RAILWAY CROSSING RENOVATIONS

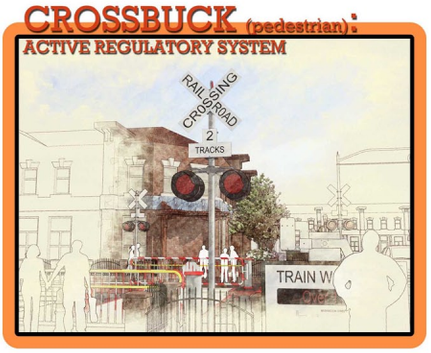
TOWN CENTER MASTER PLAN:

AERIAL PERSPECTIVE OF RAILWAY GRADE CROSSING

Railway grade crossings are a vulnerable feature in road infrastructure, jeopardizing the safety of drivers, pedestrians, and train passengers. The risk of drivers and pedestrians dying while passing through railway crossings are ten times higher than that of a commuter on the road. This project shows how new technologies can be applied to renovating the conventional structural designs of railway intersections to generate a new generation of railway crossings that minimizes accidents. The innovative railway intersection design will promote a safer, interactive, and interconnected community environment.

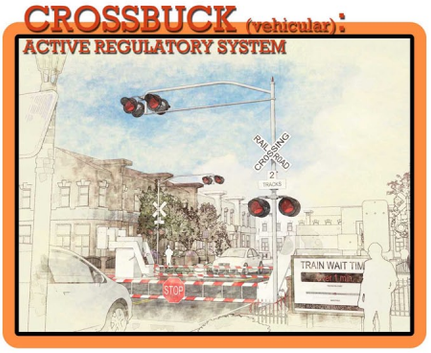
CROSSBUCK (pedestrian):

ACTIVE REGULATORY SYSTEM



CROSSBUCK (vehicular):

ACTIVE REGULATORY SYSTEM



The standard active regulatory systems, designed according to Federal Highway Administration regulations, inform drivers and pedestrians of the approaching or standing trains at the railway grade crossings. These systems are equipped with flashing-light signals, audible warning device, and an overhead structure to warn drivers from the distance.

BACKGROUND:

ACCIDENTS IN RAILWAY CROSSINGS

* This is a mock collision to raise public awareness, nobody was actually injured.

* This is a mock collision to raise public awareness, nobody was actually injured.

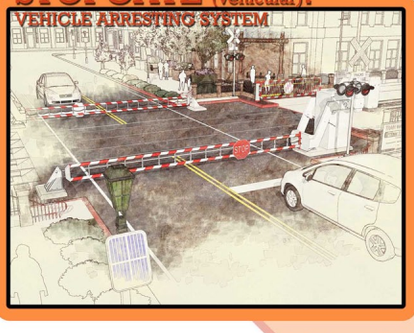
* This is a mock collision to raise public awareness, nobody was actually injured.

According to the Federal Railway Administration (FRA), human behavior is the primary contributor to railway grade crossing accidents rather than from technical, rail-based installment problems. Inadequate and improper human behaviors include violations of traffic regulations, disregard of warning signals, and trespassing by vehicles and pedestrians. Intentional unsafe actions are the most frequent factors for these accidents, including zigzagging (driving around the gates), misjudging the approaching velocity of the train, and driving around stopped vehicles.

Accidents often happen because the only warnings informing drivers and pedestrians are through signage and markings, which are frequently disregarded. Studies show that the conversion of passive crossings to active crossings with flashing lights, sound alarms, and automated gates significantly reduce the number of accidents and minimize the frequency and severity of behavioral violations. The FRA states that preventive measures can be obtained through psychological approaches and social sciences, as well as technological solutions to preclude the fatalities in railway crossing accidents.

STOPGATE (vehicular):

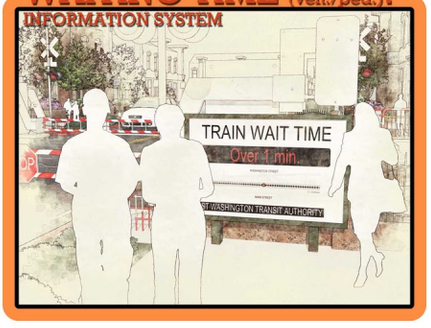
VEHICLE ARRESTING SYSTEM



The StopGate is an advanced alternative to the conventional automated gates, designed to block out-of-control vehicles from entering the right-of-way. The StopGate's energy absorbing steel cables absorb the force of a runaway vehicle, compelling even a three-ton truck traveling 45mph to come to an immediate halt. Prior to the StopGate system, there was no remedy to immobilize runaway vehicles, except with tunnels and bridges, which cost millions of dollars.

