Memo

Date:	Thursday, September 08, 2022
Project:	City of Muscatine, IA & Canadian Pacific Railroad Grade Separation Grant Support
To:	City of Muscatine, Iowa
From:	Brett Guy, EIT Jon Markt, PE, RSP_1
Subject:	Dick Drake Way – Rail Crossing Grade Separation Benefit-Cost Analysis

Introduction

This memo presents HDR's review of the at-grade crossing, 393258B, located in Muscatine, IA at the intersection of Dick Drake Way with Canadian Pacific Railroad (CP), Ottumwa Subdivision, Mile Marker 222.35. The evaluation will discuss the anticipated impacts to the City from the CP and Kansas City Southern (KSC) rail merger and provide a methodology to calculate annual costs, including safety, delay, emissions, and vehicle operating costs along the corridor. The evaluation of this corridor and the crossing at Dick Drake Way is intended to assist state and local transportation planners in identifying the most efficient grade crossing investment strategies.

Canadian Pacific & Kansas City Southern Rail Merger

On October 29th, 2021, CP and KCS filed an application with the Surface Transportation Board (STB) seeking authorization for CP to acquire KCS. Current rail traffic consists of approximately 5 trains per day. The merger is expected to increase traffic through the City to a total of 20 trains per day by 2027. This increase in train traffic is expected to have a significant impact to vehicular delays and the overall health and safety of residents who live near the rail lines.

Accident Prediction and Severity (APS) Model - APS20

The new APS model, APS20, was used to serve as a replacement for the USDOT (United States Department of Transportation) model (APS86), which was published in 1986. The new model is estimated with newer statistical methods that explain accident risk as a function of grade crossing characteristics and accounts for accident history at the grade crossing. The most up-to-date version of the APS20 Accident Prediction and Severity Model is described in detail in the FRA's *New Model for Highway-Rail Grade Crossing Accident Prediction and Severity* report ***(Attachment A)***. Based on crash history and characteristics and of the crossing, the annual predicted accidents for the crossing are summarized below.

Crash Type	***Predicted Accidents[1]***
Fatal	0.000426
Injury	0.000932
Property Damage Only	0.001957
Total	***0.003315***

1. *Zero crashes have occurred at this crossing in the past 5 years.*

Benefit-Cost Analysis (BCA)

FRA's GradeDec software tool as used to provide a computational method for calculating a variety of cost-related impacts caused by a train blockage, such as crossing safety, vehicle delay, emissions, and vehicle operating costs and compares the benefits induced from proposed safety and infrastructure improvements in an alternative condition. USDOT provides guidance **(Attachment B)** specifically for BCA's used to support discretionary grant programs. The guidance provides recommended parameters to be used in the software tool for the application. All FY (Fiscal Year) 2022 grant applications are recommended to use a base year of 2020 and summarize monetized values in 2020 dollars. A brief list of the recommended parameters for the primary factors are summarized below.

Safety

Crash Type	*Monetized Value*
Fatal	$12,837,400
Injury	$302,600
Property Damage Only	$4,600

Travel Time Costs

Category	*Hourly Value*
General, All Purpose	$17.80
Truck Drivers	$33.60

All other parameters, including emissions, fuel burn rates, safety device effectiveness and other supplemental measures rely on the default (national averages) values provided by the FRA (Federal Railroad Administration).

Base Case & Alternate Case Evaluation

A comparison of the base case (No-Build) and an alternative case (Build) is required to evaluate the overall net benefits expected based on potential improvements over a period of time (between anticipated beginning of construction and Year 2050). The No-Build case assumes that no improvements would be made and the crossing would continue to operate in its current state. The Build case, for the intent of this application, assumes that a grade separation will be constructed to eliminate the at-grade crossing at a point in time in the near future. General assumptions regarding traffic growth and timing of implementation are listed below:

1. Existing traffic on Dick Drake Way, 3,500 vehicles per day(vpd) in 2020, grows 1.5% annually.
2. Existing train traffic, 5 trains per day(tpd) in 2020, increases to 20 tpd by 2027, and grows 1% annually thereafter. Train volume estimates provided by CP.
3. At-grade crossing is closed in 2024 and construction of overpass and road infrastructure begins. Analysis assumes a 2-year construction schedule.
4. Construction is finished and overpass is open to the public in 2026.
    a. Projected cost of total project in construction year- $7,555,000
5. Traffic control measures are put in place to divert traffic from nearby neighborhoods and industries to utilize the grade separation at Dick Drake Way.

Results

Based on the current crossing characteristics, the recommended parameters, and the timing of improvements, the total benefits and total costs associated with the construction of a grade separation crossing at Dick Drake Way and adjacent crossings in year 2020 dollars is show below.

Benefits, 2020 $	**Dick Drake Way**	**Corridor[1]**
Safety	$103,260	$119,841
Travel Time	$617,154	$845,700
Environmental	$29,995	$40,719
Vehicle Operating Costs	$107,438	$144,877
Network	$0	$391
Salvage Value	$289,827	$289,827
Total Benefits	**$1,147,674**	**$1,441,355**
Costs, 2020 $		
Overpass, Construction	**$4,691,650**	**$4,691,650**
Total Cost	**$4,691,650**	**$4,691,650**
Benefit-Cost Ratio	**0.24**	**0.31**

1. Corridor includes crossings from 41st St South to Oregon St (7 crossings). The additional benefits are primarily due to the re-assignment of traffic volumes from surrounding areas to the more attractive grade separation at Dick Drake Way.

Attachment A:

FRA's Final Report, August 2022:

New Model for Highway-Rail Grade Crossing Accident Prediction and Severity

Attachment B:

USDOT: Benefit-Cost Analysis Guidance for Discretionary Grant Programs