

City of Napavine

City of Lights
214 Second Avenue NE
PO Box 810
Napavine WA 98565
Telephone (360) 262-9231
Fax (360) 262-9885

Mayor Robert C. McNelly

LaVerne Haslett, Clerk Treasurer

July 19, 2006

Ms. Kathy Hunter
Transportation Safety Compliance Manager
Washington Utilities and Transportation Commission
1300 S. Evergreen Park Drive S.W.
P.O. Box 47250
Olympia, WA 98504-7250

Re: City of Napavine – Washington Street Improvements
BNSF Intertie

Dear Ms. Hunter:

Thank you for the information provided to Carol Ruiz, the project manager, for obtaining approval for installing an intertie between Burlington Northern Santa Fe (BNSF) Railroad and the City of Napavine's traffic signals. Per your letter, attached is the completed Petition from the City of Napavine for the requested intertie.

The proposed intertie has been designed by a traffic engineer and has been reviewed and approved by BNSF. I am enclosing a copy of the Preemption Sequence letter from Bruce Newman with Transportation Solutions, Inc. (TSI), and a response letter from BNSF regarding TSI's letter.

If you have any questions or require further information, please contact me at (360) 262-9231 or Carol Ruiz, at Gibbs & Olson, Inc., (360) 425-0991.

Sincerely,

CITY OF NAPAIVINE

By: Steve Ashley
Steve Ashley
Public Works Director

Enclosures

- C: Carol Ruiz, Project Manager, Gibbs & Olson, Inc.
- Bruce Newman, Project Manger, TSI
- Dan MacDonald, Manager Public Projects, BNSF

File: 0557.1307.30

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STATE OF WASH.
UTIL. AND TRANSP.
COMMISSION

Mayor Robert C. McNelly

LaVerne Haslett, Clerk Treasurer

BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

City of Lights
214 Second Avenue NE
PO Box 810
Napavine WA 98565
Telephone (360) 262-9231
Fax (360) 262-9885

Petitioner,
City of Napavine

vs.

Respondent,
Burlington Northern Santa Fe (BNSF)

DOCKET NO. TR-06/231

PETITION TO INSTALL INTER-TIE
WITH TRAFFIC SIGNAL

WUTC CROSSING No.

DOT CROSSING No.

Petitioner requests the Washington Utilities and Transportation Commission to enter an order authorizing the installation of an inter-tie between a highway signal and a crossing signal system as follows:

1. Identifying information for the crossing:

Existing highway, street or road: Washington Street

Existing railway (company): Burlington Northern Santa Fe (BNSF)

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COMMISSION

2. Description of current signals and/or gates at the crossing:

- Mechanized crossing arms at Railroad Crossing on Washington Street between Birch Avenue and 2nd Avenue.
- Signals at the intersection of Washington Street and 2nd Avenue
- Signals at the intersection of Birch Avenue and Washington Street (flashing mode).

3. Type of current crossing circuitry:

BNSF provide a 20 second "minimum Warning Time" per the MUTCD and FRA (Federal Railroad Administration) regulations.

4. Project description and justification:

(a) Description of proposed inter-tie, including sequencing and advance preemption time, if any:

BNSF will provide a normally closed "dry" preemption relay contact to interconnect their railroad active warning system to the City of Napavine's traffic signal controller assemblies. With no trains in the area, these contacts remain closed. The City's traffic controller design requires a MPT (maximum preemption time) of 30 seconds from the moment BNSF contact opens (initiation of the preemption sequence) until the train arrives at the crossing. BNSF train detection equipment will be designed to provide a "nominal" warning time of 30 seconds to ensure the City's traffic controller MPT requirement and MUTCD/FRA minimums are met. BNSF gates will be designed to start their decent within 3 to 5 seconds of the warning lights flashing, descend in an additional 10 to 15 seconds prior to train arrival per FRA regulations.

