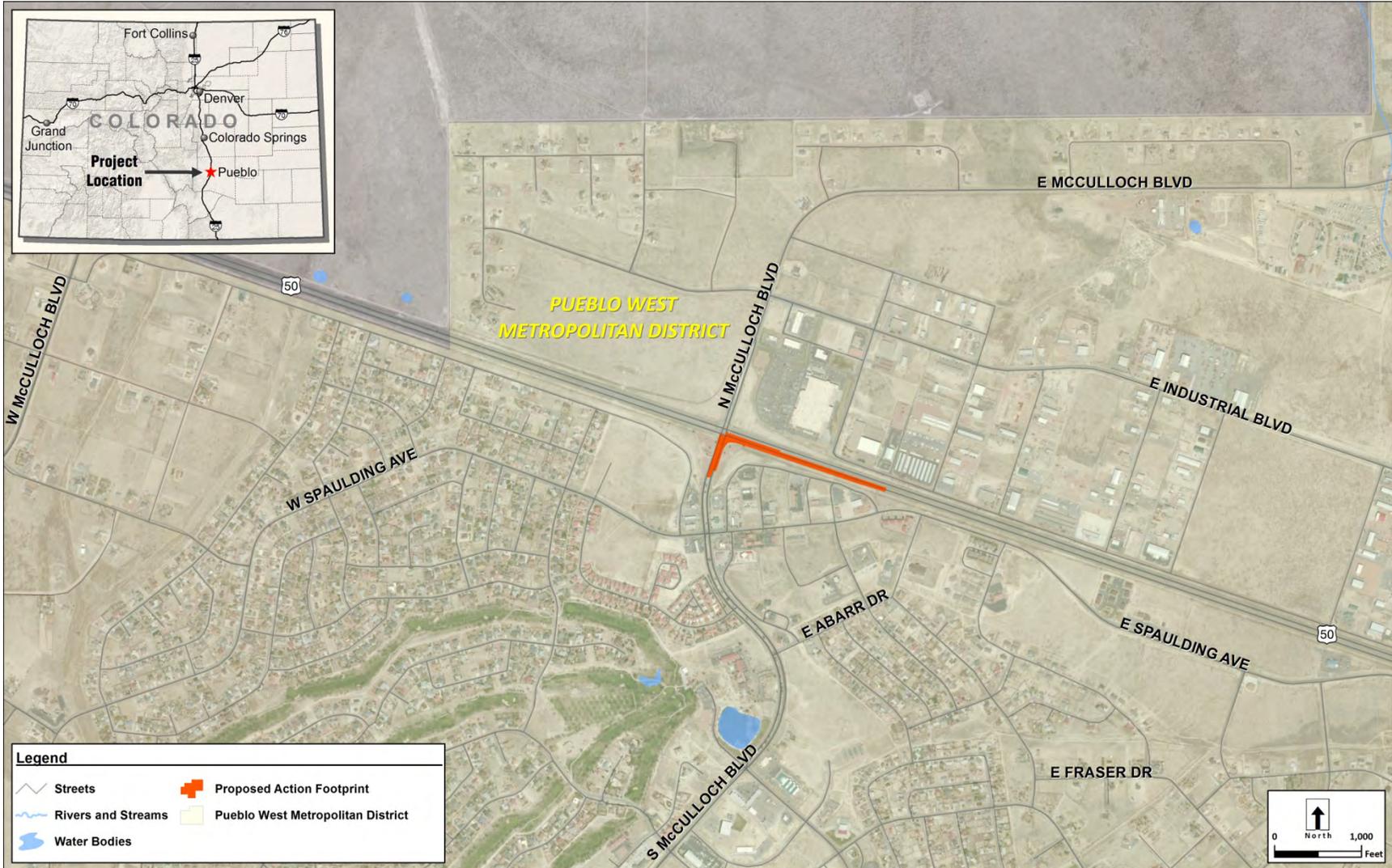
