Measure Name Physical barriers on bridges

Definition Installation of netting, fencing, or other safety barriers on a bridge to deter people from climbing on or jumping from a bridge.

Tags

Incident Type	Both trespass and suicide
Location	Right-of-way only
Intervention Strategy	Engineering: technological and physical deterrents
Measure Group	Physical barriers

Description

Physical barriers at bridges refers to the installation of fencing, netting, or other safety barriers on a bridge to deter people from climbing onto and subsequently jumping from a bridge. The measure works by limiting access to either side of a bridge where people can jump from, or by catching an individual who jumps into a net or similar structure that is suspended on either side of the bridge. Physical barriers generally consist of fence-like metal structures that are bent inward on the top to make it difficult to climb over them. Metal platforms/nets that are suspended below the bridge can also be used to catch an individual who jumped or fell from the bridge.

Some evidence suggests that the measure may be most effectively applied at bridges in urban areas and/or are close to psychiatric care facilities [1]. The measure can be combined with anti-trespass panels at railroad overpass bridges by placing them at each end of the bridge to deter people from entering the bridge.

As of 2024, numerous research studies have investigated the effectiveness of physical barriers at bridges to prevent suicide. Although these studies were conducted at roadway bridges, the results are expected to translate to railroad bridges. Research showed that bridge fencing is very effective in preventing suicides that result from jumping from a bridge [2][3][4][5][6]. Research on safety nets also showed they are effective in preventing suicide from jumping [4][5][7].

Additional search terms: *deterrent, fence, netting*

Advantages

- Safety barriers at bridges have been proven effective in reducing the number of people that die by suicide from jumping from a bridge. One study showed a fivefold increase in the number of suicides following the removal of such barriers. After the barriers were reinstalled, there were no suicides from the bridge during the data collection period [2].

Drawbacks

- Safety barriers at bridges are relatively expensive to install and require periodic maintenance. The cost can vary based on type of physical barriers chosen and the length of the bridge. For

example, the construction of netting at the Golden Gate Bridge is estimated to have cost $204 million [8].

- Barriers may affect the structural integrity and aesthetics of the bridge.
- Because this measure is intended to be installed on bridges only, it may have a limited impact on increasing safety of the rail system as a whole.
- Bridges may not be located on railroad property, so railroads may need to coordinate with another party to decide on the design of the installation.

Notable Practices

- When determining the height and material of the fencing, consider the potential for individuals to jump or climb over the fence.
- Ensure that any additional weight and structural modifications when adding safety barriers do not compromise the bridge's structural integrity.
- Consider safety and operational impacts on both train and highway users when scheduling installation on the bridge.
- If implementing the use of a safety net, ensure that procedures and equipment are in place to retrieve the individual held by the safety nets.
- Anti-trespass panels can be installed at the either end of a railroad overpass bridge to prevent people from walking onto to the bridge, especially in areas where fencing may not be possible [1].
- Signs displaying a suicide prevention hotline number may also be placed on the bridge to encourage vulnerable individuals to reach out for help.
- Warning and prohibitive signs may be placed on the fence to help convey that the area is restricted.
- If installing barriers on a bridge, consider tracking trespass and suicide rates before and after installation, as well as similar rates at any other nearby bridges.

References

[1] RESTRAIL. (2018, September 20). *9.2 Nets at Bridges*. Restrail Toolbox.

[2] Pelletier, A. (2007). Preventing suicide by jumping: the effect of a bridge safety fence. *Injury Prevention. 13(1). 57-59.*

Abstract:
Objective: To evaluate the effect of a bridge safety fence in preventing suicide.
Methods: We examined suicides from jumping off the Memorial Bridge in Augusta, Maine, from 1 April 1960 to 31 July 2005. The safety fence was installed during 1983, the mid-point of the study period.

Results: 14 suicides from the bridge were identified; all occurred before installation of the safety fence. The number of suicides by jumping from other structures remained unchanged after installation of the fence.
Conclusion: The safety fence was effective in preventing suicides from the bridge. There was no evidence that suicidal individuals sought alternative sites for jumping.

[3] Beautrais, A., Gibb, S., Fergusson, D., Horwood, L., and Larkin, G. (2009). Removing bridge barriers stimulates suicides: an unfortunate natural experiment. *The Australian and New Zealand journal of psychiatry*. 43(6):495-497.

