Environmental Analysis Methods Report

March 2005

Submitted To:

CDOT Region 6
2000 S. Holly
Denver, CO 80222

Submitted By:

Wilson & Company
999 18th Street, Suite 2600
Denver, CO 80202

Table of Contents

List of Tables

List of Figures

1.0 INTRODUCTION

The Colorado Department of Transportation (CDOT) and the Federal Highway Administration (FHWA) are preparing an Environmental Assessment (EA) and Section 4(f) Evaluation for transportation improvements along C-470 between Interstate 25 (I-25) and South Kipling Parkway. The Environmental Assessment requires full compliance with FHWA policies and procedures under the National Environmental Policy Act (NEPA-42 U.S.C. 4321-4370(c) (1969)). All technical reports will be prepared in accordance with the regulatory guidelines of 23 CFR 771 et. seq. and FHWA's Technical Advisory T 6640.8A (1987).

This methodology report describes the approach and relevant procedures that will be used to satisfactorily provide the environmental analysis for the C-470 EA. The methodology will help to guide the preparation of the Purpose and Need, the alternatives analysis process and provide full disclosure of any and all impacts related to the detailed alternatives developed as part of this project. Appendix A displays the "Environmental Scoping Form" produced by CDOT's Environmental Program Branch. This documents the responsibilities for the preparation of the EA.

The project team will consider changes in regulations regarding each environmental resource before this methodology report is finalized and approved by CDOT and FHWA.

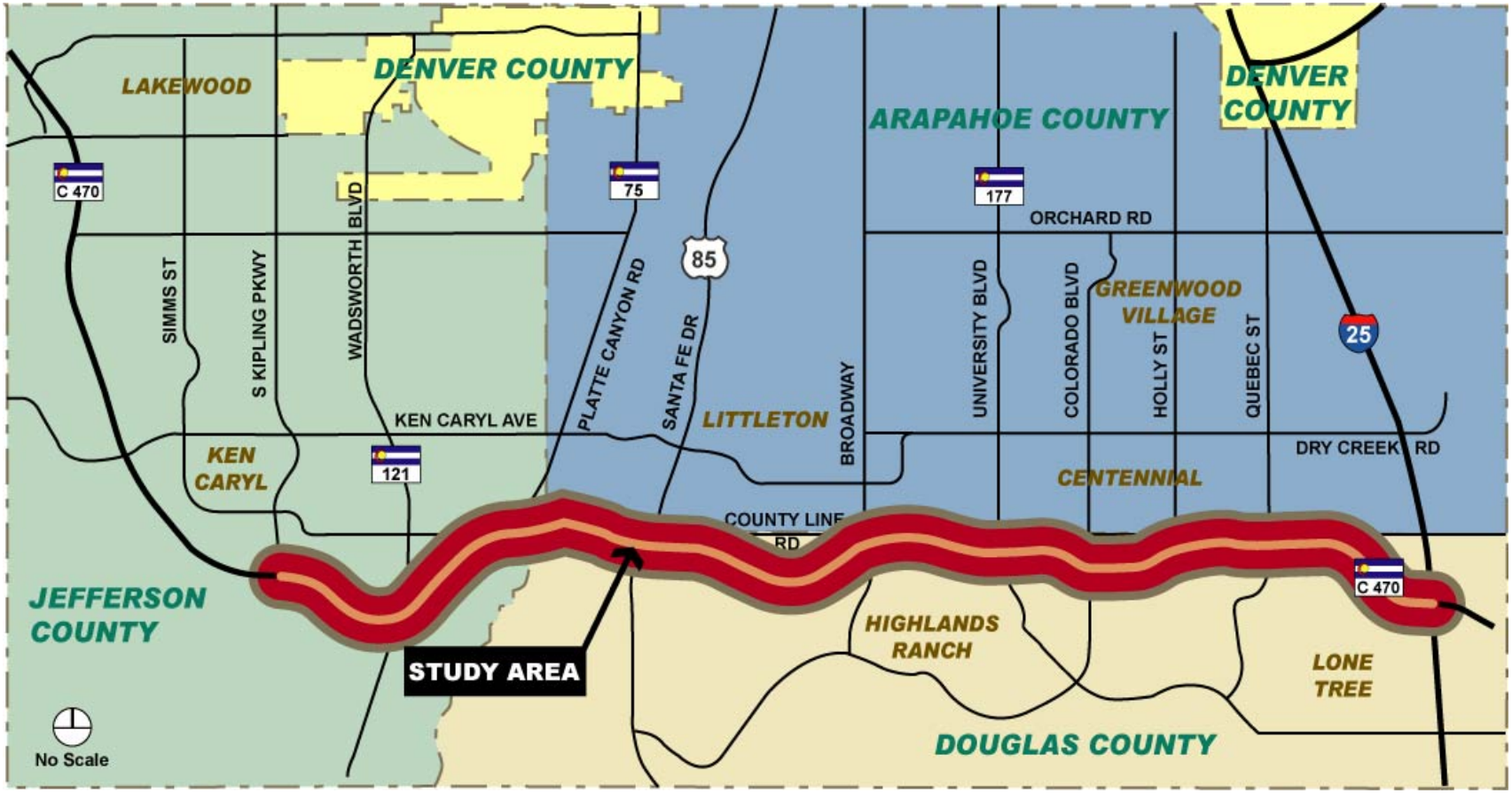
1.1 PURPOSE OF THE METHODOLOGY REPORT

The purpose of this report is to document the methods that will be followed in the preparation of reports and technical memoranda prepared to support the EA. All resource analysis will document the relevant federal, state and/or local agency mandates required in the environmental analysis of each applicable resource. The EA will have a separate section for each environmental resource that describes existing conditions, evaluates impacts of project alternatives and discusses mitigation of impacts for the alternatives.

1.2 STUDY AREA LIMITS

The general study area limits are shown in Figure 1 and includes C-470 from the I-25/C-470 interchange westbound to South Kipling Parkway. The project study area spans three counties: Jefferson, Arapahoe and Douglas and traverses through the communities of Lone Tree, Centennial, Highlands Ranch, Littleton, Ken Caryl, and unincorporated Jefferson County. The study area may be refined as more detailed alternatives are developed.

Figure 1
Project Study Area



2.0 SOCIAL, ECONOMIC, AND ENVIRONMENTAL RESOURCE AREAS

2.1 SOCIAL AND ECONOMIC ANALYSIS

Social and economic impacts are of particular note in this study area because the corridor serves a major employment center in the Denver Technology Center. The surrounding communities are dependent on C-470 and require reasonable access to support the movement of people, goods and services. Existing and projected corridor populations will be assessed. Investigation will be made into how the C-470 corridor project alternatives will affect community cohesion, safety, neighborhood disruption, and accessibility of employment, commerce, facilities and services. The benefits of transportation improvements to the community will also be discussed. Projected impacts of the proposed transportation improvements to the social and economic environment will be analyzed for all alternatives.

The effects of project alternatives on the local economy will be evaluated qualitatively and quantitatively using data is available from U.S. Census Bureau, Bureau of Labor Statistics, Bureau of Economic Analysis, Denver Regional Council of Governments (DRCOG), Colorado Department of Local Affairs (DOLA), and local chambers of commerce. The economic effects are dependent on factors which may include: direct displacement of real property, businesses, and residents, disruption of commercial activities during and after construction, and impacts of corridor operations and maintenance-related activities to businesses and residents. The analysis will examine right of way acquisition and displacement of businesses. Fiscal impacts and the potential for redevelopment will be qualitatively discussed as well.

Information sharing will occur with other tasks including environmental justice, right of way and relocation, construction, land use analysis, potential mobility and access disruptions, and displacement.

Table 1 describes the methodology of the project area's social considerations and economic impacts.

Table 1
Social and Economic Analysis

Social and Economic Analysis	
Subject Areas	• Community cohesion/division, neighborhood impacts, accessibility of facilities, travel patterns, destinations (employment and services) • Consistency with adopted land use plans and policies
Relevant Data/Information Sources	• Data on population, age distribution, employment sectors, businesses, schools, recreation areas, police, fire, and emergency services, public facilities used, and residences of users • 2000 Census block group data • Existing and projected (2025) data, as available, related to commercial and industrial enterprises, defined business districts, employment, local tax base, land values (commercial, residential, institutional, etc.), retail sales, regional earnings, etc.
Collection and/or Analysis Methodology	• Create GIS maps showing population densities • Create GIS maps showing minority and Hispanic populations • Create GIS maps showing income dispersion • Create GIS maps showing age distribution • Create GIS maps demonstrating the boundaries of community residential areas, community economic and travel boundaries, routes and methods of travel within community and leaving the community • Create GIS maps to be used to determine whether alternatives divide communities or generate new/different travel patterns • Analyze corridor employment rates by county • Analyze employment types by industry • Determine which businesses and residences maybe acquired for the project alternative. Estimate the right of way that may be acquired and discuss how relocation of displaced businesses and residences would be addressed (refer to right of way section) • Determine total acres of land converted from private ownership to public ownership for right of way acquisition or other project related purposes • Use of existing information and agency sources to determine relative economic impacts of transportation improvements
Study Location	• Study area limits as defined in Figure 1.
Regulatory Environment	• *NEPA 1969 (42 USC 4321-4370 c)* • *FWHA Technical Advisory T 6640.8A, 1987*
Impacts	• Will be determined
Mitigation options	• Will be determined
Deliverables	• Summary of data and analysis will be provided in the EA

2.2 ENVIRONMENTAL JUSTICE

The evaluation of disproportionately high and adverse affects on minority and low-income populations will include data compilation from many sources. In addition to general population data including demographics and income, other environmental studies data will be evaluated for impacts on the population. Efforts to notify and involve the population in the NEPA process will be considered in this analysis as well. Full documentation will be made of all finding and relevant data.

Table 2 describes the methodology for assessing environmental justice.