WAITING TIME (veh./ped.):

INFORMATION SYSTEM



The information system automatically communicates the remaining time for the train to pass by a crossing. Research shows that drivers and pedestrians become frustrated at railway crossings because the waiting time seems longer. However, studies show that with the information system, behavioral problems are calmed psychologically and drivers and pedestrian are less probable to act unlawfully.

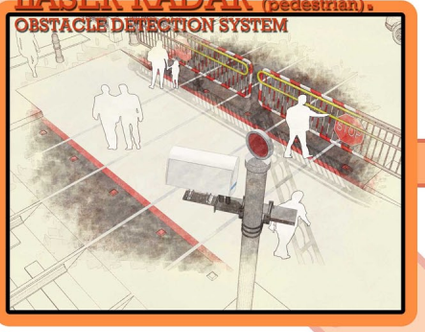
SWING GATE (pedestrian):

AUTOMATIC GATE SYSTEM

The automated swing gates, similar to the StopGate system, manage pedestrian movement through the railway crossings. Distinct from conventional manual swing gates and automatic traffic control devices, which permit the pedestrian to proceed freely beneath or around the gate, automated swing gates prevent the pedestrian from crossing when the entrance is blocked. When the swing gates open, the beams function as a fence between the vehicle and the pedestrian and provide safety handles to support the elderly and disabled.

LASER RADAR (pedestrian):

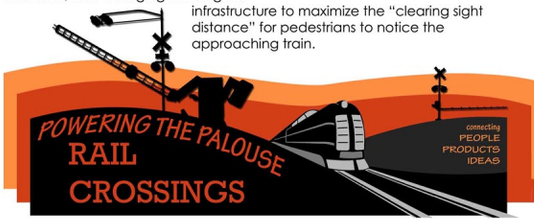
OBSTACLE DETECTION SYSTEM



The laser radar obstacle detection system is an automatic pedestrian tracking device that emits laser pulses to detect objects. When the recognized object is determined an obstacle, an alarm is generated. While conventional obstacle detection systems are incapable of detecting smaller objects such as pedestrians, bicyclists, and wheelchairs, this system is capable of distinguishing and categorizing them. The device, installation, and maintenance is inexpensive compared to conventional systems, not to mention the space consumed by the traditional systems.

❖ *Loop Coil Obstacle Detection System*:
The loop coil obstacle detection system beneath the surfaces of the railway crossings detects the position of the vehicle. When the vibrations are not detected (vehicle fails to pass through the railway crossing), an alarm is generated. Loop coils have lower maintenance compared to most obstacle detection systems and are frequently applied in climates with intense weathers.

❖ *Additional Pedestrian Safety Features*:
The crossings' additional safety features include contrasting edge lines and tactile pavement edge markers to delineate the designated pedestrian path; rubber-based pavements to prevent slipping and reduce injuries; Flangeway gap treatment fillers minimize conveyance problems for the elderly and disabled (walking canes and other mobility-assisting medical equipment); Tactile Ground Surface Indicators (TGSIs) on crossing thresholds for the disabled; lighting for nighttime identification of railway crossing entrance; and a bulging rectangular infrastructure to maximize the "clearing sight distance" for pedestrians to notice the approaching train.