- (b) Justification, including pertinent traffic and train counts, times when traffic backs up over the crossing, and alternatives considered to an inter-tie:

As motorists queue along Washington Street between Birch & 2nd Avenue, there exists the potential for them to stop on the railroad tracks. The primary purpose of the preemption is to assist these potential queues in dispersing before arrival of a train. Based on information from BNSF, approximately 8 Amtrak passenger trains traveling at a maximum speed of 79 mph and approximately 50 freight trains traveling at approximately 50 mph utilize these tracks per day.

- (c) Effects of proposed changes on warning devices and warning times for drivers:

The proposed preemption sequence is as follows:

1. Terminate any "Walk" interval displayed for any movement being served.
2. If the green interval of any vehicular movement is active, terminate it after a minimum of 4.0 seconds of green have been displayed.
3. Provide the normal, appropriate clearance of interval for such movements.
4. Provide a "Track Clearance Interval" during which traffic queued forward the tracks is protected and the queue is dispersed.

Based on time necessary for a vehicle to evacuate the railroad tracks, it has been determined 50 seconds of total preemption is needed to meet the above criteria. A maximum preemption time of 30 seconds is desired, and an advanced preemption time (APT) of 20 seconds is desired.

5. Drawings. Please attach sketches, drawn to scale, accurately showing the current and proposed layout of the highway (including shoulders, sidewalks, lanes of travel, bike lanes and crossing warning devices), the intersection to which the inter-tie is proposed, and of the railway in the vicinity of the crossing.

I certify under penalty of perjury that the foregoing is true and correct.

Dated at _____, Washington this _____ day of _____, 200__.

Petitioner

Road authority or railroad

Responsible official:

Steve Ashley, Public Works Director

City of Napavine

214 Second Avenue NE

(Address)

Napavine, WA 98565

INSTRUCTIONS

Petitioner can be the railroad, the road authority or the Washington Utilities and Transportation Commission. If the railroad is the petitioner, the road authority will be the respondent. If the road authority is the petitioner, the railroad will be the respondent.

The original and two copies of the petition must be filed with the Washington Utilities and Transportation Commission.

If the waiver of hearing is executed, the petition will be investigated and a decision made within approximately two weeks from receipt of the documents.

If the waiver of hearing is not executed on the petition filed, a copy of the petition will be served upon the respondent by the Commission for answer within 20 days. Upon receipt of respondent's answer or after the 20 day period has elapsed, the application will be processed. Time for making a decision will depend on whether an answer is filed and the content of the answer.



8250 - 165th Avenue NE
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COPY

7 June 2005

Ms. Carol L. Ruiz, P.E.
Gibbs and Olson, Inc.
1405 17th Avenue, Suite 300
P.O. Box 400
Longview, Washington 98632

Subject: Washington Street Railroad Preemption Sequence
City of Napavine, Washington

Dear Ms. Ruiz:

At your request, we have evaluated traffic operations along Napavine's Washington Street corridor, where the City of Napavine is in process of installing traffic signals at the intersections with Birch Avenue and 2nd Avenue. Our analysis was conducted to ensure that traffic signal timing and operations during a railroad preemption event provide sufficient time for automobiles queued in the vicinity of the railroad tracks to safely exit the track vicinity prior to train arrival.

As motorists queue along Washington Street between these two intersections, there exists the potential for them to stop on the railroad tracks. The primary purpose of preemption is to assist these potential queues in dispersing before arrival of a train.

This report summarizes our recommended pre-emption schedule. TSI developed these recommendations based on observation of traffic conditions and discussion the City's Public Works Department and the Burlington Northern Santa Fe Railroad.

EXISTING ACTIVITY AND CONTROLS

A railroad operated by Burlington Northern Santa Fe crosses Washington Street in downtown Napavine, at grade. The two crossings are approximately 320 feet west of 2nd Street and 220 feet east of Birch Avenue (measured from the stop lines for departing traffic to the furthest upstream rail).



We understand railroad activity includes Amtrak passenger trains (approximately 8 per day), which would travel the corridor at a maximum speed of 79 mph, and approximately 50 freight trains per day, traveling at approximately 50 mph. (Actual speeds in the immediate vicinity of the crossing may be lower due to railroad curvature north of Washington Street.) The crossing is actively controlled, including gates designed to descend automatically after an approaching train is detected, in order to minimize the likelihood of an automobile/train collision. Signing, channelization, and turn restrictions also alert motorists to the railroad tracks and discourage stopping thereon.