Table 2
Environmental Justice

Environmental Justice	
Subject Areas	• Examine disproportionate impacts of project on minority and low-income populations
Relevant Data/ Information Sources	• 2000 US Census track and block groups within corridor study area • Demographic data from the 2000 US Census and Colorado Department of Local Affairs (DOLA) including income, population, and household income • National Center for Education Statistics for students qualifying for reduced-price or free lunches at school • Department of Health and Human Services poverty guidelines • US Census Bureau Current Population Reports, Series P-60 on Income and Poverty • Individual County Average Median Income (AMI) for counties within the C-470 Corridor • Previous outreach, public involvement, environmental justice activities, comments, studies, evaluations and collected data • Interdisciplinary environmental information and impact issues obtained from other resources, including air toxics studies, hazardous materials studies, land use maps of sensitive receptors, noise studies, and traffic maps and reports addressing resident mobility, ridership, employment destinations, etc
Collection and/or Analysis Methodology	• Identify low-income populations and what constitutes a low-income population • Identify minority populations and what constitutes a minority population • Map low-income and minority populations by Census Block Group in relation to the C-470 Corridor environmental impact area • Identify percent of students in schools located within the corridor study area receiving reduced price or free lunch • Identify percent of residents in retirement communities receiving Section 8 housing assistance • Overlay impacts of project alternatives to determine if there is a disproportionate impact to low income and minority communities compared to non-environmental justice populations • Create outreach plan for low income and minority populations to involve them in EA public involvement process. Identify local community leaders to act as liaisons. • Identify disproportionately high and adverse effects • Identify and consider environmental justice concerns raised by affected populations • Determine if impacts can be mitigated, if disproportionately high and adverse impact to minority and low income population are identified
Study Location	• Study area limits as defined in Figure 1.

Environmental Justice	
Regulatory Guidance/ Requirements	• *Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, 1994, and related guidance* • *FHWA Technical Advisory T6640.8a* • *Title VI of the Civil Rights Act of 1964* • *The Uniform Relocation Assistance and Real Property Acquisition Policy act of 1970 as Amended.* • *FHWA Order 6640.23, 1998 FHWA Actions to Address Environmental Justice in Minority and Low Income Populations* • *EPA Guidance for Consideration of Environmental Justice in Clear Air Act Section 309 Review (US EPA, July 1999)* • *Environmental Justice Guidance Under the NEPA, Council on Environmental Quality, 1997* • *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses, (USEPA, 1998)* • *Interim Guidance Addressing Environmental Justice in the EA, and EIS, (FHWA Western Resource Center, San Francisco, CA July, 2000)* • *Department of Transportation (DOT) Order 5610.2 on Environmental Justice* • *Environmental Justice in Colorado's Statewide and Regional Planning Process Guidebook, CDOT Division of Transportation Development (Sept 2003)* • *Environmental Justice Research Study (CDOT Research Branch, Dec 2003)* • *Transportation & Environmental Justice: Case Studies (Dec 2000), U.S. Department of Transportation, Federal Highway Administration, Federal Transit Administration*
Impacts	• Will be determined
Mitigation Options	• Mitigation measures and implementation strategies identified in the EA will reflect community views and the needs of affected low-income and minority populations
Deliverables	• Technical memorandum comprehensively documenting all research, analysis and findings • Document public involvement, outreach, and efforts to involve participation in the EA to low income and minority populations • Summary of analysis and findings in the EA

2.3 LAND USE

The influence of alternatives on existing and projected land use and zoning will be investigated as part of the EA. This section will be coordinated with the right of way section, and the secondary and cumulative impacts evaluation. Investigation will include how alternatives will affect adopted community plans, existing zoning, planned developments, and the growth and distribution of development within the project study area.

Table 3 describes the methodology used in evaluating land use.

Table 3
Land Use

Land Use	
Subject Areas	• Community plans, zoning, planned developments, the projected growth and distribution of development within the project study area
Relevant Data/ Information Sources	• Local neighborhood plans, county zoning maps, comprehensive plans, zoning codes, and DRCOG population and employment projections • Maps from Arapahoe County, Douglas County, Jefferson County, City of Lakewood, City of Lone Tree, City of Littleton, City of Centennial, City of Greenwood Village and DRCOG • Data on planned developments from local jurisdictions • Research data on the influence of transportation improvements on the growth and distribution of development
Collection and/or Analysis Methodology	• Land uses mapped, identifying jurisdictional boundaries and use along each alternative. Parcel use categories will include land in public ownership, commercial, residential, vacant, mixed uses, etc. • All land use data will be entered into a GIS database, for use in creation of maps demonstrating existing and proposed land use and zoning • Discussions with local jurisdictions on planned development and potential plan changes will be documented and reflected as needed in a GIS database for mapping purposes • Describe changes in available open space
Study Location	• Study area limits of project corridor as defined in Figure 1
Regulatory Guidance/ Requirements	• Locally adopted land use plans and zoning codes
Impacts	• Alternative impacts to existing and proposed land use will be disclosed. Units will be in terms of acres; impacts to property function may also be assessed. • Identify any future needs for right of way from other public agencies
Mitigation Options	• Recommendations for mitigation for impacts to existing and proposed land use and zoning will be discussed. Final consideration of mitigation will be coordinated by CDOT and FHWA in cooperation with local agencies with property jurisdiction. These may include: USACOE, Arapahoe County, Douglas County, Jefferson County, City of Lakewood, City of Lone Tree, City of Littleton, City of Centennial, or the City of Greenwood Village
Deliverables	• Summary of analysis and findings in the EA

2.4 RIGHT OF WAY

For the C-470 EA, estimated right of way needs for project alternatives will be determined. For the evaluation of right of way, data will be collected from local governments and verified with field investigation. Impacted parcels (residences, businesses, publicly owned lands) will be identified and impacts quantified for alternatives in the EA.

Table 4 describes the methodology used for right of way evaluations.

Table 4
Right of Way

Right of Way	
Subject Areas	• Properties affected by acquisition and relocations activities required for transportation improvements to the C-470 corridor
Relevant Data and Information Sources	• Aerial photographs • County parcel maps • CDOT right of way maps • Local entity surveys, courthouse records including tax records, railroad right of way maps, real estate listings and sales
Collection and/or Analysis Methodology	• Field inspection performed for each alternative • For each alternative, determine impacts to number of parcels, number of residences, number of businesses, types of improvements, areas such as mobile homes, functional replacements, historical sites, etc. • Determine total acreage of new property needed for each alternative • Estimate right of way acquisition costs developed for each alternative • For Preferred Alternative determine temporary right of way impacts needed during construction • If land from a public agency is required for acquisition, determine type of Memorandum of Understanding (MOU) or Intergovernmental Agreement (IGA) that might be required or recommended between said public agency and CDOT/FHWA
Study Location	• The initial records search will include the project study area limits as defined in Figure 1
Regulatory Guidance/ Requirements	• *FHWA Technical Advisory T6640.8a* • *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law. 91-646) and the Uniform Relocation Act Amendments of 1987 (Public Law 100-17)*
Impacts	• Impacts will be determined in units of acres for alternatives
Mitigation Options	• Discussion of mitigation measures and services available to affected property owners and tenants to ensure fair and equitable treatment and protections provided by applicable laws and regulations
Deliverables	• Technical memorandum to include right of way with maps summarizing findings of area of right of way needed, number of homes and number of businesses impacted for each of the alternatives. Estimate potential cost of right of way. Identify an MOU or IGA that may be needed • Summary of technical analysis, impacts, and mitigation will be included in the EA

3.0 PHYSICAL ENVIRONMENT

3.1 CONSTRUCTION/MAINTENANCE

Construction impacts for alternatives will focus on potential violations of air, noise, and/or water quality standards; loss of habitat during construction, impacts on local businesses; and inconveniences to the local community due to noise, traffic congestion, dust, and impairment of visual quality. The impact analyses will be based on the limits of construction and the total acres to be disturbed for each alternative. An evaluation of possible construction sequencing will be discussed.

Maintenance impacts will be assessed for post-construction and long-term corridor operations. Air and water quality impacts with regard to construction activities will also be evaluated. Weed management efforts will be mentioned, and discussed in greater detail under ecology, with a specific section in the EA for noxious weed management. The construction/maintenance section of the EA will detail specific measures for mitigation of construction impacts, such as watering and sweeping to reduce air quality emissions of particulates. Long-term mitigation for maintenance impacts will also be discussed, and may include items such as implementation of Best Management Practices to decrease erosion and to reduce stormwater runoff into adjacent water bodies.

Table 5 describes the methodology in evaluating construction impacts.

Table 5
Construction/Maintenance

Construction/Maintenance	
Subject Areas	• General construction and corridor maintenance impacts
Relevant Data/ Information Sources	• Generally accepted methods of construction • Construction easement requirements • CDOT construction specifications for noise, erosion control, traffic management, etc.
Collection and/or Analysis Methodology	• Review of the required methods of construction most likely used to build the alternative • The construction footprints determined through preliminary design will be used to estimate the extent of impacts to each environmental resource • Discussion of related safety, air, noise, water, traffic congestion, and potential detours will be completed • Discussion of the development of sedimentation and erosion control plans will be completed • Both temporary and permanent construction impacts will be disclosed • Review past CDOT maintenance impacts to environment through emissions, placement of fill, noxious weeds, sanding, salt, magnesium chloride, etc • Interview CDOT maintenance personnel on corridor conditions and needs
Study Location	• The initial records search will include the project study area limits as defined in Figure 1 and will include the construction footprint of project alternatives to analyze construction impacts. To analyze maintenance impacts, the total of new right of way to be acquired for the project alternatives will be assessed.
Regulatory Guidance/ Requirements	• *FHWA Technical Advisory T6640.8a* • *CDOT Standard Specifications for Road and Bridge Construction, 1999*
Mitigation	• Develop community information campaign to decrease impact of construction on traveling public • Develop temporary mitigation strategies to address impacts such as noise, dust and weed control • Develop permanent mitigation strategies to incorporate into preferred alternative design to mitigate for general maintenance impacts
Deliverables	• Summarize of analysis, impacts and mitigation measures in the EA

3.2 UTILITIES

The intent of the utilities evaluation is to assess the impacts of the proposed alternatives on existing critical utilities. Maps of existing critical utilities will be collected from public entities (water, sewer, storm sewer) and private entities (natural gas, electric, fiber optic, telephone, cable television). Critical utilities are defined as any utility that may affect national security, communication utilities that are considered backbone or trunk line, high-voltage, electrical transmission lines, any water or sanitary sewer main with a diameter 60 inches or greater, and major appurtenances for any utility system. Additionally, those with costly and/or complicated relocations will be identified based on the collected information and from field observation. Major utilities will be identified and incorporated into the project's GIS mapping.

The impact analyses will be based on the GIS database developed early in the project with an overlay of the final alternative alignments and limits of construction prepared

by the engineering and environmental teams. A potential impact will be noted when an alignment produces a conflict horizontally or vertically with the utility.

Mitigation requirements are anticipated to include shifting the roadway alignment or relocation of utilities and/or encasement.

Table 6 describes the methodology used to evaluate utilities in the area.