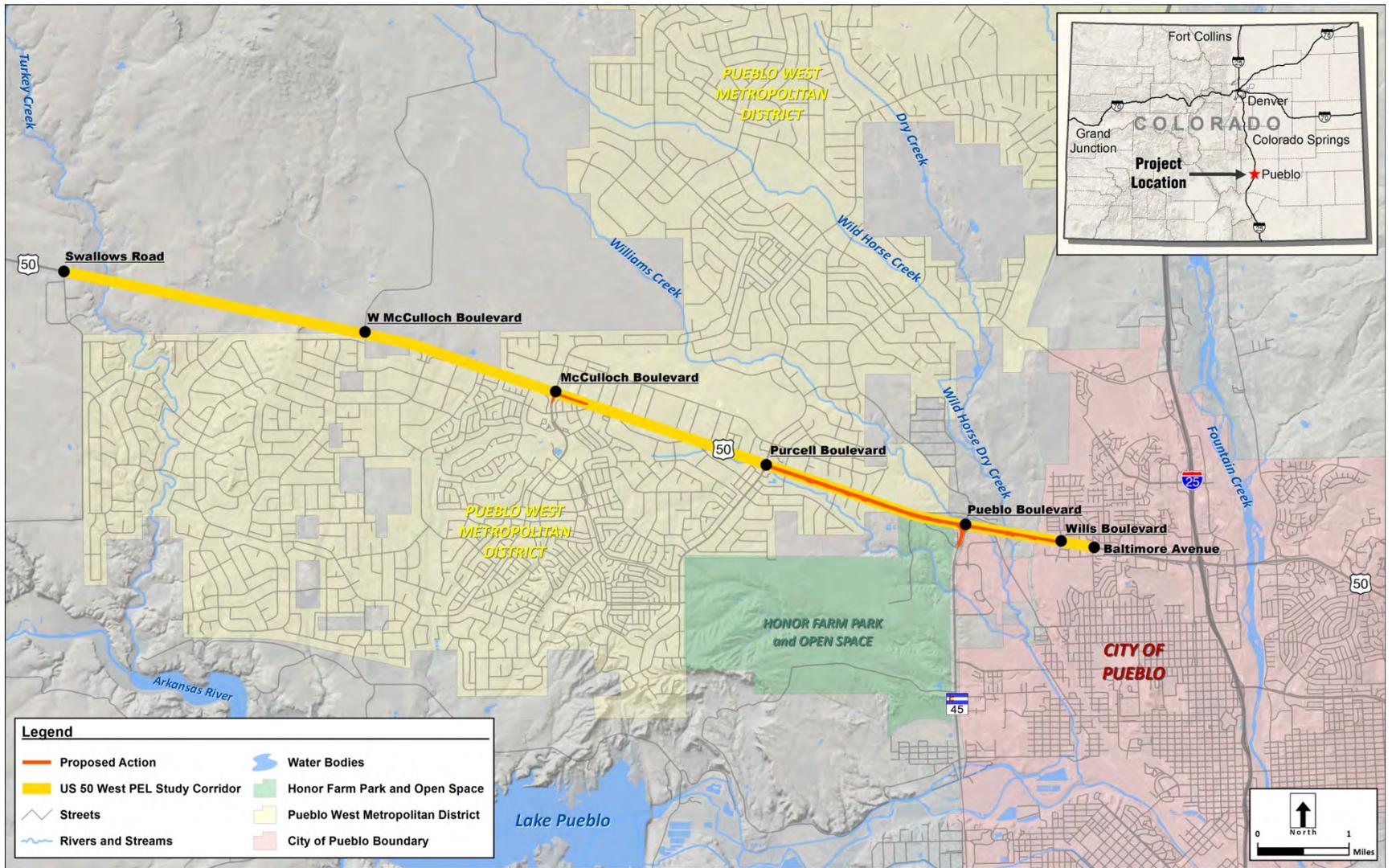