BNSF staff have indicated that the equipment currently installed is capable of detecting a train traveling at maximum speed 30 seconds prior to arrival at Washington Street. Furthermore, regardless of train speed, the automatic gates begin to descend 15 to 20 seconds prior to arrival of the train. This timing is consistent with other at-grade crossings so motorists know what to expect, minimize the likelihood of a motorist anticipating a longer interval attempting to illegally drive around the crossing arm. BNSF staff have indicated that some additional warning time may be provided at relatively minimal cost.

QUEUE STORAGE AND PREEMPTION

The location of the intersections and the railroad crossing allows storage of approximately 13 passenger cars approaching 2nd Street, and approximately 9 passenger cars approaching Birch Avenue, without encroachment upon the railroad tracks.

Current traffic volumes along Washington Street and the side streets are relatively low. Furthermore, the traffic signals under construction are expected to operate very efficiently. Based on field observations and calculation of queues under current and near-term traffic conditions, automotive queues from neither 2nd Street nor Birch Avenue can be expected to regularly use all the available queue storage between the intersection and the railroad tracks. The likelihood of an automobile queuing on the tracks and being unable to move well in advance of train arrival is extremely low. Furthermore, should a long queue develop due to unusual surges in traffic volumes, long-term growth, or an incident such as construction or an automobile collision, this will generally not result in a motorist stopping on the tracks. Given the very clear channelization of the crossing (including signage, pavement markings, presence of a center turn-lane), plus the fact that most drivers in the corridor are familiar with the area, motorists will generally stop before the tracks if they are unable to clear them completely. Nonetheless, the City considers it prudent to install railroad preemption. We agree this is an appropriate engineering treatment to improve safety. Drawbacks to preemption (such as motorist confusion or truncated pedestrian crossing intervals)

will occur, but are believed to be outweighed by the possibility of a serious high-speed railroad-automobile collision.

PROPOSED PREEMPTION SEQUENCE

Thy typical sequence for traffic signal display intervals upon detection of an approaching train are as follows:

1. Terminate any "WALK" interval displayed for any movement being served.
2. If the green interval of any vehicular movement is active, terminate it after a minimum of 4.0 seconds of green have been displayed.
3. Provide the normal, appropriate clearance interval for such movements.
4. Provide a "Track Clearance Interval," during which traffic queued toward the tracks is protected and the queue is dispersed.

TIMINGS AND INTERVAL LENGTH

TSI evaluated times necessary for automobiles to evacuate the railroad tracks. This was based on a review of published research^{1,2,3}, observation of queue dispersal at similar intersections, and use of traffic simulation software. Figure 1 illustrates observed queue dispersal times 320 feet from the stop line at a similar intersection experiencing more frequent queuing.

We determined that an eastbound vehicle queued on the tracks would virtually always begin motion no more than 21 seconds after the green interval begins (only 16 seconds is required westbound, for the Birch Street signal). This vehicle should be off the tracks before the gates descend upon it. We believe an appropriate design time by which the vehicle should be in motion is the time the gates begin their descent, which could occur 15 to 20 seconds before train arrival. Therefore, we target this automobile to be in motion 20 seconds before train arrival. This target time was selected in part on the fact it will be exceedingly rare for a queuing event to occur, based on near-term traffic volume projections.

¹ Institute of Transportation Engineers, "Preemption of Traffic Signals At or Near Railroad Grade Crossings with Active Warning Devices." Washington, D.C. 1997.

² Venglar, Steven P., et al., "Guide for Traffic Signal Preemption near Railroad Grade Crossing." Texas Transportation Institute. College Station, Texas. September 2000.

³ Marshall, Peter S., and William D. Berg, "Design Guidelines for Railroad Preemption at Signalized Intersections." *ITE Journal*. Institute of Transportation Engineers. Washington, D.C. February 1997.