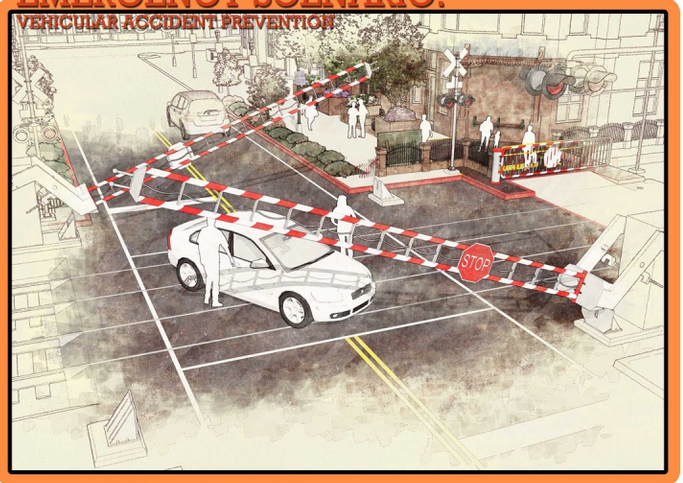


Connecting Communities: Designing a Safer Railway Crossing

DR. BOB SCARFO SPRING 2009: MIDORI FUKUTANI
WSU-SPOKANE INTERDISCIPLINARY DESIGN INSTITUTE

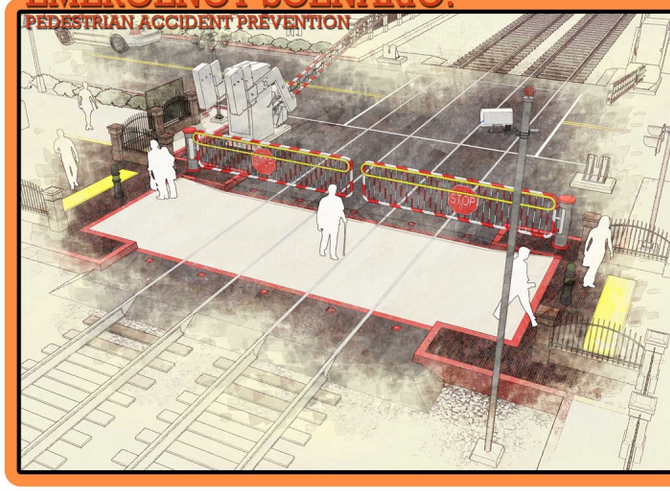
CONNECTION AND INTERACTION

EMERGENCY SCENARIO:
VEHICULAR ACCIDENT PREVENTION



These technological improvements will prevent most erroneous human actions that lead to personal injuries. Still, a vehicle could come to an unexpected halt in the middle of the railway crossing due to car-to-car accidents and engine stalls. This railway crossing system efficiently responds to these emergency situations. If the crossing becomes blocked, the active regulatory system flashes and sounds to prevent any vehicular access and the StopGate will be angled to inform drivers of the unavailability of the railway crossing but will provide a sufficient height for the exiting vehicle. The loop coil obstacle detection system identifies the stopped vehicle and informs the train of the accident. The driver can manually push an emergency button to inform the train and emergency personals. The well-informed train would cautiously approach the railway crossing and standby until the problem is solved.

EMERGENCY SCENARIO:
PEDESTRIAN ACCIDENT PREVENTION



An emergency at the pedestrian crossings is another possibility. Again, similar to the vehicular scenario, what if a person got stuck on the crossing? The automatic swing gates will not shut immediately to prevent entrapment. The laser radar obstacle detection system will identify the obstacle and make the swing gate remain open while warning the approaching train. The train will take precautions when approaching the railway crossing. These technological systems provide timely detection of potentially hazardous conditions and allow a safe environment for every pedestrian.

CONNECTIVITY:
STREET DESIGN LOOKING NORTH

CONNECTIVITY:
STREET DESIGN LOOKING WEST

Railway tracks frequently separate communities, dividing the geography, regional characteristics, and the residents. The railway grade crossings ultimately become an undesirable "crack" in the community. Therefore, the design of the railway crossings focuses on restoring and keeping neighborhoods connected. Continuity is an imperative theme in the design, generating comfort to the travelers approaching the railway crossing. An aesthetical continuous landscape pattern generates a steady motion, bringing order and unity to the region. The sequence of seasonal vegetation, framed storefronts, and seating elements for relaxation presents a healthy and calming walking experience. Regional vegetation with seasonal interests creates a sense of enclosure and security, providing a buffer between the vehicular road and the sidewalk, as well as the sidewalk and adjacent buildings. Upon exiting the crossing, the resumed local street pattern generates a perception of connective passage. These street features contribute to a vehicular- and pedestrian-friendly environment for the railway crossings and their communities.

TOWN CENTER PERSPECTIVE:
COMMUNITY CONNECTIVE AND INTERACTIVE DESIGN

Intersections are areas of potential conflicts of circulation. Since railroad trains have priority, drivers and pedestrians repeatedly become frustrated waiting. Frustration leads to railway crossing accidents. Therefore, the waiting area is designed to alleviate that frustration by creating a socially interactive and calming space. By "cutting and shaping" the corner of the building to create an opening and defining the space with different features, it becomes an area intended for the purpose of interactive experience while waiting for the train to pass. For example, the seating feature is designed as a short-term resting area that comfortably supports the person leaning against the wall of the building. When the crossing gates open, which are usually closed for less than a minute, the person sitting is able to resume walking without difficulty and applying too much energy. With an overhead structure for shading, this seating area is a relaxing environment especially for elderly and disabled travelers. By creating a comfortable waiting area, the space becomes an essential experience for people at the railway grade crossings.

INTERACTIVITY:
PEDESTRIAN RAILWAY CROSSING DESIGN

INTERACTIVITY:
PEDESTRIAN WAITING AREA DESIGN

POWERING THE PALOUSE RAIL CROSSINGS

connecting PEOPLE PRODUCTS IDEAS

Connecting Communities: Designing a Safer Railway Crossing

DR. BOB SCARFO SPRING 2009: MIDORI FUKUTANI
WSU-SPOKANE INTERDISCIPLINARY DESIGN INSTITUTE