Figure 2. Proposed Action – McCulloch Boulevard/US 50 Intersection



50 US 50 West Environmental Assessment

Figure 3. US 50 West PEL Study Corridor



2. Water Quality

The receiving water bodies of interest include Wild Horse Dry Creek and Williams Creek. Williams Creek flows into Wild Horse Dry Creek about 1 mile south of US 50, and Wild Horse Dry Creek flows into the Arkansas River 4 miles to the south. Wild Horse Dry Creek crosses US 50 at milepost 312.558 and Williams Creek crosses at milepost 312.500.

The water bodies' listed beneficial use according to the Colorado Department of Public Health and Environment (CDPHE) Regulation 32 is a user protected designation and an aquatic life warm 2, recreation E and agriculture. Impairment levels are *E. coli* at 126 colony forming units/100 milliliter and selenium (Se [ac]) at 708 micrograms per liter ($\mu\text{g/L}$).

2.1 303(d) List

Wild Horse Dry Creek is included in the CDPHE Water Quality Control Division (Division) 303(d) list for impaired waters. The CDPHE water body identity for Wild Horse Dry Creek is COARMA04a (Segment 4a). The entire creek has a 303(d) high priority listing for *E. coli* and a low priority for selenium (Se). Williams Creek is COARMA04a (Segment 4d) and is not impaired.

Regulation 32 for final action provides updated “Wildhorse Creek” information effective December 31, 2013, regarding the designation and the selenium standards (which are the selenium ambient quality-based site-specific standards proposed by the Pueblo West Metropolitan District during the June 2013 rulemaking hearing):

- On page 22 is the Middle Arkansas Segment 4a “Mainstem of Wildhorse Creek from the source to the confluence with the Arkansas River,” for which the Designation is Use Protected (UP) and the selenium (Se) water quality standards are $\text{Se(ac)}=2376 \mu\text{g/L}$ and $\text{Se(ch)}=2110 \mu\text{g/L}$. Under “Temporary Modifications and Qualifiers,” there is a note: “See assessment location at 32.6(4).” Numeric standards for other water quality parameters are listed on page 22 for Middle Arkansas Segment 4a.
- On page 11 is the 32.6(4) Assessment Criteria, “The following criteria shall be used when assessing whether a specified waterbody is in attainment of the specified standard. (a) Middle Arkansas Segment 4a, Wildhorse Creek, $\text{Se(ac)}=2376$, $\text{Se(ch)}=2110$: Selenium Assessment Location, Wildhorse Creek above Pesthouse Gulch: 38.296478, -104.649201”
- On pages 63 and 64 is the Statement of Basis and Purpose language for the Mainstem of Wildhorse Creek (Middle Arkansas Segment 4a) regarding the Water Quality Control Commission’s revision of the selenium ambient quality-based site-specific standards.

Regulation 32 for final action also provides “Williams Creek” information regarding the designation and the selenium standard:

- On page 22 is the Middle Arkansas Segment 4d “All tributaries, including wetlands, to the Arkansas River and Pueblo Reservoir from the inlet to Pueblo Reservoir to the Colorado Canal headgate, except for specific listings in the Fountain Creek Subbasin and in segments 4a, 4b, 4c and 4e through 18b,” for which the Designation is Use Protected (UP) and the selenium (Se) water quality standard is $Se(ch)=20(Trec)$. Numeric standards for other water quality parameters are listed on page 22 for Middle Arkansas Segment 4d.

The source of selenium is suspected to be related to natural background conditions from shale outcrops within the watershed. Selenium and *E. coli* are not associated with highway operations and are not considered to be an environmental issue for this project. Nevertheless, this roadway project will provide treatment for roadway runoff that extends above and beyond the minimum requirements of providing the water quality capture volume (WQCV) for the added pavement areas. These additional treatments will include additional WQCV for existing tributary pavement and providing flat swales adjacent to the road shoulders to allow sediment to settle out. Other improvements to the water quality that are not currently provided will include adding riprap erosion protection at culvert ends and around bridge abutments and piers.

