Air Quality Report
Carbon Monoxide Conformity Determination

NORTH SPOKANE CORRIDOR

SPOKANE RIVER TO FREYA STREET REDESIGN

Spokane County, WA

Prepared by

WSDOT EASTERN REGION

PLANNING OFFICE

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AIR QUALITY -
Carbon Monoxide Conformity Determination

Introduction

The WSDOT Eastern Region Planning Office has completed an air quality conformity determination as part of the North Spokane Corridor (NSC) 2009 Redesign environmental reevaluation. This reevaluation is necessitated by design changes that modify the horizontal and vertical alignment of the facility through the Hillyard neighborhood of north Spokane. Also, removal of a slip ramp serving traffic from eastbound Francis Ave. to southbound NSC, as required by the alignment modification, is included as part of this evaluation.

The Spokane region is currently in attainment of the National Ambient Air Quality Standards (NAAQS) for carbon monoxide. There have been no violations of the emission standard for 15 years. However, in order to maintain the area's attainment status, transportation plans, programs and projects must be analyzed to ensure that they do not create any potential violations of the standard. The air quality conformity analysis demonstrates that the NSC, with the proposed design modifications, will not create any violation of the NAAQS for carbon monoxide, thereby conforming to the State Implementation Plan for air quality.

NAAQS Conformity Determination Process for Carbon Monoxide

Build/No-Build Air Quality Conformity Test

A comparison of traffic operations data for the "no-build" and "build" alternatives for the NSC is the basis for the carbon monoxide conformity determination. The air quality analysis must demonstrate that the "build" alternative will not create or contribute to any exceedances of the NAAQS for carbon monoxide. In the event that the "build" alternative creates or exacerbates a location where a violation of the standards is projected to occur, solutions must be developed to eliminate the violation. These solutions then become part of the project.

The analysis and identification of potential carbon monoxide emission issues occurs at the intersection level. In order to identify locations that need to be analyzed, intersection approach volumes and turn movements for the "build" and "no-build" alternatives are compared with each other. This is done for the 2030 forecast year, which is the projected date when the facility will be completed and open to traffic. Below are descriptions of the two alternatives.

NSC "Build"

The NSC "Build" scenario assumes the completion of the NSC between US 395 at Wandermere and Interstate 90, including completion of the collector-distributor system. The "Build" alternative also assumes the slip ramp from eastbound Francis Ave. to southbound NSC will not be part of the project.

NSC "No-Build"

For this analysis, the "No-Build" alternative includes the funded elements of the NSC between US 395 and Freya Ave. The NSC will be open to traffic on a two-lane facility, between US 2 and the Freya Ave. interchange, in August of 2009. The segment between US 395 and US 2 is under construction and will be open to traffic by 2011, allowing for travel between US 395 and Freya Ave. interchange.

Intersection Selection Process

The process used to identify which intersections would be analyzed for potential exceedances of the air quality standards for carbon monoxide emissions includes a screening protocol, an intersection operational analysis, and an intersection "hot-spot" analysis, as necessary. The screening protocol was first used in 2003 to determine air quality conformity for design modifications relative to Phase 2 of the North Spokane Corridor, which extends from the Spokane River to I-90. A report, "North Spokane Corridor Phase 2, Air Quality Conformity Results", was submitted to the Federal Highway Administration as part of the re-evaluation documentation for Phase 2.

The screening protocol for the 2003 NSC Phase 2 analysis was created through interagency coordination and consultation with the U.S. Environmental Protection Agency (EPA), Washington State Department of Ecology (WSDOE), Spokane County Air Pollution Control Authority (SCAPCA), and the Spokane Regional Transportation Council (SRTC). A detailed presentation of the screening criteria is included as Attachment 1, "Air Quality Conformity Determination Protocol for the North Spokane Corridor (NSC) Phase 2".

In the years following the 2003 analysis done for Phase 2 of the NSC, the WSDOT, in collaboration with the EPA, developed a carbon monoxide emissions model called the Washington State Intersection Screening Tool (WASIST). As the name implies, the tool is designed to distinguish between intersections that need in-depth air quality analysis from those that need not be subject to further analysis because of their high improbability for having an exceedance of the CO standard. WASIST was used in this evaluation to identify locations possibly needing analysis with a more in-depth air quality analysis tool, CAL3QHC. Using WASIST, it was determined that there were no locations requiring review using CAL3QHC.

The purpose of the screening protocol was to identify intersections where carbon monoxide emissions could adversely be impacted by the construction of the NSC

Redesign through the Hillyard neighborhood of Spokane. With some exceptions, discussed below, the air quality analysis was largely focused on the Hillyard vicinity as this is where the redesign of the facility is located. Generally, this area is bounded by Francis on the north side, Euclid on the south side, Market/Haven on the west side and Freya to the east. (In the last 10 years, extensive air quality analysis has been performed for the entire facility, as well as various segments as required by design changes, such as the Phase 2 report discussed above.)