Table 6
Utilities

Utilities	
Subject Areas	• Critical utilities within the corridor
Relevant Data/ Information Sources	• Utility maps for utilities in the study area from public entities (water, sewer, storm sewer) and private entities (natural gas, electric, fiber optic, telephone, cable television, Lockheed Martin, irrigation canals) • Field observation of utilities • Coordination with Utility representatives regarding existing critical utilities
Collection and/or Analysis Methodology	• Critical utilities in the project area will be mapped and impacts of alternatives alignments on the utilities will be determined. • Information on the type of approvals and requirements for utility line relocations and/or protection will be collected and documented in a technical memorandum.
Study Location	• The initial records search will include the project study area limits as defined in Figure 1
Regulatory Guidance/ Requirements	• *FHWA Technical Advisory T6640.8a* • *FHWA NHI-01-035 Highway/Utility Issues* • *AASHTO Guide for Accommodating Utilities within Highway Right-of-Way*
Impacts	• Using the utility maps and alternative alignment(s), impacts to overhead and underground critical utilities will be assessed
Mitigation Options	• Identification of strategies for avoidance or minimization of potential impacts related to critical utilities
Deliverables	• Technical memo identifying critical utilities to be impacted, relocated, and/or protected in place. Memorandum will include a map of critical utilities that could be impacted by project alternatives and utility table • Summary of critical utilities will be documented in the EA

3.3 HAZARDOUS MATERIALS

The investigation into potential and known hazardous material sites in the project area will be initially conducted through a search of existing data in government records. The data research will be followed by a field survey to confirm the presence of sites identified with a high, moderate, or low potential for environmental risk. Land acquisition where hazardous materials are present will be reviewed. The potential for environmental impact on highway design, right of way acquisition and worker health and safety will be assessed for each site identified in the search. A Modified

Environmental Site Assessment (MESA) will be developed to identify the potential for contamination at all properties needed for each of the proposed alternatives. respectively. The level of detail of the existing environmental conditions will be sufficient for a comparison of alternatives.

Table 7 describes the methodology used to determine the presence of hazardous materials and other contaminants.

Table 7
Hazardous Materials

Hazardous Materials	
Subject Areas	• Hazardous and solid waste contamination of property required for alternatives
Relevant Data/ Information Sources	• EPA and CDPHE data and file information that identify solid waste landfills, Resource Conservation and Recovery Act (RCRA) hazardous waste generators, transporters, and treatment/storage/disposal facilities (current and closed), RCRA Corrective Action Sites, National Priority List (NPL) sites, Colorado Voluntary Cleanup Program (VCUP) Sites, Comprehensive Environmental Response Compensation and Liability Act-Superfund, (CERCLA) Sites, underground storage tank sites (UST), leaking underground storage tank sites (LUST), mining sites/oil wells, and spill sites. EPA, CDPHE file information including violations and citations, releases of hazardous materials, site investigations, feasibility studies, remediation plans, Records of Decision, five-year reviews, and site monitoring • Colorado Division of Oil and Public Safety data regarding "active" LUST sites and closed LUST sites • Location of drinking water wells from State Engineer's office • HAZMAT incidents/accidents • Data from Tri-County Health Department • Available historic (pre-C-470) aerial photographs of the corridor • Pertinent records maintained by CDOT • Data provided by Environmental Data Resources, Inc.-a database search company • Database search radii (0.5 to 1.0 mile depending on type of data) will conform to CDOT MESA requirements
Collection and/or Analysis Methodology	• Assess potential for environmental impact on highway design, right of way acquisition and worker health and safety. • Determine distance of each site from C-470 • Review each site of environmental concern for type, magnitude and date of contaminant release into the environment • Analyze groundwater depth and flow direction • Gather and compile appropriate data, as listed above. Search (0.5 to1.0 mile depending on the type of data-refer to MESA guidelines) radii for database research will conform to CDOT MESA requirements on Preferred Alternative only. • Identify properties requiring additional investigation • Complete MESA report prior to signing NEPA decision document
Study Location	• The initial records search will include the project study area limits as defined in Figure 1.

Hazardous Materials	
Regulatory Guidance/ Requirements	• *FHWA Technical Advisory T6640.8a* • *FHWA Supplemental Hazardous Waste Guidance (FHWA, 1997)* • *AASHTO Hazardous Waste Guide for Project Development, 1989* • *Interim Guidance for Hazardous Waste Sites (FHWA, 1988)* • *CDOT Guidance for Modified Environmental Assessments (CDOT Region 6 Environmental, June 2003)*
Impacts	• Will be determined
Mitigation Options	• Will be determined on a case by case basis and potential for avoidance will be discussed
Deliverables	• A MESA document will be prepared per CDOT requirements • Summary of data and analysis including reference table identifying potential hazardous waste sites, impacts, and mitigation will be included in the EA.

3.4 AIR QUALITY

The project study area is in a maintenance phase for PM_{10} (particulate matter less than 10 microns in diameter) and carbon monoxide (CO). The current ozone (O_3) status is under re-consideration by the US EPA because of recent summer violations. For this EA, air quality pollutants with regard to carbon monoxide, particulate matter, ozone, and mobile source air toxics will be assessed. The EA will describe the study corridor's air basin, disclose current air pollution levels and trends, and discuss the region's compliance with state and federal standards. The air quality impacts will be evaluated using a methodology approved by CDOT, FHWA, EPA, Colorado Air Pollution Control Division, and DRCOG to assess these air quality pollutants as part of the process to include the preferred alternative into the DRCOG conforming plan. Changes in emission levels will be based upon direct changes in travel activity in the units of vehicle miles traveled for the action and no action alternatives. The analyses will examine opening year and the design year 2025. Coordination meetings will include FHWA, EPA, the CDOT Air Quality Specialist, DRCOG, and the Colorado Air Pollution Control Division (APCD) for methodology development, types of pollution to be assessed (CO, O_3, and/or PM_{10}) and appropriate number of intersections to be modeled. A screening analysis will be used to determine critical intersections, which will be modeled using CAL3QHC. Mitigation commitments will be developed as necessary for short-term construction and for long-term emission control through TCM and TDM (Transportation Control Measures and Transportation Demand Management measures).

Table 8 describes the methodology for assessing the air quality impacts.

Table 8
Air Quality

Air Quality	
Subject Areas	• Local air quality, including air toxic levels and relevant pollutant concentrations • Identify EPA non attainment areas
Relevant Data/ Information Sources	• Local meteorological conditions, windrose data, and pollutant monitoring data for carbon monoxide, nitrogen oxides, volatile organic compounds, hydrocarbons, ozone, particulates • Concentrations of air toxics for both mobile and stationary sources-MSAT=Mobile Source Air Toxics from monitors in the project area • Ambient air quality standards/attainment status for CO, PM_{10}, 8-hr and 1 hr ozone • Traffic volume and LOS, used to determine critical intersections • Projected traffic volumes and distribution under the project alternatives. • Air quality data from SIP under the Clean Air Act and Amendments • Existing air quality models and their input parameters • Emission factors provided by DRCOG
Collection and/or Analysis Methodology	• Describe regulatory requirements • Attainment status-related information summarized • Coordination with FHWA, EPA-Office of Air Quality, DRCOG, and APCD • Regional and corridor analysis performed by APCD and DRCOG, with EPA coordination • Local meteorological conditions and air quality monitored data in study area documented • DRCOG will run the air quality model, in order to determine air quality conformity on the regional level. DRCOG will run EPA Mobile 6.2 Emissions Model which will determine CO Emission Factors • Full air quality analyses will include hot spot analysis for CO at interchange ramp intersections and new ramps for express lanes using CAL3QHC which is a dispersion model requiring inputs of: meteorology, projected traffic data for worst peak hour, and Mobile 6.2 emission data. • Qualitative assessment for corridor-wide PM_{10}, per requirements after meeting with FHWA, EPA Office of Air Quality, DRCOG, APCD, and CDOT • Qualitative assessment for corridor-wide ozone, per requirements after meeting with FHWA, EPA Office of Air Quality, DRCOG, APCD, and CDOT • Qualitative mobile source air toxics discussion, per requirements after meeting with FHWA, EPA Office of Air Quality, DRCOG, APCD, and CDOT • Analyses will be performed for opening year and year 2025 • Analyze dust, vehicle emissions, and other air quality impacts from construction and compare differences between alternatives (data will be based upon acres of disturbance per alternative). Utilize EPA's Compilation of Air Pollution Emission Factors, AP-42-0, for fugitive dust on roadways, both paved and unpaved • Qualitatively estimate how mitigation will control and/or decrease emissions
Study Location	• Critical intersections within the study area, as shown in Figure 1, including those adjacent to park and rides, improved interchanges, areas with sensitive receptors

Air Quality	
Regulatory Guidance/ Requirements	• *FHWA Technical Advisory T6640.8a, 1987* • *Applicable SIP Plan* • *Transportation Equity Act of the 21st Century, Sections 110, 6101* • *Clean Air Act: 42 U.S.C. 7400, 23 U.S.C. 109(j), 23 U.S.C. 102(a), 23 U.S.C. 110(c)* • *23 U.S.C., 149, Congestion Mitigation and Air Quality Improvement Program* • *40 CFR Parts 51 and 93 Prevention of Significant Deterioration and Non Attainment New source review: Equipment Replacement Provision of the Routine Maintenance, Repair and Replacement Exclusion EPA* • *49 CFR 93 (Subpart B) Air Quality Conformity Analysis EPA* • *Memorandum of Agreement Between CDOT and Air Pollution Control Division Regarding Procedures for Determining Project Level Conformity, (CDOT, APCD, January 1996)* • *Policy Memo Addressing in System Requirements in Environmental Documents (FHWA, July 23, 1993)*
Impacts	• Will be determined using both qualitative and quantitative methods
Mitigation Options	• Long term mitigation for operational impacts will be determined such as potential Transportation Control Measures and Transportation Demand Management Strategies • Short term mitigation will be determined for use during construction by vehicle management, site logistics, material selection, and project planning
Deliverables	• Technical report outlining the air quality baselines, analysis of potential air quality impacts and options for mitigation, as necessary • Summary of technical memorandum in EA

3.5 HIGHWAY NOISE

Noise analysis is essential for planned new highway projects and for major improvements of existing highways, such as widening. The noise analysis will determine the locations adjacent to the proposed highway improvements where noise levels are projected to occur beyond the acceptable thresholds of noise per FWHA and CDOT guidelines and secondly, determine where noise mitigation would be "feasible" and "reasonable" to implement. The evaluation of traffic noise begins with documentation of baseline levels near the transportation facility and further away for sensitive areas and structures. Existing traffic data counts (which incorporate trucks and general traffic) and vehicular speeds are taken to calibrate and validate the STAMINA model. The model then projects future noise levels based upon anticipated changes in traffic volume and speed with the proposed transportation improvements. A technical report will be provided to document all existing noise data, to predict future noise levels, and to provide mitigation recommendations.

Table 9 describes the methodology for assessing the impact of noise.