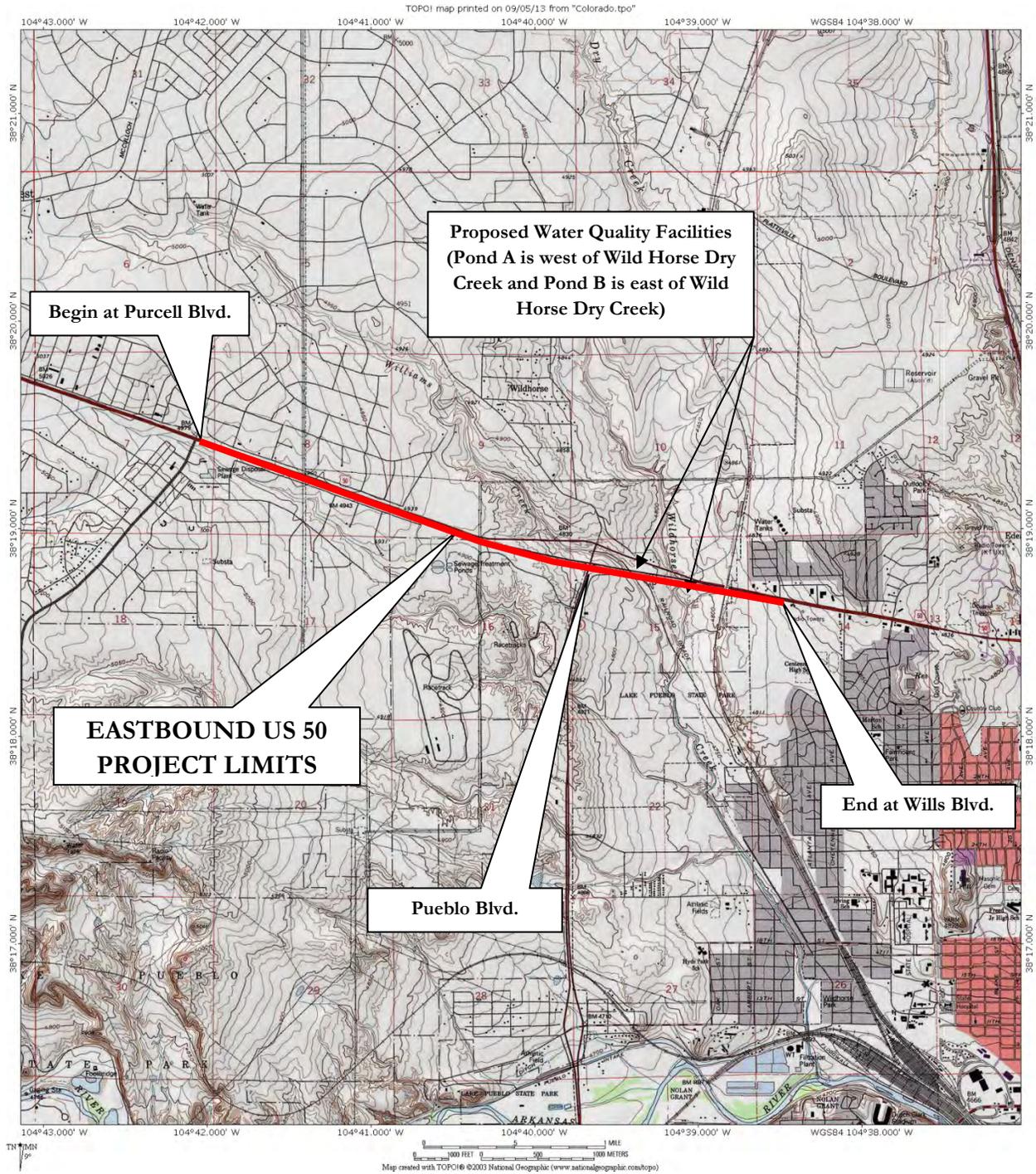
3. Issues

Potential construction phase issues include sediment or pollutants running off exposed areas or paved areas and entering a waterway, tributary culverts and swales or to private property. Post-construction issues include pollutants being washed off paved surfaces and eventually entering waterways or adjacent properties. Increased pavement will also increase the amount of surface runoff.

4. Methods

Based on CDOT’s *Water Quality Model Program Decision Tree and Evaluation Handbook* of February 2013, it was determined that no modeling was necessary for this project. Data uses included checking the CDPHE 303(d) list of impaired waters database. The 303(d) lists Wild Horse Dry Creek as having a high priority for *E. coli* and a low priority for selenium (Se), neither of which are pollutants associated with transportation projects or pavement. The proposed permanent water quality facilities identified in the Proposed Action include flat swales adjacent to the roadway and two extended detention basin (EDB) water quality ponds. The swales and EDBs will attenuate flows, allow infiltration, evapo-transpiration, and treat biological uptake. This technical report involved no sampling or analysis.

