



CALTRAIN ELECTRIFICATION

Grade Crossing Activation System
Update

OVERVIEW TODAY

- Existing Caltrain grade crossing activation system is Direct Current (DC) based
- FRA requires gates to activate at least 20 seconds prior to the train approaching the crossing
 - JPB requirement is at least 25 seconds
- Grade crossing activation system is a key safety component of the railroad and of an electrified system

OVERVIEW ELECTRIFICATION

- Caltrain Electrification requires Alternating Current (AC) system
 - Cannot have a DC grade crossing system with the overhead contact system which is AC (too much interference)
 - Grade crossings will be modified to AC system
- Balfour Beatty, Inc. (BBI) is responsible for delivering an design-build electrified system with a certified grade crossing activation system
- New Grade Crossing System
 - Design
 - Install
 - Test

TWO SPEED CHECK SOLUTION

- Originated from Association of American Railroads (AAR) typical circuits
- Proposed solution has been developed in coordination with UPRR, FRA, CPUC
- Meets all system safety and regulatory requirements
- Each crossing will need to be individually designed, several already complete

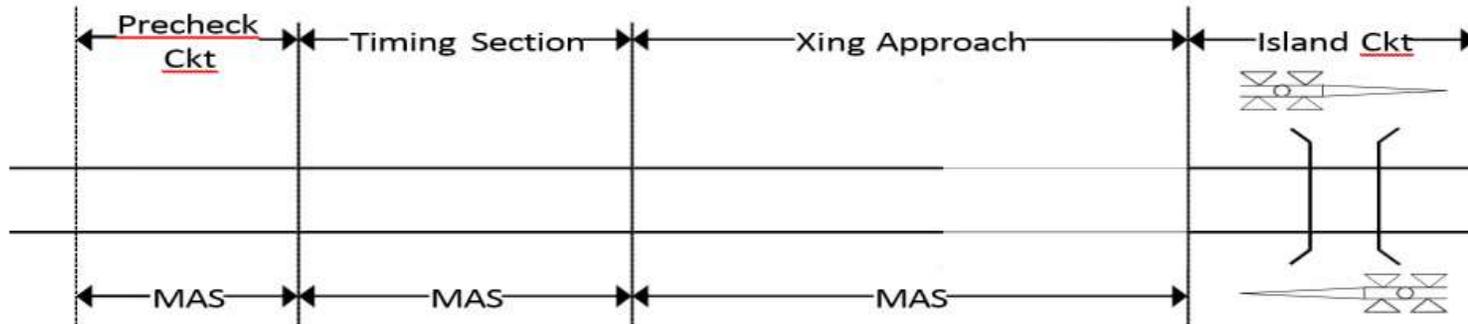
TWO SPEED CATEGORIES

- Each crossing will have two assigned speed categories
 - Max speed to x speed (MAX Category)
 - X speed to 0 mph (Lower Category)

Categories	Example Category Speeds*	Description
Max Category	79mph to 41mph	Any train traveling between 79-41mph will be in the Max Category
Lower Category	40mph to 0mph	Any train traveling between 40-0mph will be in the Lower Category

* Some crossings may have different speeds for each category based on track alignment and configuration

TWO SPEED CHECK DIAGRAM



- Pre-check – health check (working properly)
- Timing section – detects the speed of the train and sends instruction to gate controller (max or lower category)
- Xing Approach – enough distance prior to the crossing to safely provide the required gate warning time based on the maximum speed (when the gate will start to go down – max or lower category)
- Island Circuit – the actual crossing with the gates down

MAX AUTHORIZED SPEED

- Max authorized speed at a crossing is calculated based on:
 - Alignment
 - Curvature
 - Line of sight
- Speed is picked up by the system in the timing section
- Trains would travel below max speed
 - Accelerating out of a station
 - Decelerating into station
 - Mechanical failure
 - Freight train
 - Heat or other restrictions

OVERALL GATE DOWN TIME

- Gate down time is dependent on
 - Individual crossing speed categories
 - Schedule
 - Which determines the speed (that train will go through a crossing)
 - Station stopping pattern
 - If trains crossing each other at a grade crossing the same
- At stations: system features (e.g. circuit timers, whistle mics) also assist with reducing gate down time

CITY/COUNTY COORDINATION

- Caltrain will review gate down times with municipalities when the analysis for individual crossings become available
 - BBI is currently completing gate down time design and analysis for each crossing. Design build contract so not all crossings will be designed at once
- Traffic mitigation included as part of Electrification is still applicable

WIRELESS SYSTEM

- Existing Positive Train Control (PTC) contract includes implementation of a wireless grade crossing activation system
 - Timing of implementing wireless activation system is still being determined, but most likely post electrification
- Wireless solution requires a significant design effort and is intended to enable gate crossing activation based on actual speed of the train
 - Will also require significant alignment effort with the FRA
- Two Speed Check Solution will be implemented first
- Once there is a wireless grade crossing system, the two speed check solution would be used for non-equipped trains

NEXT STEPS

- BBI to continue individual crossing design and analysis
 - Continue to meet with cities as designs are finalized
- Work with CPUC and municipalities to complete the GO-88b process

BACK-UP SLIDES

ALTERNATIVES CONSIDERED

- Fixed Start Solution
 - Longer average gate down times
- Axle counters for speed detection
 - Not acceptable for maintenance & operations
- Aspect-based speed limits for train approach
 - Not reliable method to determine train speed
- ➔ Two Speed Check Solution
 - Determined to be best alternative