

APPENDIX D

Lackawanna Cut-Off Restoration – Passenger Rail Study

RAILROAD SIGNALING AND POSITIVE TRAIN
CONTROL

Gannett Fleming Transit & Rail Systems

December 13, 2019

Lackawanna Cut-off, Water Gap Passenger Service Operation Conceptual Signal Design

Executive Summary:

Gannett Fleming has been tasked with performing a conceptual study to determine the configuration and cost for the addition of a Signaling and Positive Train Control (PTC) System for the proposed extension of New Jersey Transit (NJT) commuter train service to a new commuter train station at Water Gap, Pennsylvania. The study was conducted utilizing old Conrail Track Charts and Google Earth maps for the location of necessary signaling and PTC facilities. A field site visit was not performed as it was not included within the Scope of Services that Gannett Fleming was contracted to perform.

Findings and Report:

Passenger service will follow the former Lackawanna Cut-off track from the Delaware River Bridge and connect to the existing Pennsylvania Northeast Regional Rail Authority (PNRRA) freight track at Slateford Junction Interlocking at Milepost 2.62. From there it will continue approximately 3.6 miles to the North and terminate at a new passenger station in the Town of Water Gap. All new signal and PTC equipment and all construction required to begin revenue train operations on the portion of track from the Delaware River bridge to the new station would follow NJT signal design criteria, adhere to AREMA Standards and FRA regulations, and follow NORAC train operating rules which are currently employed for all NJT rail operations and freight Carriers in the region.

The signaling for the Cut-off will be configured with a single main track connecting to the existing Pennsylvania Northeast Regional Rail Authority (PNRRA) freight track at Slateford Junction Interlocking at Milepost 2.62. The existing PNRRA freight track continues north to the Water Gap rail station. To provide a means for automatic train control (ATC) for passenger train operation in both directions between Slateford Junction Interlocking and Water Gap Station, the station end will have back to back controlled signals to control access to the station platform track area and to control train movement back towards Slateford Junction interlocking. It should also be noted that an existing highway grade crossing is located just south of the proposed station track at River Road.

Signal control will be provided by an ATC system which provides speed control and train separation. An ACSES II PTC System (which is NJT's Standard) overlay system provides for the mandated requirements of positive stop at interlocking home signals displaying the Stop Signal Aspect, over-speed protection for all Civil Speed restrictions and Temporary Speed restrictions, and enforcement of a stop at the edge of a Highway grade crossing that has been reported as inoperable. As NJT is currently installing ACSES II PTC on its rail system, and it is outfitting all of its trains with the on-board portion of this system, it is assumed that all trains operating on the Lackawanna Cutoff to Water Gap Station from Hoboken will be outfitted with this equipment. For track circuit indication and cab signal control, electronic track circuits will provide 100Hz cab signal generation currently in use by NJT passenger equipment for train control.

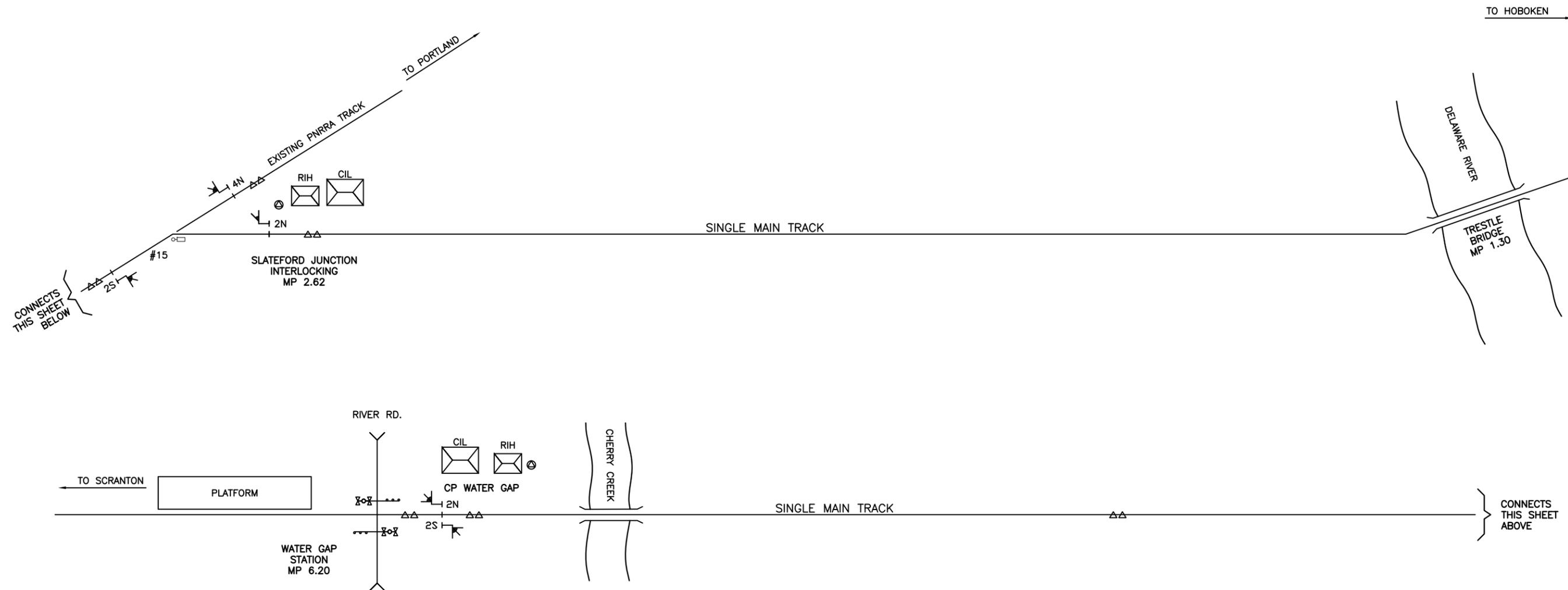
For the purposes of this report the controlled back to back Signals 2N and 2S at MP 6.20 shall be considered an interlocking. Each interlocking will require a commercial feed for interlocking power. A 10 X 20-foot signal house would be installed to house the interlocking signal equipment along with an 8 X 8-foot radio instrument house for wayside PTC radio equipment. Interlocking control will be provided by vital microprocessor technology which will provide control and indication for signal field equipment such