Figure 4. Vicinity Map



5. Impact Summary

Permanent impacts on water quality in Wild Horse Dry Creek and Williams Creek will be mitigated with project modifications that will include improved flat native grass lined swales adjacent to the roadway and two extended detention basin ponds. These modifications will treat new pavement plus existing pavement. Currently, there is no water quality treatment for the roadway runoff, and this project will improve the water quality of stormwater runoff. Temporary impacts during construction will include working adjacent to drainageways. Impacts on drainageways can occur during bridge construction (pier construction and revetment placement), storm drainage construction, removal of invasive plant species (tamarisk, noxious weeds), or during grading operations. It is planned to have construction best management practices (BMPs) adjacent to drainageway areas to prevent erosion in adjacent construction zones and deposition of sediment.

6. Mitigation Strategies

The following are preliminary strategies for mitigation of impacts and are subject to change. The National Environmental Policy Act decision document will define final mitigation measures. The project will closely follow the existing horizontal and vertical alignment of eastbound US 50 to minimize impacts. The new bridge at Wild Horse Dry Creek will be of similar length and location, and grading below the bridge is planned to minimize impacts to the waters of the US and avoid wetlands.

The two water quality ponds will pass treated stormwaters to Wild Horse Dry Creek via culverts, with end sections and riprap erosion protection. These two outfalls will be placed as needed to avoid any impact to the existing wetlands. A preliminary bridge hydraulics analysis for US 50 over Wild Horse Dry Creek was performed. Results indicate that the proposed bridge, with minor channel improvements, will produce a minor-rise in the 100-year regulatory base flood elevation (BFE) (see **Section 8.1, Floodplain Assessment**, for details). During construction, impacts will be minimized. Final design plans will include a detailed Stormwater Management Plan (SWMP) and a set of erosion and sediment control plans. This set of plans will serve as a guide to the contractor and CDOT construction management forces during construction. It will be a living document that can be modified or revised in the field during construction to address any unforeseen erosion or sedimentation problems. BMPs that are anticipated to be used for this project might include:

- Sweeping with a pick-up broom
- Erosion logs
- Aggregate bags
- Check dams
- Silt fence
- Concrete washout structures
- Storm drain inlet protection
- Stabilized construction entrances
- Removal and disposal of sediment
- Temporary berms
- Native seeding and mulching
- Placement of soil retention blankets
- Placement of plastic fence to protect sensitive areas

An erosion control supervisor will be present at the construction site to ensure that erosion control is provided throughout the construction period and the SWMP is implemented. Erosion control

devices will be added, repaired, modified, and maintained as required to limit erosion and sedimentation within the project site.

CDOT's Municipal Separate Storm Sewer System (MS4) requires either 100 percent water quality capture volume (WQCV) or 80 percent total suspended solids (TSS) removal for new impervious areas in a project area. The permanent water quality facilities for this project will provide 100 percent WQCV for the new paved areas within the project area. This conforms to CDOT's MS4 requirements.

The mitigation strategy for permanent water quality is to have two EDBs: (1) Pond A west of Wild Horse Dry Creek and (2) Pond B east of Wild Horse Dry Creek. These ponds will have fore-bays and micro-pools and provide the required water quality capture volumes for their tributary areas. Each pond will have an outlet structure designed for a 40-hour drain time. The fore-bays will be located where the storm sewers empty into the ponds. They are designed to drain within 5 minutes and intercept the large floatable debris. Access to each facility will be from US 50 or other CDOT ROW locations. A 10-foot-wide aggregate base course maintenance path at a maximum 10:1 slope will provide direct access to the basins and outlet works. The design objective for this project is to provide the water quality capture volume for all of the paved surfaces (new and existing) within the tributary basins to each pond. The EDB type of permanent water quality treatment conforms with the CDOT Region 2 MS4 program because it:

- Can be fit within the current CDOT ROW (no additional ROW is required for water quality facilities; however, permanent easements for drainage will be required in three locations adjacent to CDOT ROW)
- Can achieve the required water quality capture volume
- Can be accessed for maintenance
- Is the type of facility that CDOT has approved

Expected pollutant removal rates for facilities that capture the water quality capture volume are between 80 and 90 percent of TSS. No existing water quality facilities in the project area will necessitate abandonment or reconfiguration. All water quality facilities will pass treated stormwaters to Williams Creek or Wild Horse Dry Creek within the ROW. **Table 1** summarizes the impervious area that would be treated by the proposed water quality ponds.