Twenty-six signalized intersections located adjacent to, or in the proximity of, the NSC alignment through Hillyard were subject to the screening protocol. Additionally, in accordance with the screening protocol, 10 intersections identified in the State Implementation Plan (SIP) for air quality were also evaluated. These particular intersections are sensitive to carbon monoxide emissions, thereby warranting analysis regardless of their relationship and proximity to the project. Applying the protocol, of the 36 candidate intersections, 5 locations were identified for further operational analysis by criteria contained within the protocol. The criteria were developed such that, if satisfied, they would indicate a potential air quality issue at an intersection caused by the "build" scenario. The criteria are as follows:

- The percent change in intersection approach volumes attributable to the "build" scenario as compared to the "no-build" scenario.
- The 2030 forecast ambient CO value for the area in the vicinity of the intersection, as indicated by the SRTC Urban Airshed Model
- If the intersection is a location identified in the SIP as being sensitive to carbon monoxide emissions.

Spokane Regional Transportation Council provided 2030 1 hour forecast ambient carbon monoxide background data. Background carbon monoxide values are geographically specific with higher values located in the central business district and lower values present in rural areas. 1 hour ambient background values are used in the modeling of CO emissions at intersections. Generally, lower 1 hour background values reduce the probability of an intersection demonstrating a modeled violation of the CO emissions standard. The CO background values for 2030 are shown below. A map that defines the three geographic areas is attached to this report.

- Rural – 1.00 parts per million (ppm)
- Suburban – 1.00 ppm
- Central Business District – 2.19 ppm

Table 1 represents the application of the screening protocol. At the 36 selected intersections, 2030 approach volumes for the "build" and "no-build" scenarios were compared against each other. Results of the screening process for each intersection category; "SIP", "adjacent" and "proximate", are presented below.

SIP Intersections

For the 10 SIP intersections, 4 were identified as needing operational analysis based on volume increases at the intersection relative to the "no-build" scenario.

- Browne at 2nd Ave.
- Division at 2nd Ave.
- Division at 3rd Ave.
- Sprague Ave. at Park Ave.

Due to level of service values falling below the LOS "C" threshold in the protocol, two intersections were analyzed for potential exceedances of the air quality standard. They were Division at 3rd and Sprague Ave. at Park Ave. WASIST was used to perform this analysis.

Sprague at Park

The Synchro level of service analysis indicates that this intersection will operate at LOS "D" in the 2030 forecast year, assuming completion of the NSC. The WASIST model indicates there will not be any exceedances of the 1 hour or 8 hour NAAQS for carbon monoxide in the 2030 forecast year. 2030 forecast turning movements from the regional travel demand model were used for the analysis. Signal timing was optimized based on turn movements and roadway geometry. The highest modeled concentration of CO for the 8 hour standard was 3.8 ppm. This is well below the standard of 9 ppm. Synchro and WASIST data for this intersection is included in the appendix.

Division at 3rd

The Synchro level of service analysis indicates that this intersection will operate at LOS "F" in the 2030 forecast year for the "build" alternative. The WASIST model indicates there will not be any exceedances of the 1 hour or 8 hour NAAQS for carbon monoxide in the 2030 forecast year. The highest modeled concentration of CO for the 8 hour standard was 4.9 ppm. This is well below the standard of 9 ppm. Synchro and WASIST data for this intersection is included in the appendix.

Adjacent Intersections

11 signalized intersections were defined for this analysis as being *adjacent* to the NSC in the Hillyard neighborhood vicinity. Two intersections, Freya at Wellesley and Market at Regal, are currently unsignalized but will be signalized as part of the project. 9 locations were not subjected to further analysis as the "build" scenario resulted in approach volume decreases compared to the "no-build". Two locations, Market at Regal and Market at Wellesley, exhibited higher approach volumes for the "build" scenario. The model predicted that approach volumes at Market and Wellesley would be about 8% higher in the "build" scenario. However, in accordance with the protocol, this location was not analyzed any further as the 2030 forecast ambient CO value is 1.00 ppm.

The travel demand model predicts that the 2030 approach volumes at Market and Regal will be 10% or higher for the "build" scenario. Per the protocol, this required an operational analysis of the intersection to determine level of service (LOS). The analysis determined that the 2030 forecast LOS for this intersection would be "C". Consequently, no further air quality analysis was necessary.

Proximate Intersections

15 signalized intersections were identified as being proximately located to the NSC in the Hillyard vicinity. The travel demand model predicts lower 2030 approach volumes, in the "build" scenario, for 14 of the locations, requiring no further analysis for those intersections. The model indicates that one location, Haven at Wellesley, may have a 9% increase in volume. The 2030 background CO concentration value for the area in the vicinity of the intersection is 1.00 ppm. Consequently, no additional analysis was necessary for that location as well.

Conclusion

The 2009 Redesign of the NSC conforms to the State Implementation Plan for Air Quality. The project does not create any modeled violations of the NAAQS. This determination is based on the evaluation of 36 signalized locations, largely located in the immediate vicinity of the project. Of the 36 locations, travel demand modeling indicated that only 7 intersections would experience increased traffic volumes in the NSC "build" scenario. This is understandable, given the traffic diverted from arterials to the NSC. Of the 7 locations, five were subjected to additional analysis in accordance with a previously approved air quality analysis protocol. Of the 5 locations, 2 required more in-depth air quality review because operations analysis predicted a poor level of service. The additional examination, conducted using WASIST, a screening tool used for intersection air quality analysis, indicated the intersections would not violate NAAQS for carbon monoxide in the 2030 forecast year.