Table 9
Highway Noise

Highway Noise	
Subject Areas	• This study includes traffic noise on the C-470 corridor from I-25 to South Kipling Parkway. The analysis will also look at an area 500 ft. beyond these endpoints. The analysis will include all homes and businesses adjacent to C-470 out to a distance of 500 to 1000 feet.
Relevant Data/ Information Source	• Existing traffic counts • Location and distance of roads, homes and businesses, receptors from transportation improvement alternatives' alignments • Location of significant terrain features in CAD files
Collection and/or Analysis Methodology	• Determine Noise Study Zone: The noise analysis will be conducted along the entire length of the project, as well as 500 feet beyond each end of the project. The analysis will include the first row of homes and businesses adjacent to C-470, or 500 ft.
Collection and/or Analysis Methodology (Continued)	• Conduct Survey of Corridor: A comprehensive "windshield survey" will be conducted in order to: determine the location of all residences and businesses within the study area, determine locations for noise measurements, and to gather topography information for subsequent modeling. • Measure Existing Noise Levels: Noise levels will be measured continuously for approximately one week at 10 to 12 locations. Additionally, samples of the traffic volumes and speeds will be monitored during this time for noise model validation purposes. • Construct Model of Existing Conditions: A model of existing conditions will be constructed using the STAMINA 2.0 software program. The model will contain the location of all roads, receptors (i.e. residences), and important terrain features. The location information will be obtained from CAD files. Traffic data will be obtained from Wilson and Company and will correspond to "loudest hour" conditions. • Validate Model of Existing Conditions: The model of existing conditions will be "validated" by inputting into the model the traffic volumes monitored during the noise measurements (from Step 3) and comparing the predicted noise levels to the measured values. Typically, the difference between the measured and the predicted levels is within ±3 dBA. If the difference is greater than ±3 dBA, then reasons for such an error will be provided. In general the STAMINA model has validated well on CDOT projects. • Construct Model of Future Conditions: A STAMINA model of future conditions will be constructed. The model will contain the proposed location of C-470 for all design alternatives being analyzed, and design-year (2025) traffic volumes and speeds, and the location of existing noise walls and other important terrain features. • Predict "Noise Impact": Noise levels will be predicted for "loudest-hour" conditions at each residence and business along the Corridor for existing and design-year conditions. The "loudest hour" is that hour where the highway is carrying as much traffic as it can without congestion occurring. The predicted levels will be compared to CDOT impact criteria. Those areas where the criteria are exceeded will be considered impacted and noise mitigation will be analyzed. • Analyze Noise Mitigation: Noise mitigation will be analyzed at each impacted receptor location to determine its feasibility and reasonableness. The most commonly considered noise mitigation measures are walls and earthen berms. • Construction Noise: A brief discussion of potential construction noise will be discussed including potential mitigation options. • Documentation: A noise technical report will be generated that details the methodology used to analyze noise, and the results of the analysis. The report will include all data used in the analyses, figures showing the receptor locations, predicted noise levels, and the results of any mitigation analyses.

Highway Noise	
Study Location	• Limits of Study: This study includes traffic noise on the C-470 corridor from I-25 to Kipling. The analysis will also look at an area five hundred feed beyond these endpoints. The analysis will include all homes and businesses adjacent to C-470 out to a distance of 500 to 1000 feet.
Regulatory Guidance/ Requirements	• *CDOT Noise Analysis and Abatement Guidelines (CDOT, December 2002)* • *Procedures for Abatement of Highway Traffic Noise and Construction Noise (23 CFR 772)* • *Highway Traffic Noise Analysis and Abatement Policy and Guidance (FHWA, 1995)*
Mitigation Options	• Mitigation Analysis will be conducted wherever the CDOT noise abatement criteria (NAC) are not met, or if there is an increase greater than 10 dBA. First, a determination will be made if proposed mitigation meets "feasibility" criteria of absolute minimum noise reduction of 5 dBA at one front-row receiver, and a "desired" substantial reduction of 10 dBA at front row receptors, no "fatal flaw" maintenance or safety issues, and for barriers-continuous construction (limited) breaks. Then if feasible, noise mitigation will be determined reasonable based upon the following criteria: cost benefit ratio, overall design year noise levels, impacted receptor's choice to accept or reject noise abatement, development type, development existence and increase in noise levels.
Deliverables	• A technical report will be generated that details the methodology used to analyze noise and the results of the analysis. The report will include all data used in the analyses, figures showing the receptor locations, predicted noise levels, the results of any mitigation analyses, and any necessary copies of CDOT Noise Abatement Determination Forms (CDOT Form 1209).. This will be included in the Appendix to the EA. • Summary of the analysis will be documented in the text of the EA.

3.6 WATER RESOURCES AND WATER QUALITY

Water quality and water resource impacts will be evaluated for the proposed alternatives (Waters of the U.S. will be addressed in the Wetlands section). The project team will examine and map the various surface and groundwater resources within the project area. Then impacts to these resources will be assessed for each of the proposed transportation alternatives. The location of project alternatives, Colorado Department of Public Health and Environment (CDPHE)-Water Quality Control Commission specifications, existing permits and future maintenance issues, and design concepts will be considered in the evaluation. Temporary impacts during construction as well as permanent impact of the alternatives on water quality will be analyzed.

In analyzing direct and indirect water quality effects for the C-470 Environmental Assessment, a qualitative approach will be followed. Table 10 describes the methodology used for the evaluation of water quality.

Table 10
Water Resources and Water Quality

Water Resources and Water Quality	
Subject Areas	• Watersheds, water resources and water bodies within or affected by waters originating in the project area • Groundwater • South Platte River near US 85 • Drainages of Cottonwood Creek, Willow Creek, Big Dry Creek, Lee Gulch, Dad Clark Gulch, Marcy Gulch, the Highline Canal, Deer Creek and Massey Draw • Riparian habitat areas • C-470 right of way, vacant lots, drainage ditches, floodplains and floodways, parks, golf courses and open spaces
Relevant Data/ Information Sources	• Existing permits from the COE and from CDPHE • Water quality data from CDPHE, EPA and CDOT • Examine present Colorado water quality standards • Determine existing maintenance issues • Location of identified existing aquatic and riparian habitats, sensitive waters, wild and scenic rivers, aquifers, and State waters • Existing concentrations of contaminants (for example may include: copper, lead and zinc) in receiving waters • CDOT MS4 New Development Stormwater Management Program (post construction) (CDOT, December 2003) • Maps showing drinking water treatment facilities, drinking water wells, sanitary sewer treatment facilities and existing Waters of the U.S.
Collection and/or Analysis Methodology	• Determine project location, water uses and classifications • Determine Impervious surface changes • Determine ADT changes • Identify expected Total Maximum Daily Loads of project pollutants • Identify and evaluate highway runoff constituents • Describe past and current conditions on local aquatic life including known fish kill causes and any CDOW fish inventory studies or monitoring that has taken place to establish existing conditions that could affect these resources in addition to the project • Summarize all coordination with CDOW regarding SB 40 to establish the agency opinion on existing habitat quality and function • Discuss CDOT's maintenance program; include methods for maintaining temporary and permanent BMPs, their use of winter de-icing chemicals, and their policies on winter sanding operations to establish baseline conditions and to extrapolate to future project conditions • Discussions will include avoidance measures (such as temporary construction BMPs and permanent water quality measures following construction) and minimization measures (such as exploring reductions in winter sanding and deicing operations by CDOT compared to amounts used 3-4 years ago or how those deicing chemicals might be contained on-site) • Cumulative and indirect effects from other project activities, changes in travel patterns, or increased impervious surface as a result of future roadside developments will be included in the analysis. • Project pollutant effects on existing stream segments, drainage features, wells, drinking water facilities, and irrigation ditches
Study Location	• Study area limits of project corridor as defined in Figure 1 and will include the area within ½ mile of the centerline of the existing C-470 highway alignment

Water Resources and Water Quality	
Regulatory Guidance/ Requirements	• *FHWA Technical Advisory T6640.8a, 1987* • *FHWA, 1981. Research report, Constituents of Highway Runoff* • *FHWA, 1985. Report, Management Practices for Mitigation of Highway Stormwater Runoff Pollution* • *FHWA, 1987. Report, Effects of Highway Runoff on Receiving Waters.* • *Driscoll, Shelley and Strecker, Pollutant Loadings and Impacts from Highway Stormwater Runoff, (FHWA,1990)* • *FHWA Publication No. FHWA/RD-88-006-9, Pollutant Loadings and Impacts from Highway Storm water Runoff, Volumes I-IV* • *FHWA Publication No. FHWA-PD-96-032, Evaluation and Management of Highway Runoff Water Quality* • *Urban Drainage and Flood Control District's Urban Storm Drainage Criteria Manual, Volume 3* • *Clean Water Act, as amended by the Water Quality Act of 1987, Section 404* • *Safe Drinking Water Act, Section 1424(e) and 1986 amendments to the Act* • *Colorado Water Quality Control Act-Colorado State Water Quality Certification Program* • *Municipal Separate Storm Sewer System (MS4) New Development/Redevelopment Program.* • CDOT MS4 New Development Stormwater Management Program (post construction) (CDOT, December 2003)
Impacts	• Physical impacts to water resources and impacts to water quality will be disclosed
Mitigation Options	• Temporary and permanent Best Management Practices for erosion control and protection of receiving waters will be recommended for the project alternatives • The success of mitigation on water quality will be assessed where practicable
Deliverables	• Water quality technical report documenting existing water quality conditions, mapping existing water quality, projected future conditions, impacts during construction. Report will recommend Best Management Practices and water quality permits required for the preferred alternative construction such as recommendation of completion of a Storm Water Management Plan, obtaining a National Pollutant Discharge Elimination System Permit, or a Section 40 Construction Dewatering Permit. Report will compare the differences of impacts to water quality and resources for each of the alternatives. • Summary of water quality analysis will be included in the EA.

3.7 FLOODPLAINS AND DRAINAGE

Activities involved with assessing impacts on the floodplains and existing drainage of this area will be performed to ensure that cross drainage structures are properly sized to convey the storm event they are required to convey. Hydrologic and hydraulic computations will take place in conjunction with researching previously completed reports, models and maps from the Urban Drainage and Flood Control District (UDFCD), Federal Emergency Management Agency (FEMA), the US Army Corps of Engineers (USACOE), CDOT Hydraulics Department, and city/county planning, zoning or engineering departments. Localized drainage systems will be designed in conjunction with water quality features, which are covered in the water quality section of this report. For each transportation alternative, adverse effects on floodplains and drainage will be assessed. Mitigation strategies will be developed for each alternative. When necessary, coordination with the USACOE, FEMA, UDFCD, CDOT, and local

agencies will be made for highly sensitive areas impacted by project alternatives. A comprehensive report of the findings will be prepared.