Table 1. Summary Water Quality Facility at Wild Horse Dry Creek

ID	Description	Required Impervious Area to be Treated (acre)	Actual Impervious Area Treated (acre)	Comments
Pond A	US 50 Basins West of Wild Horse Dry Creek	12.18	>13.0	Water quality needs fulfilled
Pond B	US 50 Basins East of Wild Horse Dry Creek	1.95	>2.5	Water quality needs fulfilled
—	Untreated Area at McCulloch Blvd.	0.65	0.0	Water quality needs fulfilled by compensation from Basins Tributary to Ponds A and B above
Totals		14.78	>15.5	All water quality needs fulfilled and MS4 obligations met

CDOT forces will complete the anticipated maintenance work that will be required to ensure continued effectiveness of the facility, which will include:

- Conducting regular inspections.
- Mowing the native grass in the water quality basin and removing vegetation that may clog the outlet structure.
- Cleaning trash and debris off the trash rack and grates and appropriately disposing of material off-site.
- Clearing orifice holes so that water can continue to flow.
- Removing sediment from the basin when levels reach the lowest hole or the fore-bay outlet pipe is blocked. This can be done with a hand shovel, bob-cat, or skid-steer. Removing the material off-site prevents re-polluting the pond.
- Reseeding as necessary to prevent erosion.
- Adding additional erosion control items as needed to stabilize the site.
- Tightening or replacing trash rack bolts and screens as necessary to keep the structure in working order.

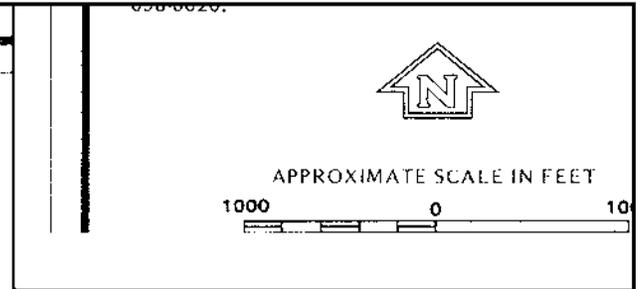
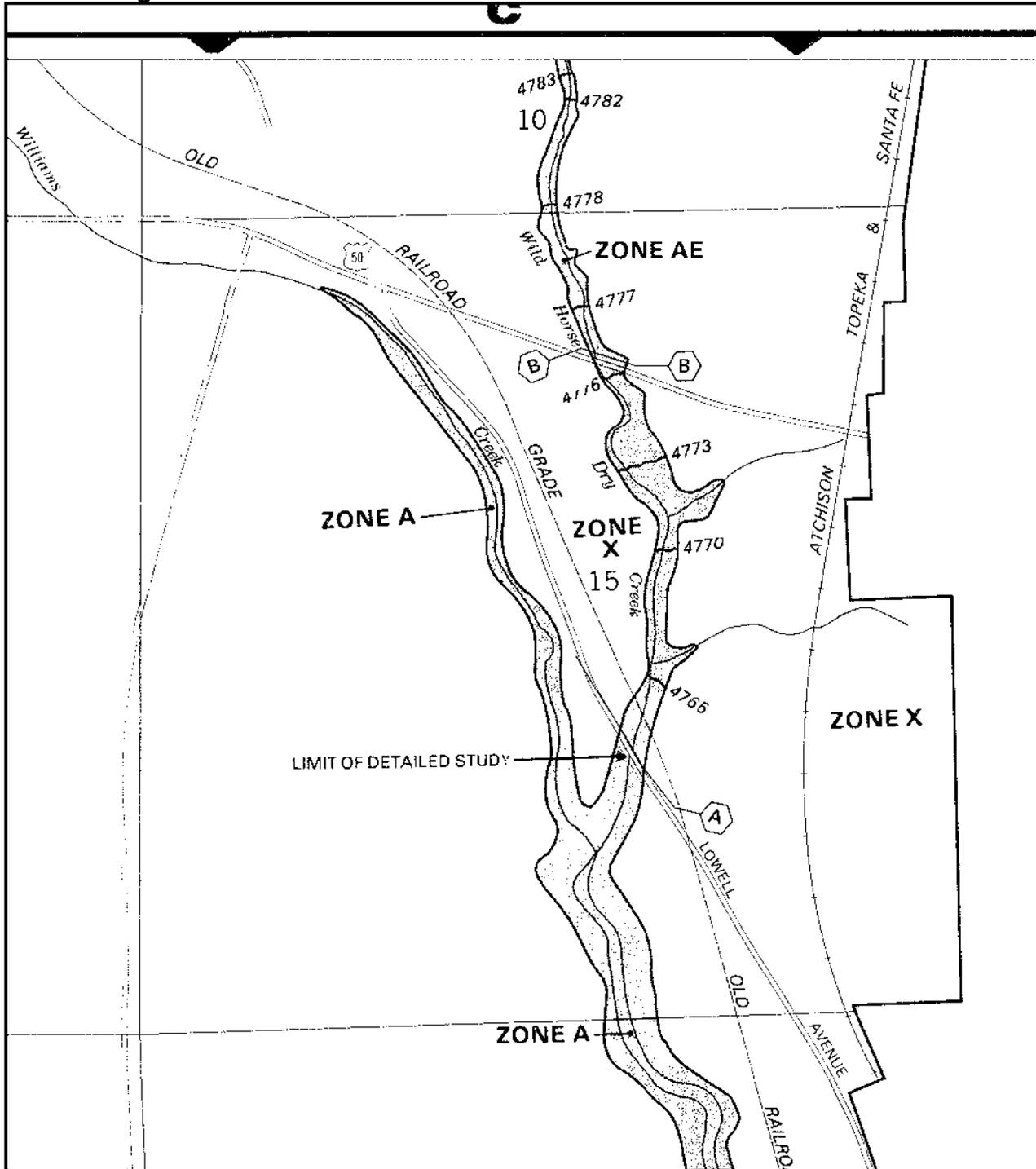
7. Floodplains

