BNSF RAILWAY

Date: December 20, 2016

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Subject: New La Junta-Pueblo Amtrak Service Capacity Analysis

Project Summary:

Capacity Planning has completed an RTC analysis to determine the infrastructure required to support a new Amtrak train proposed to operate between La Junta, CO and Pueblo, CO. The train would be an extension of Amtrak's Southwest Chief (No. 3 and No. 4 trains) at La Junta.

The goal of this analysis was to determine the level of capacity improvements that would be required to ensure safe passenger train performance, and also mitigate BNSF freight train delays created by the new passenger trains.

RTC results indicate that the proposed new Amtrak service would require the following upgrades:

- **The installation of Positive Train Control (PTC)**
- **The installation of a CTC signal system and power switches**
- **Constructing between 2.5 and 8.65 miles of second main track on the BNSF Pueblo Subdivision**
- **Increasing maximum passenger train speed to 79 mph (if operating at passenger train priority)**

None of these upgrades are currently planned for this route in the near future.

Background:

This analysis was completed at the request of Amtrak to determine what BNSF rail infrastructure upgrades would be required to operate an on-schedule, one round-trip per day, 55 mph or 79 mph passenger train operation between La Junta, CO and Pueblo, CO over the BNSF Pueblo Subdivision.

The BNSF Pueblo Subdivision is 62.6 miles long, has 5 sidings varying between 4,100' and 7,500', and the method of operation is approximately 60% TWC ABS and 40% CTC. The two longest sidings (both 7,500') have dual control (power) switches.

Proposed Amtrak operating schedule:

Scenario 1 schedule. Operate at 79 mph and passenger train priority
From La Junta to Pueblo 08:55 – 10:00
From Pueblo to La Junta 17:55 – 19:00

Scenario 2 schedule. Operate at 55 mph and freight train priority
From La Junta to Pueblo 08:55 – 10:21
From Pueblo to La Junta 17:35 – 19:01

Because dispatch conflicts with BNSF trains of equal priority might result in extended delays to Amtrak, operating Amtrak at freight train priority increases the likelihood that the train may not operate on schedule.

The current Southwest Chief scheduled arrival/departure times at La Junta are:
No. 3 La Junta 08:15 – 08:30.
No. 4 La Junta 19:31 – 19:41.

RTC Modeling:

The following scenarios were modeled for this new passenger service:

I. Scenario 1. The new Amtrak train operating at passenger train speed (79 mph) and passenger train priority

II. Scenario 2. The new Amtrak train operating at freight train speed (55 mph) and freight train priority

The RTC model network consisted primarily of the Pueblo Subdivision between Pueblo, CO and La Junta, CO.

Base train volumes used in the RTC train files for this analysis were based upon 2014 actual train volumes that averaged 14.9 freight trains per day, with peaks at 18 trains per day. These volumes are consistent with the most recent 3 months (Sep-Nov 2016) train

volumes on the Pueblo Subdivision. Because this is an important BNSF coal route, typical coal train volumes associated with coal train "peak" season were programmed into the model.

A week's worth of historical train data was used in developing the RTC train file.
To simulate current and future operations, one Base Case and multiple Test Cases were created as described below. For each case, 15 randomized RTC model dispatch runs were completed.

Base Case:
The RTC Base Case used 2014 train volumes and a network identical to BNSF's current rail infrastructure.

1. At the conclusion of the Base Case RTC runs, simulation train run time data was extracted from the RTC output files and these run times were then later compared to the Test Case run time data.

Test Cases:

1. New Amtrak service – Two types of Test Cases were created to determine the impact of adding the additional Amtrak train.

    a. Each of the two Test Cases initially used a network identical to the Base Case but modeled different speeds and priorities for the new Amtrak service:

        i. Operate at passenger train speed (79 mph) and passenger train priority
        ii. Operate at freight train speed (55 mph) and freight train priority

    The purpose of these initial RTC Test Cases was to establish the amount of freight train delay created by the new Amtrak trains with no additional capacity infrastructure added to the network.

    b. At the conclusion of these two RTC runs, total run time for all trains (other than Amtrak) and Amtrak trains were extracted from the RTC output files. These output statistics are shown below in Table 1 which represent 7 days' worth of modeling statistics.

        - Scenario 1 resulted in 36.3 additional hours of BNSF train run time per week (5.2 hours per day).