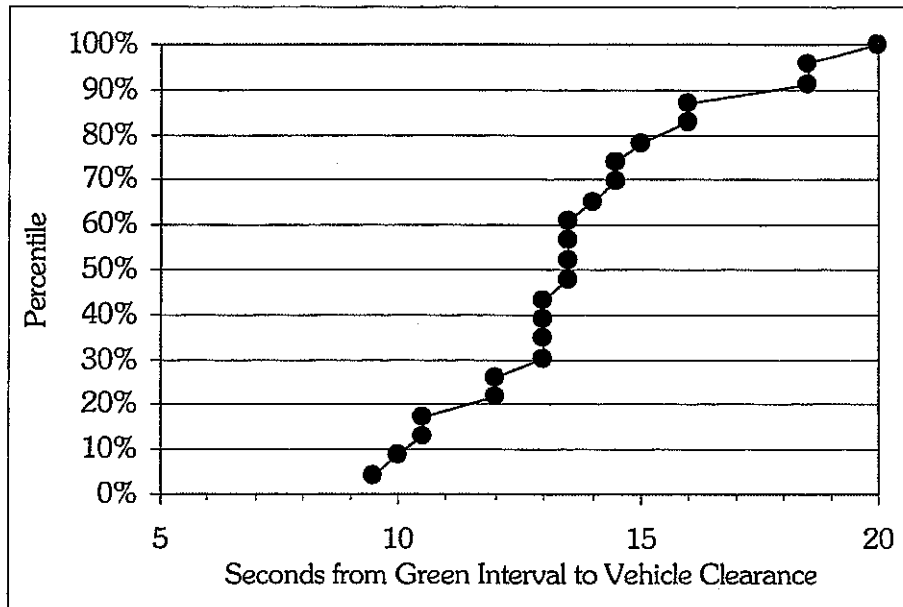


Figure 1. Observed Dispersion Distribution for 320-Foot Queue.

Provision of this amount of preemption time will provide some benefit and is recommended considering that the cost of using preemption hardware already provided for the Washington Street signal is minimal.

Working backward from the train arrival time, relevant signal timing parameters are illustrated in Table 1. These include 4 seconds of an interrupted green interval and a 5-second clearance interval. This represents 50 seconds of total preemption time and an "advanced preemption" signal (i.e., the traffic signal initiates the preemption procedures before the warning lights are activated). A maximum preemption time (or MPT; the time for train detection, notification to signal system, clearance interval, track clearance interval) of 30 seconds is desired, and an advanced preemption time (APT) of 20 seconds is desired.

Table 1. Proposed Railroad and Automotive Signal Event Timeline.

TIME	ACTIVITY
Seconds From Train Arrival at Crossing	-50 Traffic signal systems initiate preemption. Conflicting phase, if active, terminates.
	-46 Latest termination of preempted phase. Latest initiation of conflicting clearance interval.
	-41 Latest termination of conflicting clearance interval. Latest beginning of track clearance interval.
	-25 Earliest that warning lights may start to flash.
	-20 Last desirable time for automobile queued to begin motion. Earliest that gates may start down.
	-18 Latest that warning lights may start to flash.
	-15 Latest that gates may start down.
	-5 Latest that gates are down.
	0 Train arrives at crossing.

PROVISION OF ADDITIONAL TIME

BNSF staff have suggested based on a very preliminary review that 50 seconds of preemption time could be at relatively minimal cost. If confirmed, we believe that the times outlined herein would be a prudent investment of the City's limited resources. In the event it is determined that these timings would require substantial additional costs for the railroad to relocate sensors or install additional equipment, it may be appropriate to revisit whether the advantages of preemption outweigh the costs.

SUMMARY

TSI recommends provision of a total of 50 seconds' preemption time, and an "advanced preemption" signal.

These recommendations incorporate several conservative assumptions to minimize the likelihood of a train/automobile conflict. At-grade rail crossings have an inherent potential for conflict, and no timing plan can guarantee that an automobile/train collision will not occur. Unusual conditions such as stalled vehicles, incident-related congestion, or motorists carelessly stopping on the railroad tracks may occur. This timing plan is designed to provide safe operations in the event of an exceedingly unusual confluence of queued vehicles, an arriving train, conflicting phases being served, slowly accelerating vehicles, and inattentive drivers.