Table 11 describes the methodology used in the evaluation of the floodplains and drainage assessment.

Table 11
Floodplains and Drainage

Floodplains and Drainage	
Subject Areas	• Floodplains and drainage basins contributing to the project area as well as drainage basins that drain through the project area • South Platte River near US 85 • Drainageways of Willow Creek, Big Dry Creek, Dad Clark Gulch, and Massey Draw • Contributing portions of basins for Lee Gulch and Deer Creek • Irrigation ditch crossings including the High Line Canal • Riparian habitat areas • C-470 right of way, vacant lots, drainage ditches, floodplains and floodways, parks, golf courses and open spaces
Relevant Data/ Information Sources	• FEMA Flood Insurance Studies, Flood Insurance Rate Maps, and related hydrologic and hydraulic models. • Urban Drainage and Flood Control District (UDFCD) Flood Hazard Area Delineation, Master Planning and Outfall Studies • Previous designs, soil types and land uses in the project area • CDOT right of way maps • USGS quadrangle maps • Studies, models, and reports from Urban Drainage and Flood Control District (UDFCD), Federal Emergency Management Agency (FEMA), the US Army Corps of Engineers (USACOE), CDOT Hydraulics Department, planning, zoning or engineering departments from the City of Lakewood, City of Lone Tree, City of Littleton, City of Centennial, City of Greenwood Village, Jefferson County, Douglas County and Arapahoe County • Project area precipitation data

Floodplains and Drainage	
Collection and/or Analysis Methodology	• Delineate drainage basins and establish hydrologic basin data. For areas of existing FHAD or Master Planning Studies basin delineation, land use, etc. will be confirmed. • Research existing bridges and culverts for locations, flows, and sizes • Capacities of irrigation crossings will be maintained. • Estimate future maintenance needs of structural measures for preventing channel degradation and degradation at outlets from water quality ponds. • Incorporate existing floodplains and floodways into baseline mapping for project alternatives • For each alternative, conceptual design of minor drainage systems and structures and preliminary sizing of major channel crossings, culverts, and bridges • For preferred alternative: – Develop preliminary sizing of hydraulic structures using the appropriate methods for 25 % design. – Estimate design flows using the rational method for smaller basins and Colorado Urban Hydrograph Procedure and UDSWM for larger more complex basins for undocumented drainage structures crossing C-470. – If a FEMA flood insurance study with approved 100-year discharges exists, these flows will be verified and used to analyze impacts of a proposed crossing on the regulatory floodplain. If the discharges are outdated, new discharges based on current methods and with necessary regulatory approval shall be used. – Coordination with the USACE will take place for discharges from Chatfield Dam to the S. Platte River. – The impacts of the 100-year storm event shall be evaluated for all on-site storm drainage systems. – Water surface elevations, or ponding elevations will be developed for those waterways with previously undefined floodplains, "100-year" flood limits, and existing regulatory floodplain limits will be verified for areas with defined floodplains. – Establish mitigation for floodplain impacts where necessary. – Identify permits required for construction and operation of the preferred alternative; such as stormwater, sewer, groundwater, MS4, and floodplain use permits. – Identify adverse effects on project area under normal operating conditions as well as during construction – Coordination with other agencies and local jurisdictions shall include, but not be limited to, the review of the following agencies: FHWA, Federal Transit Authority, Federal Emergency Management Agency, US Fish and Wildlife Service, USACOE, US Environmental Protection Agency, Federal Railroad Administration, Colorado Department of Public Health and Environment, Colorado Water Conservation Board, Arapahoe County, Douglas County, Jefferson County, City of Lakewood, City of Lone Tree, City of Littleton, City of Centennial, City of Greenwood Village, Denver Water Board, Utility Companies, Urban Drainage and Flood Control District, and Denver Regional Council of Governments
Study Location	• Study area limits of project corridor as defined in Figure 1, tributary drainage basins for major channels, and local drainage basins that contribute to cross drainages needing a 48" RCP culvert or larger.

Floodplains and Drainage	
Regulatory Guidance/ Requirements	• *FHWA Technical Advisory T6640.8a* • *Executive Order 11988, Floodplain Management DOT Order 5650.2,* • *Flood Management and Protection; FHPM-6-7-3-2; and 23 CFR 650.* • *City floodplain management regulations and ordinances* • *Jefferson, Arapahoe and Douglas Counties floodplain management regulations and ordinances* • *CDOT Drainage Criteria Manual (July, 1995)* • *Relevant Hydraulic Engineering Circulars (FHWA)* • *Urban Storm Drainage Criteria Manual (1999-2001)* • *CDOT Municipal Separate Storm Sewer System (MS4) Permit New Development/Redevelopment Program (2004)* • *Design software may include the following:* – *Stormwater Management Model (UDFCD)* – *XP-SWMM (XP Software)* – *Colorado Urban Hydrograph Procedure (UDFCD)* – *HEC-2 (USACOE)* – *HECRAS (USACOE)* – *StormCAD (Haestad Methods)* – *Culver Master (Haestad Methods)* – *Flow Master (Haestad Methods)* – *Pond Pack (Haestad Methods)* – *Computer Program HY8 (FHWA)* – *Visual Urban (FHWA)* – *HydroCad (Applied Microcomputer Systems)*
Impacts	• Impacts to floodplains that will result in higher Base Flood Elevations will be determined for project alternatives • Reconstructing or shifting of channels will be compared for each option using lineal feet of channel affected
Impacts (Continued)	• Needs for changes to existing stormwater drainage systems will be determined • Erosion protection needs for cross drainage structures and outfall structures will be determined
Mitigation Options	• If floodplain impacts are unavoidable, mitigation options will be determined and may include structural recommendations, detention storage basins, increasing channel capacity and shifting the channel to increase the capacity of the channel while maintaining velocity freeboard, maintenance access and other requirements for the channel.
Deliverables	• Floodplain and drainage assessment report including a discussion of the pertinent aspects of the project, a determination of probable impacts and identification of possible practical mitigation actions. Analyses and comparison of impacts and mitigation for the proposed concepts. • Preliminary hydraulics report that will include a detailed discussion of the pertinent aspects of the analysis, impacts of scour, bank stabilization, maintenance access, design freeboard, water surface elevations, capacities, velocities, and other relevant information. Conceptual design of minor drainage systems and structures and preliminary sizing of culverts and bridges for major channel crossings will be included. • A drainage plan will be developed for the project to provide information regarding the proposed concepts for the design and construction of a complete storm drainage system or systems to intercept and remove surface runoff from the highway and maintain surface and channel flow through the project right of way • Summary of floodplain impacts in the EA

3.8 CULTURAL RESOURCES

3.8.1 Historic Resources

The objective of the C-470 historic resource analysis is to identify historic and potentially eligible resources for the National Register of Historic Places (NRHP) in the area of potential effect as defined in consultation with the State Historic Preservation Office (SHPO), and to prepare documentation to complete the Section 106 procedures and Section 4(f) evaluation. The assessment of potential impacts to historic resources, including residences, buildings, and features such as ditches, railroads, and bridges will begin with a comprehensive file search and data compilation of recorded historical resources within the project area. The project team in conjunction with CDOT will initiate the Section 106 consultation process with the SHPO and obtain their concurrence with the determination of the Area of Potential Effect (APE). Through research at the Office of Archaeology and Historic Preservation (OAHP), the Colorado Historical Society, County Tax Assessor Offices for Jefferson, Arapahoe, and Jefferson Counties, Counties' Planning and Clerk and Recorder's Officers, county libraries, local history libraries, the Stephen Hart Library, and the Denver Public Library, and through discussions with local historical groups, local planning agencies, and Certified Local Governments (CLGs), a list of properties that are eligible for listing in the National Register of Historic Paces (NRHP), properties recorded in the state inventory, and properties/resources requiring further investigation will be determined. Further investigation will include an Intensive Class III level field survey within the APE that requires recording and reevaluation of historic resources in consultation with SHPO. A log and photographs of properties will be maintained by interchange segment. Properties will be evaluated for historic and architectural integrity and significances, as well as eligibility. If any of the resources found within the affected area, including pre-1959 bridges, are determined eligible for inclusion or listed on the NRHP, potential impacts and mitigation strategies will be determined. These strategies will include the identification of alternatives to minimize or mitigate impacts on the resources. A complete survey report documenting all findings will be prepared according to the guidelines of the OAHP.

Table 12 describes the environmental methodology for historic resources.

Table 12
Historic Resources

Historic Resources	
Subject Areas	• Resources on or eligible for the NRHP within the Area of Potential Effect (APE). These include residences, buildings, ditches, railroads, etc. that are at least 43 years old, and bridges built prior to 1959
Relevant Data/ Information Sources	• Previously recorded historic resources • Existing reports and historic and cultural resources management plans • Relevant books, maps, photographs, newspaper articles, city directories and published reports from local institutions • Office of Archaeology and Historic Preservation (OAHP) • Colorado Historical Society (CHS) • County Tax Assessor Offices for Jefferson, Arapahoe, and Jefferson Counties • Planning and Clerk and Recorder's Officers for Jefferson, Arapahoe and Jefferson Counties • County libraries, local history libraries, the Stephen Hart Library and the Denver Public Library • Local historical groups • Local planning agencies • Certified Local Governments (CLGs) • Individuals associated with significant properties in the survey area • Literature Survey-including review of Sanborn Fire Insurance maps and other sources to determine if area was utilized historically and may contain significant sites or features

Historic Resources	
Collection and/or Analysis Methodology	• Literature, records and state inventory document search at the OAHP and CHS • Contact county historical societies to determine if there are any local historical landmarks • Determine if there are designated National Register of Historic Places (NRHP) or eligible properties within the APE • A historic resource field survey to identify and record unidentified historic resources and to determine NRHP eligibility. The surveys will be conducted after the APE and potential corridors have been identified. • Coordination with public and historic preservation groups in area, including local historical societies, certified local governments, and museums • Conduct telephone interviews with residents, businesses, and local public agencies to determine information about specific historical resources • Review of *Colorado Bridge Survey* for eligibility status of pre-1959 bridges (e.g. vehicular bridge at Santa Fe is on the CDOT historic bridge list) • Conduct Class III field survey within APE for historic resources • Maintain a log of all surveyed properties by interchange segment and locate by north or south side of C-470. • Photograph all previously recorded properties and all surveyed new properties • Evaluate the properties for historic and architectural integrity and significance. • Evaluate the newly identified properties for eligibility for the NRHP • Prepare Colorado Historical Society Architectural Inventory forms to include location maps and archival photographs • Prepare Re-evaluation forms for previously recorded properties identified during the file search and include photographs as required • Prepare Management Data and Linear Resources forms for all linear resources to include location maps and archival photographs • Include the Smithsonian identification number for each property on all maps, forms, photographs and logs • Prepare Survey Report according to the guidelines as drafted in the Colorado Cultural Resources Survey Manual • Assess transportation alternatives' impacts to identified historic resources and look for ways to avoid, reduce, or minimize impacts • Under Section 4(f) evaluation assess impacts and document ways to avoid, reduce, or minimize impacts to historically eligible properties
Study Location	• The initial records search will include the project study area limits as defined in Figure 1. Field surveys will be limited to the proposed corridors identified through the alternative screening process. Determine the APE in consultation with SHPO.

