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Technical Memorandum Partial Backfill Alternative Traffic Analysis

To:	Kathy Arnold	From:	Seri Park
Company:	Rosemont Copper	Date:	January 9, 2010
CC:	Jamie Sturgess (Rosemont); Kekoa Anderson and David Krizek (Tt)	Doc #:	013/10-320871-5.3

1.0 Introduction

This Technical Memorandum was prepared by Tetra Tech and presents a Traffic Analysis for the Partial Pit Backfill Alternative being considered in the US Forest Service Environmental Impact Statement (EIS) for the proposed Rosemont Copper Project (Project). The partial Pit Backfill Alternative assumes a base configuration similar to that of the Barrel and McCleary Alternative. This analysis assesses the potential impact that the Partial Pit Backfill Alternative will have on the traffic network performance of State Route 83 (AZ-83). This memorandum also discusses the input parameters used for determining the level of service (LOS) for intersections and roadway segments.

Tetra Tech published a comprehensive Traffic Study Report in April of 2009 which was based on the Mine Plan of Operations (MPO). The traffic study included LOS analysis of key intersections and roadway segments along AZ-83 for the Existing Year, Construction Year, Operations Year 5, and Operations Year 20. Two (2) scenarios, Carpool and Partial Carpool, were also examined for Operations Year 5 and 20.

The Partial Pit Backfill Alternative differs from the MPO primarily in the design and location of the Waste Rock Storage Area and the Dry Stack Tailings Facility. Activity at the Project site is also assumed to continue after the cessation of operations associated with partially backfilling the Open Pit. A small fleet of equipment would be used to move waste rock from the Waste Rock Storage Facility to the Open Pit. The operation would likely last about three (3) years and engage about 30 personnel per shift, two (2) shifts per day. Since pit backfilling would take place after the cessation of operations, any Project related traffic, such as employee commutes, fuel deliveries, etc., would be minimal compared to the operational period.

This alternative, however, does not change the location of the Primary Access Road or future peak traffic forecasts during the operational period. These parameters are identical to the previous Traffic Study Report published in April of 2009. Therefore, the analysis completed and the results presented in the April 2009 Traffic Study Report are still applicable to the Partial Pit Backfill Alternative. The following sections of this Technical Memorandum explain in detail the



various traffic analysis parameters used in the April 2009 study, including an explanation why the study results are still applicable to the Partial Backfill Alternative.

2.0 Level of Service Input Parameter

In order to examine the impact of the proposed alternative on LOS, a review of the input parameters that determine LOS was conducted. The following section describes the LOS derivation process for unsignalized intersections and highway segments along with input parameters of each method.

Unsignalized Intersection LOS

Unsignalized intersection LOS analysis was conducted using SYNCHRO software, which utilizes the Intersection Capacity Utilization (ICU) 2003 method. This method takes the sum of critical movement volume to saturation flow rates. The following elements are used as input parameters to determine the ICU rate which serves as LOS criteria.

Geometric Design Parameters

- Lane width and number
- Terrain grade
- Left turn/right turn bay length and number of lane: within the study site, no intersection had a left turn/right turn bay.
- Median type: in this study, a non-raised median type was applied.
- Area Type: this parameter defines whether the study site is within the Central Business District (CBD) or not. The study site was classified as a non CBD area.

Traffic Parameters

- Turning movement volumes: a typical four way intersection has a total of twelve (12) turning movements. Hourly turning movement volume is a key input element in intersection analysis.
- Heavy vehicle percentage: heavy vehicles are converted to passenger car equivalents (PCEs) for performing the LOS analysis.
- Peak Hour Factor (PHF): the vehicle arrival pattern produced during the analysis period is likely to be non uniform. To account for this varying arrival pattern, a peak hour factor (PHF) was developed and is defined as the ratio of the hourly volume to the maximum 15-minute flow rate expanded to an hourly volume.



- Intersection control type: in this study, the control type at all intersections was unsignalized control.
- Link speed: the posted roadway speed limit is usually used as the link speed.
- Pedestrian information: number of pedestrians.

Two-Lane Highway Segment LOS

In the Highway Capacity Manual (HCM) 2000, two-lane highway segment LOSs are determined by a range of the percentage of time spent following (%) which is derived using the following parameters.

Geometric Design Parameters

- Lane width
- Shoulder width
- Segment Length
- Terrain grade
- Highway Type: Per HCM, Class 1 highways include inter-city routes, daily commuter routes, and primary links in state or national highway networks where motorists expect to travel at high speeds. Scenic or recreational routes, or routes that pass through rugged terrain, are typically assigned to Class II. Since AZ-83 is regarded as a scenic highway, a Class II highway classification was applied for the analysis.
- Median type
- Percentage of passing zone: within the study site, no passing zones were present.
- Access point: an intersection or driveway should be included if it influences traffic flow. Access points unnoticed by the driver or with little activity are not considered and not included in the analysis per HCM.