        - Scenario 2 resulted in 20.0 additional hours of BNSF train run time per week (3.1 hours per day).

    c. After establishing the amount of BNSF freight train delay that would be created by the new Amtrak trains in Scenarios 1 and 2, follow-on RTC cases were developed. The goal of these follow-on cases was to determine the amount of infrastructure that would be required to operate an on-time

passenger operation and mitigate BNSF freight train delay. Scenario 1 and 2 RTC cases were used as a basis, and infrastructure projects were added incrementally to the model using a "build, run, and compare performance to the Base Case" process to determine the infrastructure improvements required to support an on-time passenger operation and mitigate freight train delay to Base Case levels.

High-level Capacity Analysis Results:

Case Description – Scenario 1	BNSF impact Total Hrs/Wk (from Base)	Pueblo Amtrak Trains Avg. run time in hours.	
		West	East`
Case 1PR79 – Add New Pueblo Amtrak Trains at max 79 mph and passenger train priority	36.3	1.10	1.06
Case 2PR79-f – with New Pueblo Amtrak Trains at max 79 mph and passenger train priority and added improvements as listed in Appendix I.	4.6	1.10	1.13

Table 1

Case Description – Scenario 2	BNSF impact Total Hrs/Wk (from Base)	Pueblo Amtrak Trains Avg. run time in hours.	
		West	East
Case 2P – Add New Pueblo Amtrak Trains at max 55 mph and reduce passenger train priority to freight priority	22.0	2.76	2.51
Case 2P-d – Add new Pueblo Amtrak Trains at max 55 mph and freight priority and added improvements as listed in Appendix II.	1.6	1.93	1.89

Table 2

Summary:

As indicated above, without infrastructure improvements, both scenarios would significantly increase the run time of existing BNSF freight trains. To accommodate the operation of passenger trains on this route and mitigate the passenger train created freight train run time increase, each scenario would require capacity improvements which include:

- Construction of 2.5 miles (Scenario 2) to 8.65 miles (Scenario 1) of second main track
- Installing Positive Train Control (PTC)
- Upgrading the existing TWC/ABS portions of the subdivision to CTC
- Construction of some switch and track upgrades at Pueblo, CO
- Upgrading signals to accommodate 79 mph (Scenario 1)

Although these projects will significantly decrease the freight train run time increases, they do not completely mitigate the passenger train created delays.

None of these projects are currently planned for the Pueblo Subdivision in the near future.

It should be noted that the infrastructure requirements listed for the Scenario 2 freight train priority operation, may not be adequate on some occasions to allow the Amtrak train to operate on-schedule.

See below appendix for a detailed list of capital improvement requirements.

If you have any questions about this analysis, please contact John Rinehart at (817) 867-5131.

Appendix: Modeled Infrastructure Upgrades

Mileposts listed are approximate and are for reference only.

I. Scenario 1. Amtrak operating at passenger train priority (79 mph) - The following projects would be required to ensure a safe and on-time Amtrak operation and mitigate run time impact to existing BNSF freight train service between La Junta and Pueblo:

- Construct 2.5 miles of new second main track between MP 556.25 – 558.75
  Plus install 4 new power turnouts and 1 new CTC control point
- Install 6.15 miles of new second main track between MP 567.2 – 573.35
  Plus install 6 new power turnouts and 4 new CTC control points connecting Manzanola and Rocky Ford sidings
- Install CTC on the current ABS portion of the Pueblo Subdivision between La Junta MP 554.9 and NA Junction MP 591.6 (~36 miles)
- Install PTC on the Pueblo Subdivision (~62.6 miles) MP 554.9 – 617.5
- Install a power turnout at Pueblo Union Depot MP 119.5 (Pikes Peak Sub)
- Upgrade ~ 2500 feet of industry track at Pueblo Union Depot MP 119.0-119.5 (Pikes Peak Sub)
- Upgrade the timing of signals and gated road crossings on the Pueblo Subdivision

II. Scenario 2. Amtrak operating at freight train priority (55 mph) - The following projects would be required to ensure a safe Amtrak operation and mitigate runtime impact to existing BNSF freight train service between La Junta and Pueblo:

- Construct 2.5 miles of new second main track MP 556.25 – 558.75
  Plus install 4 new power turnouts and 1 new CTC control point
- Install CTC on the current ABS portion of the Pueblo subdivision between La Junta MP 554.9 and NA Junction MP 591.6 (~36 miles)
  Plus install 4 new power turnouts and 4 new CTC control points for the Manzanola and Rock Ford Sidings
- Install PTC on the Pueblo Subdivision (~62.6 miles) MP 554.9 – 617.5
- Install a power turnout at Pueblo Union Depot MP 119.5 (Pikes Peak Sub)
- Upgrade ~ 2500 feet of industry track at Pueblo Union Depot MP 119.0-119.5 (Pikes Peak Sub)
- Upgrade the timing of signals and gated road crossings on the Pueblo Subdivision