Historic Resources	
Regulatory Guidance/ Requirements	• *Guidelines established by OAHP* • *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation* • *Colorado State Register Bulletin 960, How to Apply the Nomination Criteria for Colorado State Register of Historic Properties* • *Colorado Cultural Resources Survey Manual* • *Executive Order 11593: Protection and Enhancement of the Cultural Environment* • *Protection of Historic and Cultural Properties 1999 (36 CFR 800)* • *National Register of Historic Places (36 CFR 60)* • *Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR 68)* • *Executive Order 13287 "Preserve America" 2003* • *Section 106 of the National Historic Preservation Act of 1966 (16 USC-470)* • *Department of Transportation Act of 1966 (Section 4(f)) (49 U.S.C. 303)* • *FHWA Technical Advisory T6640.8a*
Impacts	• Assess adverse effects to historic resources listed on or eligible for the NRHP under Section 106 • Assess use of historic resources and under Section 4(f) regulation
Mitigation Options	• Strategies to avoid, minimize, or mitigate impacts on historic resources will be determined • For impacts to resources that cannot be avoided, mitigation strategies will be determined with assistance of CDOT and FWHA. Upon CDOT and FHWA concurrence, the strategies will be presented to the SHPO as part of the Section 106 consultation process. • Alternatives to possible bridge replacement will be determined for NRHP bridges in project area
Deliverables	• Log of all surveyed properties will be maintained by interchange segment and will be included in the Appendix of the EA • Colorado Historical Society Architectural Inventory Forms, Re-evaluation forms and/or Management Data and Linear Resource Forms with archival photographs and maps of historical resources • Comprehensive Survey Report for review by Project Team and Staff Historian • Correspondence and consultation to resolve adverse effects, as needed, for CDOT submittal to OAHP and Advisory Counsel on Historic Preservation (ACHP) • Memorandum of Agreement, if needed, with recommended mitigation strategies • Historic recordation of bridges, if needed • Summary of impacts and mitigation measures (if necessary) in EA

3.8.2 Native American Consultation

The CDOT Staff Archaeologist/Cultural Resources Manager will conduct the Native American Consultation Process with regional tribes (approximately 15 to 16 tribes) who previously inhabited the area surrounding the C-470 corridor. A letter inviting the tribes' participation will be sent by CDOT to the regional tribes. Aerial photography of the project area will accompany the letter. CDOT has established a 60-day period for an initial response from the tribes to the CDOT request to initiate consultation. Tribes will be given the opportunity to coordinate a tribal visit and participate in the EA. If any tribes are interested, the CDOT Staff Archaeologist/Cultural Resources Manager will serve as the project liaison to the tribes. Results of the alternatives analysis and

screening and copies of the Draft and Final EA will be sent to the interested tribes for their review and comment. A summary of the consultation process will be included in the text of the EA. All coordination documents will be attached in the Appendix of the EA.

3.8.3 Archaeological and Paleontological Resources

The archaeological and paleontological resources evaluation will begin with initiation of the consultation process (in conjunction with CDOT) with the SHPO and obtaining their concurrence on the APE. Then the CDOT Staff Archaeologist and Staff Paleontologist will conduct an assessment of known existing information about resources potentially affected by the project, respectively. This compilation will involve significant literature research and coordination with the CDOT and SHPO. Further investigations including field surveys and testing will be determined through consultation with CDOT and the SHPO. Mitigation recommendations will be provided to the CDOT Staff Archaeologist, Historian, and Paleontologist, the State Historic Preservation Officer, and other required agencies.

Table 13 describes the environmental methodology for archaeological and paleontological resources.

Table 13
Archaeology and Paleontology

Archaeology and Paleontology	
Subject Areas	• Prehistoric and historic archaeological sites and paleontological localities and resources within the APE
Relevant Data/ Information	• Previously recorded sites listed on or eligible for the NRHP • Previously recorded archaeological sites • Previously recorded paleontological localities • Geologic Maps • Existing reports and management plans • 1980s CDOT Archaeological survey
Collection and/or Analysis Methodology	• See also methodology for evaluation of historic resources • Archaeological and paleontological field survey to determine presence or absence • Data compilation and mapping of archaeological and paleontological resources • Site-specific test excavations, as appropriate, to determine NRHP eligibility, following consultation with CDOT Staff Archaeologists and SHPO, as needed • Laboratory analyses of sites, located artifacts and specimens to determine scientific significance
Study Location	• The initial records search will include the APE and the project study area limits as defined in Figure 1. Field surveys and testing will be limited to the proposed corridors, identified through the alternative screening process.

Regulatory Guidance/ Requirements	• Guidelines established by OAHP • *Protection of Historic and Cultural Properties (36 CFR 800)* • *Executive Order 11593: Protection and Enhancement of the Cultural Environment* • *Section 106 of the National Historic Preservation Act of 1966 (16 US C-470)* • *Native American Graves Protection and Repatriation Act (NAGPRA)*
Impacts	• Determine adverse effects to resources
Mitigation Implementation	• Document how sites were avoided or impacts were minimized • Coordination of activities with appropriate agencies with SHPO, ACHP, CLGs • For mitigation, conduct data recovery excavations at any site that cannot be avoided during construction
Deliverables	• Comprehensive Archaeology Survey Report and data forms • Paleontological Assessment and Survey Report and data recovery forms • Summarize impacts and mitigation measures to archaeological and paleontological resources for EA

3.9 GEOLOGY AND SOILS

The project area will be investigated for geologic influences and geological hazards, such as swelling and erodible soils or rock to the existing or future pavement and other highway structures. This impact on the alternative designs will be documented. Major excavations, unsatisfactory sub-grade materials, and present and potential subsidence, unstable slopes, among other relevant factors, will be considered. A comprehensive report of the findings for each alternative will be provided.

Table 14 describes the methodology used for the geology evaluation.

Table 14
Geology and Soils

Geology and Soils	
Subject Areas	• Geologic impacts on the project designs, or impacts on the geology of the area
Relevant Data/ Information Sources	• Geological data from US Geological Survey, Colorado Department of Transportation, Colorado Geological Survey and others • Geologic maps, aerial photographs and other information • Soil maps from the Natural Resources Conservation Service

Geology and Soils	
Collection and/or Analysis Methodology	• Collect maps of mineral resources, baseline geology, and geologic hazards • Gather geologic and soil data • Research various existing subgrade treatment methods and structural foundation types on the C-470 corridor • Verify research data by conducting field reconnaissance and performing additional geological mapping • Identify any current problems associated with swelling such as seepage or groundwater presence in the field • Evaluate and investigate major excavations, unsatisfactory sub-grade materials, present and potential subsidence, corridor water table, etc. • Comparison of geologic impacts between alternatives • Prepare report describing the anticipated effect of geologic conditions including maps showing geology and locations of anticipated problems and describe treatment methods for the future pavement subgrades
Study Location	• Study area limits of project corridor as defined in Figure 1
Regulatory Guidance/ Requirements	• *FHWA Technical Advisory T6640.8A*
Impacts	• Will be determined
Mitigation Options	• For preferred alternative in EA, assess treatment methods for the future pavement subgrade • See Best Management Practices for erosion control to mitigate for water quality impacts
Deliverables	• Technical report will be prepared to document all findings and recommendations for further soil testing prior to construction • Summary of geologic conditions, soils, potential issues and mitigation methods will be produced for the EA

3.10 PRIME AND UNIQUE FARMLANDS

An evaluation of the potential impacts of all alternatives on land categorized as prime farmland, unique farmland, farmland of statewide importance, and farmland of local importance will be evaluated. Consultation with the Natural Resources Conservation Service (NRCS) regarding the results of the evaluation will be necessary.

Table 15 describes the methodology for evaluating prime and unique farmlands.

Table 15
Prime and Unique Farmlands

Prime and Unique Farmlands	
Subject Areas	• Direct and indirect loss of prime farmland, unique farmland and farmland of statewide importance
Relevant Data/ Information Sources	• Maps of land use data, particularly identifying farmlands within the study area • Project aerial photographs • Soils maps or data
Collection and/or Analysis Methodology	• Identify relevant farmlands in the project area • Perform field inspection and photograph to confirm presence • Consult with NRCS for important farmlands • Evaluate alternatives' impacts to farmlands and complete USDA Form No. 1006 for Farmland Conversion Impact Rating
Study Location	• The initial records search will include the project study area limits as defined in Figure 1.
Regulatory Guidance/ Requirements	• *FHWA Technical Advisory T6640.8A* • *Farmland Protection Policy Act, 7 U.S.C. 7, Chapter 73 Section 4201, part 658* • *7 CFR 658, as amended at 59 Federal Register 31117 (June 17,1994) for Natural Resources Conservation Service* • *Implementing the Final Rule of the Farmland Protection Act for Highway Projects (FHWA, May 1989)*
Impacts	• Will be determined
Mitigation Options	• Will be determined if impacts to regulated farmlands are identified
Deliverables	• Map showing location of all farmlands in the project study area • USDA Form No. 1006-Farmland Conversion Impact Rating • Summary of impacts to farmland (if any) in EA

3.11 AESTHETICS AND VISUAL IMPACTS

Relative visual qualities and unique structural features of proposed alternatives will be determined. Visual impacts by alternatives on adjacent areas and view sheds will be disclosed. This includes the location of sensitive or special areas, unique architectural features, and locations described as potential "high impact areas," based on designated views and scenic resources. Review of local plans to determine unique community aesthetic features will also be conducted. This section of the EA will explain potential visual impact measures to mitigate adverse impacts of the alternatives and offer an Aesthetic Treatment Plan to maximize corridor visual consistency and to be followed during design and construction of the preferred alternative.

Table 16 describes the methodology for aesthetic considerations.