US 50 crosses one FEMA regulated floodplain in the project area: Wild Horse Dry Creek. Wild Horse Dry Creek is designated as a Zone “AE” floodplain. No floodway is delineated for the Wild Horse Dry Creek floodplain. Zone “AE” designates areas that are subjected to inundation by the 100-year flood event as determined by detailed methods. BFEs are provided for “AE” Zones. The existing floodplains and Flood Insurance Study for Pueblo County has an effective date of September 29, 1989, and no Letters of Map Revision have been completed in this area for either creek, as shown on **Figure 5**. It does not appear that the eastbound lanes of US 50 were modeled and incorporated into the current FEMA mapping. The Wild Horse Dry Creek floodplain is approximately 230 feet at the widest part of the US 50 crossing based on the Flood Insurance Rate Map (FIRM) Panel No. 080147 0240B effective September 29, 1989.

7.1 Floodplain Assessment

Work in this floodplain will require a Floodplain Development Permit, most likely from both the City of Pueblo and Pueblo County. It is unlikely that a Conditional Letter of Map Revision (CLOMR) from FEMA will be needed. A CLOMR is required for projects where the proposed changes produce a rise in the water surface elevation (WSE) of more than 1 foot in the floodplain or more than 0.0 feet in the floodway. Wild Horse Dry Creek does not have a floodway delineated; however, FEMA is currently reviewing a Flood Hazard Area Delineation (FHAD) study for the area done by Anderson Consulting Engineers, Inc. This FHAD would delineate a floodway for both Williams Creek and Wild Horse Dry Creek. This FHAD also revises the hydrology for Wild Horse Dry Creek and decreases the 100-year flows significantly. It is not currently known when FEMA will accept this study and it will become effective, but it is likely to occur during the final design phase of the US 50 West Project. Therefore, the goal of this project is to use the base information from the FHAD and evaluate the floodplains with the intent of not having to do a CLOMR. Mitigation efforts will be investigated to produce a no-rise situation to facilitate this goal. Access to the HEC-RAS model for the FHAD was available to use as a base model. This also ensures that this project will tie into the proposed FHAD study and use the same 100-year flows.