Traffic Parameters

- Segment traffic volume
- Directional split: this parameter indicates the total volume split into each direction.
- Peak hour factor
- Truck percentage



- Recreational vehicle percentage
- Highway segment speed

3.0 Proposed Alternative Impact

Different LOS results from that of the Traffic Study Report (April 2009) would only be expected if the input parameters would be different for the Partial Pit Backfill Alternative. Modification of Primary Access Road would impact the geometric design parameters while changes in future forecasts would affect traffic parameters. As indicated in Section 1.0 Introduction, the main difference between the MPO and the Partial Pit Backfill Alternative is the design and location of the Waste Rock Storage Area and the Dry Stack Tailings Facility, including moving waste rock from the Waste Rock Storage Area for placement in the Open Pit following the cessation of operations. In this alternative, the location of the Primary Access Road and the future traffic forecasts remain identical to those used in the previous Traffic Study Report (April, 2009). Therefore, no changes to the input parameters are anticipated, thus yielding the same LOS results as presented in Traffic Study Report (April 2009).

4.0 Conclusion

In this Technical Memorandum, input parameters for determining intersection and two-lane highway LOSs were reviewed to analyze possible impacts of the Partial Pit Backfill Alternative on traffic performance. Because the Primary Access Road and future traffic forecasts remained the same as in the previous Traffic Study Report (April, 2009), no changes in LOS results are expected. In summary, the proposed alternative will not change the analysis results presented in the Traffic Study Report published in April, 2009.



REFERENCES

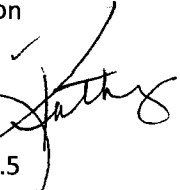
Transportation Research Board (2000) *Highway Capacity Manual*

Trafficware (2003) *Intersection Capacity Utilization – Evaluation Procedures for Intersections and Interchanges*

Highway Capacity Software McTrans Version 4.11

Tetra Tech (2009) *Traffic Analysis Report – Rosemont Copper Project*. Prepared for Rosemont Copper Company. Report Dated April, 2009

Memorandum

To: Beverly Everson
Cc: Tom Furgason ✓
From: Kathy Arnold 
Doc #: 003/10 - 15.3.5
Subject: Transmittal of Technical Memoranda and Pit Lake Report
Date: February 8, 2010

Rosemont Copper is pleased to transmit the following twenty technical memoranda and one report:

1. Rosemont Hydrology Method Justification, a Tetra Tech memo dated January 7, 2010;
2. Barrel Only alternative –
 - a. Noise Analysis, a Tetra Tech memo dated January 15, 2010
 - b. Traffic Analysis, a Tetra Tech memo dated January 8, 2010
 - c. Geochemical Characterization of Facilities, a Tetra Tech memo dated January 10, 2010
 - d. Lighting, an M3 memo dated December 2009
3. Barrel and McCleary alternative –
 - a. Noise Analysis, a Tetra Tech memo dated January 9, 2010
 - b. Traffic Analysis, a Tetra Tech memo dated December 15, 2009
 - c. Geochemical Characterization of Facilities, a Tetra Tech memo dated December 16, 2009
 - d. Lighting, an M3 memo dated December 2009
4. Scholefield Tailings and McCleary Waste alternative –
 - a. Noise Analysis, a Tetra Tech memo dated January 15, 2010
 - b. Traffic Analysis, a Tetra Tech memo dated January 12, 2010
 - c. Geochemical Characterization of Facilities, a Tetra Tech memo dated January 10, 2010
 - d. Lighting, an M3 memo dated January 2010
5. Sycamore Tailings and Barrel Waste alternative –
 - a. Noise Analysis, a Tetra Tech memo dated January 15, 2010
 - b. Traffic Analysis, a Tetra Tech memo dated January 9, 2010
 - c. Geochemical Characterization of Facilities, a Tetra Tech memo dated January 10, 2010
 - d. Lighting, an M3 memo dated January 2010
6. Partial Backfill alternative –
 - a. Noise Analysis, a Tetra Tech memo dated January 23, 2010
 - b. Traffic Analysis, a Tetra Tech memo dated January 9, 2010
 - c. Geochemical Characterization of Facilities, a Tetra Tech memo dated January 10, 2010
7. Geochemical Pit Lake Predictive Model, prepared by Tetra Tech and dated February 2010

As per your request, I am transmitting three hardcopies and two disks (disks contain tech memos only) directly to the Forest Service and two copies and one disk directly to SWCA. The Pit Lake report includes a copy of the report on a CD on the inside of the back cover of each report.