Table 16
Aesthetics and Visual Impacts

Aesthetics and Visual Impacts	
Subject Areas	• Visual qualities of project alternatives and impact of alternatives on adjacent view sheds
Relevant Data/ Information Sources	• Aerial photographs, corridor photographs, and maps • Sensitive or special areas • View sheds • Unique community architectural features or art
Collection and/or Analysis Methodology	• Identify alternatives • Identify and map sensitive visual areas and locations of visual issues and view sheds • Determine unique community aesthetic features • Determine visual impacts of improvements on adjacent areas and view sheds. • Identify the relation of impacts of project alternatives to potential views of and from the project vicinity. • Assess and measure visual quality based on *FHWA's Visual Impact Assessment Manual for Highway Projects* • Disclose visual qualities and unique structural features of proposed alternatives and their impact to host community • Develop Aesthetic Treatment Plan, mitigation options, and areas for additional community support for improvements.
Study Location	• The initial records search will include the project study area limits as defined in Figure 1 and may extend into visual view sheds for areas seen from corridor and from areas whose view is of the corridor.
Regulatory Guidance/ Requirements	• *FHWA Technical Advisory T6640.8A* • *23 U.S.C. 101, 109, 138,319* • *49 U.S.C. 303, 5301, 5312, 5324, 55, Subchapter II* • *Visual Impact Assessment Manual for Highway Projects (FHWA HI 88-054, 1988.)* • *Aesthetics and Visual Quality Guidance Information,(FHWA, 1986)* • *Urban Design for Region 6 (CDOT, 2003)*
Impacts	• Impacts of project alternatives on aesthetics and visual qualities will be assessed
Mitigation Options	• Mitigation techniques will be developed for visual impacts. Options for aesthetic treatments of the preferred alternative will be explored and may include landscaping, architectural design elements, incorporation of public art, or barriers during construction phases.
Deliverables	• Technical Memorandum detailing visual context of the corridor, use of CDOT Region 6 design guidelines for corridor improvements, and mitigation options for impacts, specific to Santa Fe interchange and other visually impacted areas, as necessary • Present areas of potential impacts at Public Open House/Public Hearing for EA • Possible public design workshop for Santa Fe interchange with C-470, including interchange reconstruction alternatives and visual treatments (if necessary) • Summary of analysis and mitigation measures in EA

3.12 SECONDARY EFFECTS

Secondary (indirect) effects will be evaluated and addressed with direct impacts within the individual resource discussions. A clear definition of what constitutes secondary (indirect) effects and how they will be analyzed for specific resources will be presented for approval to CDOT and FHWA prior to performing the secondary impact analysis.

Impacts to the environment by the range of alternatives carried forward into the EA will be discussed. Mitigation measures will be evaluated and may or may not be the direct responsibility of CDOT and FHWA.

3.13 CUMULATIVE EFFECTS

Cumulative effects will be evaluated using a methodology that coordinates the related NEPA documentation efforts involving the other major corridors within CDOT Region 6 and is consistent with CDOT policy currently under development. The cumulative effects analysis will begin with an effort to characterize the past, present and reasonably foreseeable projects that have caused impacts similar to those of the alternatives carried forward into the EA. A spatial (geographic area) and temporal (point in time in the past and point in time into the future) boundary specific to the C-470 Corridor will be defined in cooperation with CDOT Environmental Programs Branch and FHWA. For example, the temporal limits for past, present and reasonably foreseeable projects will be between 1980 (the year of construction of the first segment of C-470 from I-25 to Santa Fe)[1] and 2025 (DRCOG's long-term planning horizon). The spatial boundary for C-470 cumulative effects analysis is variable, dependent on the resource affected by the project. Different types of topographic and geopolitical factors place difference limits of the area of influence of the C-470 project for different resources such as air, water, wildlife and the human environment.

Past, present and reasonably foreseeable actions will be briefly described to characterize a chronology of incremental and cumulative impacts in the study area. Impacts to the environment by the range of alternatives carried forward into the EA will be discussed. The EA will characterize how the project's incremental impacts have and will contribute to other impacts over time. Specific areas of discussion may include: land use and growth, traffic growth, water quality or wildlife habitat (These areas of investigation will be confirmed in discussions with CDOT and FHWA). The cumulative effects analysis will assess the magnitude of the project's contribution to cumulative effects and, if necessary, assist in the identification of appropriate mitigation for impacts. Mitigation measures may or may not be the direct responsibility of CDOT and FHWA. It is likely that mitigation may fall under shared or independent regional responsibility. Table 18 describes the methodology for conducting the cumulative effects analysis.

1 C-470 construction began in 1982 for the first segment from Interstate-25 to Santa Fe. The next section of C-470 was constructed from Santa Fe to US 285. The last section of construction from US 285 to Interstate 70 was opened to traffic by 1990.

Table 17
Cumulative Effects

Cumulative Effects	
Subject Areas	• Impacts of the proposed action relative to past, present and reasonably foreseeable future actions in the study area
Relevant Data/ Information Sources	• Existing and approved plans for residential, commercial and industrial development projects from local governments, county and city planning commissions and other agencies (such as DRCOG) serving the study area boundaries • Past, present and (reasonably foreseeable) future actions by private, federal and non-federal agencies and related documentation • CDOT project documents for past, present, and reasonably foreseeable future actions • Demographic data from Colorado Department of Local Affairs • Historical land use data and permits from US COE • Aerial photographs • Ecological/natural resources, including wetlands, streams, forests, other natural habitats, and wildlife • Land use/community-based factors, including neighborhoods, recreational facilities, socio-economic resources • Traffic modeling data
Collection and/or Analysis Methodology	• Consider potentially affected resources that are vulnerable to incremental effects. These social and/or environmental issues of concern will be established through coordination with FHWA and CDOT and may include: traffic growth, land use/growth, water resources, or wildlife. • Action and impact compilation created through local agency consultation, and review of local land use and development plans Generate list of past projects. • Responsible agencies may be contacted for additional information for permitted, planned and programmed projects. Generate a list of reasonably foreseeable projects. • Resources characterized and baseline conditions determined through past evaluations, current studies, and new analysis as needed • Data evaluated through the use of analytical tools, including tables, matrices and system diagrams, trends analysis, maps and overlays, GIS • Environmental consequences of cumulative impacts determined
Study Location	• See Figure 1. Spatial and temporal boundaries will be subject to review by CDOT and FWHA to ensure acceptable limits beyond project area for certain resources
Regulatory Guidance/ Requirements	• *Considering Cumulative Effects under the NEPA, Council on Environmental Quality Cumulative Effects Handbook, January 1997* • *Interim Guidance: Questions and Answers Regarding Indirect and Cumulative Impact Considerations in the NEPA Process, FHWA 2003* • *40 CFR 1508.7 Cumulative Effects Definition in CEQ Regulations.*
Impacts	• Determine incremental impact from project alternative relative to total cumulative impacts of past present and reasonably foreseeable projects • Disclose impact of growth on host communities
Mitigation Options	• Develop broad, regional and conceptual mitigation strategies to be implemented by CDOT/FHWA and mitigation recommendations for surrounding jurisdictions or other partners and entities. • Opportunities for environmental enhancement may be considered.

Cumulative Effects	
Deliverables	• Summary of analysis and impacts in the EA

3.14 ECOLOGICAL RESOURCES

3.14.1 Wildlife, Vegetation, Threatened and Endangered Species, and Colorado Species of Special Concern

The ecological resource assessment will be initiated through requests to the U.S. Fish and Wildlife Service (USFWS), Colorado Natural Heritage Program (CNHP), and Colorado Division of Wildlife (CDOW), for lists of federally threatened, endangered and candidate species, and Colorado species of special concern. Migratory birds, rare plants, vegetation communities, and noxious weeds will also be studied in the ecological resource assessment. An initial investigation will be conducted to determine the potential for listed species habitat within or adjacent to the project study area, and field analyses and presence/absence surveys will follow as needed. Global Positioning System (GPS) and Geographic Information System (GIS) technologies will be used to record, locate, and map habitat, vegetation, noxious weeds, and record the presence or absence of species. Complete resource assessments will be prepared and a report of "Existing Conditions of National Resources and Sensitivity Evaluations" will be produced. Potential permitting needs required for implementation of the preferred alternative will be disclosed.

Table 18 describes the methodology for assessing the impact of project alternatives on ecological resources.

Table 18
Ecology

Ecology	
Subject Areas	• Plants, wildlife, and habitat. Specifically included are federally threatened, endangered, and candidate wildlife and plant species, and Colorado species of special concern • Wildlife corridors • Noxious weed patches • Fisheries • South Platte River near US 85 • Drainages of Cottonwood Creek, Willow Creek, Big Dry Creek, Lee Gulch, Dad Clark Gulch, the Highline Canal, Deer Creek and Massey Draw • Riparian habitat areas • C-470 right of way, vacant lots, drainage ditches, floodplains and floodways, parks, golf courses and open spaces • Potential Preble's meadow jumping mouse habitat • Potential habitat for rare or protected plants/ plant communities • Raptor nests • Migratory bird nests • Natural resources within residential and commercial developments and within private land will not be inventoried
Relevant Data/ Information Sources	• Lists of threatened, endangered, candidate, and sensitive species of plants, animals, and fish obtained through correspondence with USFWS, CDOW and CNHP • Potential habitat or presence/absence of species on the Federal and State lists (Lists must be periodically reviewed) • Federal Species List: - Preble's Meadow Jumping Mouse - Bald Eagle - Colorado Butterfly Plant - Ute Ladies' Tresses Orchid • Colorado Species List: - Black-Tailed Prairie Dog - Burrowing Owl - Ferruginous Hawk • Wildlife mortality data from CDOW or CDOT maintenance • Local resource management agencies • CDOT's Priority Weed Maintenance List • Jefferson and Douglas Counties' established weed priority lists • State of Colorado Noxious Weed List