as signals, switch machines, interlocking and approach track circuits, and automatic train control interface. A local control panel will also be provided at Slateford Junction interlocking for emergency operation and testing purposes. A local control panel will be located at for MP 6.20 Signal's 2S and 2N emergency operation. The vital microprocessor will be serially linked via the NJT ground based fiber optic communications network (in-ground installation of fiber optic cable) with adjacent interlockings for vital communications, and with NJT's Rail Operations Control Center (ROCC) located in Kearney, NJ providing control and indication of interlocking functions, and to provide Temporary Speed Restriction (TSR) updates from the NJT PTC Safety Server also located at the ROCC. The vital microprocessor will also be linked to a PTC wayside encoder unit which will provide interlocking route and signal status information to the approaching passenger trains via a ground-based PTC 218 MHz radio network. This request is triggered when the train passes over a track mounted transponder set in the approach to the interlocking home signal. The transponder set is located at a distance greater than the stopping distance to the home signal so that a positive stop can be enforced by the PTC system prior to the train reaching the home signal location if the signal is displaying a stop signal. This radio request is an Interlocking Status Request (ISR) which provides the interlocking route and signal status information to the approaching train. The freight carrier's use a different PTC system than NJT. The freight carriers use a system called I-ETMS. As such interoperability will be provided with freight train operations by means of "Wayside Status Relay Service" (WSRS) communications connection to the freight carrier control office for transmission of PTC I-ETMS interlocking status information for freight train operations.

Slateford Junction Interlocking will provide access southbound over a #15 turnout to either the existing PNRRA track, or to the Single Main Track. North bound home signals will be located to protect movement north from the Single Main Track, and northbound from the existing freight track. A southbound home signal will be provided to protect movement southbound over the facing points of the switch to the Single Main Track.

Passenger service north from Slateford Junction will be a single-track operation to Water Gap Station. Just south of the station is an existing at grade highway grade crossing at River Road which is protected by highway grade crossing gates and flashers. This location will need to be updated to provide longer gate warning times if the train speeds are increased in this area. Access to the station platform track is protected by a northbound controlled signal. A passenger train berthing in the station will reverse direction and be governed by a southbound controlled signal which will control access to the Single Main Track for travel back towards Slateford Junction for passenger operation to. The controlled signals at Water Gap Station will allow for bi-directional (261) ATC operation between the passenger station and Slateford Junction although only one train will be permitted into this track section at any one time as there are no intermediate signals planned and there are no sidings to allow passing moves.

It is assumed that track speed on the existing alignment will be 30 MPH, if the civil speeds are increased after track improvements, signal design can be modified at that time for increased speeds. The Conceptual Order of Magnitude Cost Estimate is based upon this assumption.



SYMBOLOLOGY

- △△— = TRANSPONDER
- +— = INSULATED JOINT
- = POWER OPERATED SWITCH MACHINE
- ⊙ = PTC ANTENNA
- /— = SPLIT POINT DERAIL
- └┘ = CONTROLLED DWARF SYMBOL
- ⊠ = INSTRUMENT HOUSE
- ⊠— = HIGHWAY GRADE FLASHER & GATE

No.	Revisions	Date	By



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Approved	Date

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