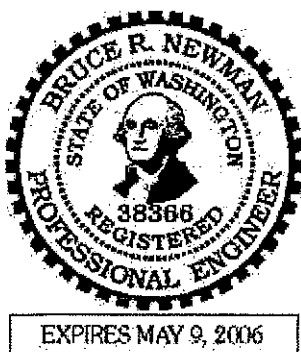


Ms. Carol Ruiz, P.E.
June 7, 2005
Page 6 of 6

This preemption plan is intended to minimize the potential for an automobile/train conflict, and also balance other safety and operational concerns such as increased delays caused by railroad preemption.

Should you have any questions on these draft recommendations, please contact me at your earliest convenience.

Sincerely,
Transportation Solutions, Inc.



A handwritten signature in black ink, appearing to read "B. Newman", written over a horizontal line.

Bruce R. Newman, P.E., PTOE
Transportation Engineer

cc: Mr. Steve Ashley, City of Napavine
Mr. John Duncan, Gibbs and Olson, Inc.
Mr. Steve Hovey, Burlington Northern Santa Fe



Steve L. Hovey
Signal Engineering
Project Engineer

BNSF Railway Company
4515 Kansas Avenue
Kansas City, KS. 66106

Phone: 913-551-4133
Fax: 913-551-4647
steve.hovey@bnsf.com

June 10, 2005

Bruce Newman
Transportation Solutions, Inc.
8250 – 165th Avenue NE
Suite 100
Redmond, WA 98052-6628

COPY

Please reference our phone conversation on June 9, 2005 regarding "Railroad Preemption" at Washington Street and 2nd Avenue and Washington Street and Birch Avenue in the city of Napavine, WA – your letter to Ms. Ruiz dated June 7, 2005.

Per BNSF standard, we will provide a normally closed "dry" preemption relay contact to interconnect our railroad active warning system to your traffic signal controller assemblies. Each contact is rated at 4 amps, and the source voltage from the traffic signal controllers should not exceed 30 volts DC or AC. With no trains in the area, these contacts remain closed. The City of Napavine will be responsible for installing the interconnection cable between the traffic signal controllers and the crossing warning signal control housing.

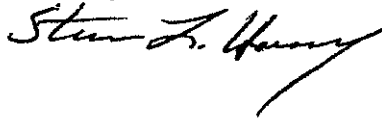
We acknowledge that your traffic controllers design requires an MPT (maximum preemption time) of 30 seconds from the moment the BNSF contact opens (initiation of the preemption sequence) until the train arrives at the crossing.

Per our conversation, this will be an "Advance Preemption" which means we will design our system to open the preemption contacts for a predetermined amount of APT (Advance Preemption Time) prior to activation of the warning devices (flashing lights). We acknowledge that you have specified 18 seconds of APT instead of the 20 seconds required in the letter. If the track clearance phase time is less than the APT, then you may need to consider extending the minimum green time on the track clearance phase to exceed the APT time.

We must provide at least 20 seconds of "Minimum Warning Time" per the MUTCD and FRA (Federal Railroad Administration) regulations. However, per BNSF standards for CWT (constant warning time) train detection equipment, this system will be designed to provide a "nominal" warning time of 30 seconds to ensure your traffic signal controller MPT requirement and MUTCD/FRA minimums met. Our gates will be designed to start their descent within 3 to 5 seconds of the warning lights flashing, descend in an additional 10 to 15 seconds, and reach horizontal at least 5 seconds prior to train arrival per FRA regulations.

Please contact me at (913) 551-4133 with any questions or possible changes to the above requirements.

Sincerely,

A handwritten signature in black ink, appearing to read "Steve L. Hovey". The signature is written in a cursive style with a long, sweeping underline.

Steve L. Hovey

cc: Carol Ruiz – Gibbs and Olson, Inc.
Steve Ashley – City of Napavine
John Shurson – BNSF RR
Jim Abbey – BNSF RR