Ecology	
Collection and/or Analysis Methodology Collection and/or Analysis Methodology	• (1) Collect existing data from relevant resource agencies including USFWS, CNHP, CDOW, and Jefferson and Douglas County Open Space. • (2) Inventory species of existing vegetation communities by categories of grasslands, wetlands, riparian, and shrub lands. • (3) Inventory for potential habitat for threatened, endangered, or state sensitive species or communities along the corridor and for migratory bird nests. Additional field analysis and investigation to be performed if habitat is identified within the project area • (4) Determine any wildlife corridors, wildlife roadway crossings, and if existing or future transportation facilities are impeding wildlife corridors • (5) Utilize IPAC hand held computers (with GIS and Global Positioning System [GPS] software) to document resources in the field, record spatial locations and attributes, map locations, and create record in GIS database • (6) Conduct presence and absence surveys using approved survey protocol for shortlist of alternatives, as required per USFWS
	• (7) Inventory location of noxious weed species as listed by the State of Colorado, Jefferson and Douglas Counties, and CDOT. • (8) Develop integrated noxious weed management plan for project construction to (1) identify, map and prioritize the targeted noxious weed species, and (2) provide recommendations for treatment for control. • (9) Conduct "Sensitivity Evaluation" for all resources that describe the relative quality and extent of each resource, types of impacts that could result from transportation improvements, and mitigation and/or enhancement opportunities for each resource. • (10) Prepare a Biological Assessment for federally listed species located in project area.
Study Location	• The initial records search will include the project study area limits as shown in Figure 1 and will include the area within ½ mile of the centerline of the existing C-470 highway alignment. Detailed studies will be done within 300 feet of existing or proposed right-of-way (whichever is widest).
Regulatory Guidance/ Requirements	• Endangered Species Act (16 USC 1531-1543) • Interagency Cooperation – Endangered Species Act of 1973 as amended (50 CFR 402) • *Colorado Noxious Weed Act (CRS 35-5.5-101)* • *Integrated Noxious Weed Management Plan, CDOT 2000* • *Migratory Bird Treaty Act (16 USC 703-711)* • *Bald and Golden Eagle Protection Acts (16 USC 668-668d)* • *Fish and Wildlife Coordination Act (16 USC 661-666c)* • *Executive Order 13112 - Invasive Species* • *Executive Order 13186 - Responsibilities of Federal Agencies To Protect Migratory Birds* • *Black-Tailed Prairie Dog Relocation Guidelines CDOT (January 8, 2002)* • *Interim Guidance for Prairie Dog Policy CDOT Region 6 (December 16,1996)*
Impacts	• The number of acres of disturbed threatened, endangered, and state sensitive species habitat and disturbed vegetation communities will be calculated for each alternative. • Determine impacts to federally listed species or state sensitive species in consultation with USFWS and DOW. • Assess indirect impacts to habitats
Mitigation Options	• If impacts to federally listed species are possible, consultation with USFWS will be initiated • Follow Region 6 Guidance on no net loss of trees policy • Protect wildlife habitat corridors: developing wildlife crossings, over sizing of culverts and other strategies to mitigate impacts to wildlife may be recommended

Ecology	
Deliverables	• Recommendations for seasonal buffers for raptor nests and temporal restrictions on construction seasons for raptors and other wildlife • List of Federally-listed species with potential to occur near C-470 corridor • Sensitivity evaluation ranking criteria • Recommendations of future surveys to be considered during the implementation of a preferred alternative • Disclosure of permitting needs that exist in the corridor to be considered during the implementation of a preferred alternative: such as consultation with CDOW, Section 7 Consultation with USFWS, or a Migratory Bird Depredation Permit. • Biological Assessment (if required) • Existing Conditions of Natural Resources and Sensitivity Evaluation technical report • Noxious Weed Management Plan • Summary of analysis, impacts, and mitigation measures in the EA

3.14.2 Wetlands and Riparian Areas

Wetlands and riparian corridors are of special concern for this project. To collect baseline data for this study, an initial review of potentially affected wetlands will be performed, focusing on the National Wetland Inventory (NWI) maps, Natural Resources Conservation Service (NRCS) County Soil Surveys, aerial photography, and United States Geological Survey (USGS) topographical maps. Existing wetlands, water bodies, and riparian areas in the study area will be identified and mapped using GPS units and potential impacts will be evaluated. The type, quality, and function of wetlands will be described. The wetlands and water bodies will be assessed for their jurisdictional status under the Clean Water Act Section 404. Acres of disturbed wetlands, waters of the U.S, and riparian areas will be tabulated for each alternative. These findings will be documented in the wetland determination report submitted to USACE and in the CDOT Wetland Finding Report. Senate Bill 40 (SB40) Certification will be completed if construction affects any stream or riparian corridors within the project area. Recommendations for additional surveys and permitting needs will be disclosed in the EA.

Table 19 describes the methodology for assessing the project alternative's impacts on wetlands and riparian areas.

Table 19
Wetlands and Riparian Areas

Wetlands and Riparian Areas	
Subject Areas	• Wetlands, Waters of the U.S., and riparian areas • South Platte River near US 85 • Drainages of Cottonwood Creek, Willow Creek, Big Dry Creek, Lee Gulch, Dad Clark Gulch, the Highline Canal, Deer Creek and Massey Draw • Riparian habitat areas • C-470 right of way, vacant lots, drainage ditches, floodplains and floodways, parks, golf courses and open spaces • Natural resources within residential and commercial developments and within private land will not be inventoried
Relevant Data/ Information Sources	• NWI mapping • NRCS soil surveys • Location of jurisdictional wetlands and non jurisdictional wetlands • Location of Waters of the U.S. • Location of riparian habitats • From the ACOE, obtain previous wetland delineations and Section 404 permits completed within the project study area • Aerial photography
Collection and/or Analysis Methodology	• (1) Desktop study: review of NWI maps, NRCS soil maps, aerial photography, and USGS topographic maps • (2) Inventory and characterize soils • (3) Inventory canals and ditches within project area • (4) Inventory streams, creeks, rivers and open bodies of water within project area • (5) Utilize IPAC hand held computers (with GIS and Global Positioning System [GPS] software) to document potential wetlands in the field, record spatial locations and attributes, map locations, and create record in GIS database • (6) Assess types of vegetation found within wetland areas • (7) Wetland and riparian corridor locations will be plotted on topographic maps and aerial photos • (8) Conduct "Sensitivity Evaluation" for wetlands and riparian areas that describe the relative quality and extent of wetlands and riparian areas, types of impacts that could result from transportation improvements, and mitigation and/or enhancement opportunities. • (9) Conduct a full wetland delineation, according to the 1987 USACE *Wetland Delineation Manual*, for the wetlands and waters of the U.S. that are impacted by the preferred alternative identified in the EA. • (10) Obtain COE determination of jurisdictional wetlands • (11) Conduct preliminary assessment of wetland functions and values for wetlands within or near the C-470 right of way • (12) Assess the need for SB 40 Certification and, if required, complete SB 40 Certification • (13) Complete supporting documentation for a Section 404 B(1) Guidelines Analysis
Study Location	• The initial records search will include the project study area limits as defined in Figure 1 and will include the area within ½ mile of the centerline of the existing C-470 highway alignment.

Wetlands and Riparian Areas	
Regulatory Guidance/ Requirements	• *Clean Water Act/Water Quality Act of 1987, Section 404 (33 USC 1251-1376)* • *Executive Order 11990 - Protection of Wetlands* • If construction is planned in any area meeting the relevant criteria, *Colorado State Senate Bill 40 (SB 40) Certification (33-5-101 CRS 1973 as amended)* will be completed through coordination with Colorado Division of Wildlife • *Integrating NEPA/404 for Transportation Projects (US EPA, FHWA, ACOE, USFWS, NMFS, 1992)* • *Mitigation of Impacts to Wetlands and Natural Habitat (23 CFR 777)* • USACOE *Wetland Delineation Manual*, 1987 • *Montana Wetland Field Evaluation Form and Instructions (Montana Department of Transportation, 1996)*
Impacts	• Quantify acres of wetlands, Waters of the U.S., and riparian areas impacted with each alternative. Areas within 300 feet of existing or proposed right-of-way will be considered during the assessment of impacts. Loss of wetlands will be calculated to the nearest 1/10th of an acre. • Determine type and function of each wetland impacted
Mitigation Options	• Document where wetlands were avoided or where impacts were minimized • CDOT wetland banking, as appropriate • For wetland mitigation, determine appropriate in kind on-site wetland mitigation sites and/or determine where site replacement acreage is appropriate
Deliverables	• Identify the least environmentally damaging alternative to the aquatic environment • Wetland Delineation Report (USACE) • Wetland Finding Report (CDOT) • Summary of analysis, mitigation measures, and Wetland Finding will be included in the EA document • Recommend permits required to implement the preferred alternative • Complete Section 404 (b)(1) Guidelines Analysis in order to select the least environmentally damaging and most practicable alternative with regard to cost, logistic, and technology • Section 404 Permit to combine NEPA/404 Permitting Process and have public comment for 404 be simultaneous as the public comment for the EA • Produce Wetland Mitigation and Monitoring Plan • Complete SB 40 Certifications

Appendix A

DATE: 10/16/2003

COLORADO DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL SCOPING FORM

PROJECT: C-470 Corridor, Kipling to I-25 DOCUMENT TYPE: Environmental Assessment
SUB-ACCOUNT:

	EXTENT OF STUDY REQUIRED				PREPARATION & COORDINATION REQUIREMENTS				EXTENT OF NARRATIVE REQUIRED				
TOPICS	Complete Analysis Required	Short Analysis to Define Resources/Impacts	No Analysis Required	Analysis Already Completed	Work to be Done by Region Staff	Work to be Done by Central Staff	Work to be Done by Consultant	Outside Agency Concurrence or Approval Required	Complete Analysis / Documentation Included in Text	Summary of Analysis / Documentation Included in Text	Statement of No Involvement or No Impacts	Coordination Documents Included in Appendix	COMMENTS
Public Involvement	X						X					X	Small Group Meeting notes in appendix
Socio-Economics	X						X			X			
Environmental Justice	X						X			X			
Land Use	X						X			X			
Right-of-Way	X						X			X			
Traffic	X						X			X			
Accidents	X					X				X			
Air Quality	X						X	X		X		X	Coordination with Air Pollution Control Division
Noise	X						X			X			Detailed technical report in appendix
Hazardous Waste	X						X			X		X	Modified ESA Tech Report
Farmlands		X					X			X			
Archaeology	X					X		X		X		X	Coordination with US ACOE
Native American Consultation	X					X				X		X	Coordination with tribes
Paleontology	X					X				X		X	Coordination with US ACOE
History	X						X	X		X		X	Coordination with SHPO
Historic Bridge	X						X	X		X		X	Coordination with SHPO
Section 4(f) / 6(f)	X						X	X	X			X	If needed.
Wildlife / Fisheries	X						X			X			
T & E Species	X						X	X		X		X	Agency concurrance in appendix
Vegetation	X						X			X			Define certain regions (eg. the Hogback region) in more detail.
Noxious Weeds	X						X			X			Weed management plan required
Wetlands	X						X	X		X		X	Wetland finding in document
Floodplains	X						X	X		X		X	Coordination with US ACOE
Hydrology	X						X			X			
Water Quality	X						X			X			To Be Expanded.
Senate Bill 40	X						X	X		X		X	CDOW
401 Permit													
402 Permit													
404 Permit	X						X					X	NEPA/404 Merger, ongoing coordination w/COE
Other													

Note: Shaded blocks were completed following the EP Scoping Meeting

APPROVED_____

DATE_____