Figure 5. FEMA FIRM



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

PUEBLO COUNTY,
COLORADO
(UNINCORPORATED AREAS)

PANEL 240 OF 725
(SEE MAP INDEX FOR PANELS NOT PRINTED)

PANEL LOCATION

COMMUNITY-PANEL NUMBER
080147 0240 B

EFFECTIVE DATE:
SEPTEMBER 29, 1989

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

The bridge at Wild Horse Dry Creek will be widened to the south (downstream) approximately 38 feet. This has been modeled in HEC-RAS for preliminary design and would produce minor impacts to the floodplain of approximately 0.2 feet rise upstream of the eastbound bridge when comparing existing floodplain conditions to proposed floodplain conditions. This 0.2 foot rise is within the FEMA allowable rise of 1 foot. This will not produce a measureable change in the floodplain width because the floodplain is confined to the main channel.

Freeboard is not an issue for this bridge as there is at least 10 feet of freeboard available in both existing and proposed conditions. The flows are contained in the channel, and the proposed bridge widening will not impact any property outside the channel. The HEC-RAS model will be updated during final design with a final grading plan in the channel due to riprap and channel improvements. Floodplain Development Permits will be completed during final design for both the City of Pueblo and Pueblo County as needed. Further coordination will be done with Anderson Consulting Engineers, Inc. on the FHAD study during final design.

7.2 Floodplain Mitigation

Mitigation efforts will be investigated as part of final design to negate these impacts and produce a no-rise situation. This area of Wild Horse Dry Creek is under investigation to provide some environmental benefits, including removing the tamarisk and adding some new plantings. Riprap will also be added to protect the bridge from scour and for incidental benefit of discouraging the use of an informal trail system under the bridge. These items are not expected to impact the channel geometry significantly, but they have not been accounted for in the floodplain modeling yet. During final design, these impacts will be taken into account in the floodplain modeling and evaluated. The floodplain mitigation efforts will then be investigated in the form of additional channel improvements where appropriate to produce a no-rise situation. This should ensure that a CLOMR is not needed for this project.

8. Agency Coordination

Agencies that were coordinated with include the City of Pueblo, Pueblo County, and Pueblo West Metropolitan District.

9. CDOT Coordination

CDOT coordination for this project included Region 2 design, hydraulics, environmental, and maintenance staff.

10. Permits

Wetlands exist near the low areas for Wild Horse Dry Creek and Williams Creek. The anticipated impacts on these wetlands will likely be avoided, based on the current preliminary design. As the design progresses toward final completion, impacts will be more accurately established. Currently, it is not anticipated that an Army Corps of Engineers Section 404 permit will be necessary.

The consultant will prepare a CDPHE Colorado Discharge Permit System (CDPS) Permit. This permit will be prepared in conjunction with a set of erosion control plans that address erosion and sedimentation during construction. These plans will be prepared as a part of the final design. This permit will be transferred to the contractor at CDOT's discretion.

Groundwater depths within the project area are deep and the storm drain lines and water quality ponds are not anticipated to penetrate it. Caissons for bridge improvements may encounter groundwater and might require a dewatering permit. The contractor will be required to obtain any necessary dewatering permits. Project specifications will outline any required dewatering permits during final design.

A floodplain use permit will be obtained from Pueblo County. This permit will be prepared during the final design in conjunction with CDOT. In summary, the CDPS Permit and the floodplain permit(s) will be obtained by CDOT and transferred to the contractor at CDOT's discretion. The contractor will apply for a dewatering permit if deemed necessary.

11. References

- Colorado Department of Transportation (CDOT). 2004a. Drainage Design Manual.
- . 2004b. MS4 Permit, New and Redevelopment Stormwater Management Program, February.
- . 2012a. *US 50 West Planning and Environmental Linkages (PEL) Study*. June.
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- Urban Drainage and Flood Control District. 2011. Urban Storm Drainage Criteria Manual, Volumes I, II, and III.