Abstract: Safety barriers to prevent suicide by jumping were removed from Grafton Bridge in Auckland, New Zealand, in 1996 after having been in place for 60 years. This study compared the number of suicides due to jumping from the bridge after the reinstallation of safety barriers in 2003. National mortality data for suicide deaths were compared for three time periods: 1991-1995 (old barrier in place); 1997-2002 (no barriers in place); 2003-2006 (after barriers were reinstated). Removal of barriers was followed by a fivefold increase in the number and rate of suicides from the bridge. These increases led to a decision to reinstall safety barriers. Since the reinstallation of barriers, of an improved design, in 2003, there have been no suicides from the bridge. This natural experiment, using a powerful a-b-a (reversal) design, shows that safety barriers are effective in preventing suicide: their removal increases suicides; their reinstatement prevents suicides.

[4] Pirkis, J., Spittal, M., Cox, G., Robinson, J., Cheung, Y., and Studdert, D. (2013). The effectiveness of structural interventions at suicide hotspots. *International Journal of Epidemiology, 42(2),* 541–548.

Abstract:

Background: Certain sites have gained notoriety as 'hotspots' for suicide by jumping. Structural interventions (e.g. barriers and safety nets) have been installed at some of these sites. Individual studies examining the effectiveness of these interventions have been underpowered.

Method: We conducted a meta-analysis, pooling data from nine studies.

Results: Following the interventions, there was an 86% reduction in jumping suicides per year at the sites in question (95% CI 79% to 91%). There was a 44% increase in jumping suicides per year at nearby sites (95% CI 15% to 81%), but the net gain was a 28% reduction in all jumping suicides per year in the study cities (95% CI 13% to 40%).

Conclusions: Structural interventions at 'hotspots' avert suicide at these sites. Some increases in suicide are evident at neighbouring sites, but there is an overall gain in terms of a reduction in all suicides by jumping.

[5]. Hemmer, A., Meier, P., and Reisch, T. (2017). Comparing Different Suicide Prevention Measure at Bridges and Buildings: Lessons We Have Learned from a National Survey in Switzerland. *PLOS One*.

Abstract: The goal of the study was to compare the effectiveness of different suicide prevention measures implemented on bridges and other high structures in Switzerland. A national survey identified all jumping hotspots that have been secured in Switzerland; of the 15 that could be included in this study, 11 were secured by vertical barriers and 4 were secured by low-hanging horizontal safety nets. The study made an overall and individual pre-post analysis by using Mantel-Haenszel Tests, regression methods and calculating rate ratios. Barriers and safety nets were both effective, with mean suicide reduction of 68.7% (barriers) and 77.1% (safety nets), respectively. Measures that do not secure the whole hotspot and still allow jumps of 15 meters or more were less effective. Further, the analyses revealed that barriers of at least 2.3 m in height and safety-nets fixed significantly below pedestrian level deterred suicidal jumps. Secured bridgeheads and inbound angle barriers seemed to enhance the effectiveness of the measure.

Findings can help to plan and improve the effectiveness of future suicide prevention measures on high structures.

[6] Beautrais, A. (2001). Effectiveness of barriers at suicide jumping sites: a case study. *Australian and New Zealand Journal of Psychiatry,* 35, 557-562.

Abstract:

Objectives: Suicide safety barriers were removed from a central city bridge in an Australasian metropolitan area in 1996 after having been in place for 60 years. The bridge is a known suicide site and is located adjacent to the region's largest hospital, which includes an acute inpatient psychiatric unit. This paper examines the impact of the removal of these barriers on suicide rates. Method: Data for suicide deaths by jumping from the bridge in question, from 1992 to 2000, were obtained from the regional City Police Inquest Office. Data for suicide deaths by jumping from other sites in the metropolitan area in question, from 1992 to 1998, were obtained from the national health statistics database. Case history data about each suicide death by jumping in the metropolitan area in question, from 1994 to 1998, were abstracted from coronial files held by a national database. Results: Removal of safety barriers led to an immediate and substantial increase in both the numbers and rate of suicide by jumping from the bridge in question. In the 4 years following the removal of the barriers (compared with the previous 4 years) the number of suicides increased substantially, from three to 15 ($\chi 2 = 8$, $df = 1$, $p < 0.01$); the rate of such deaths increased also ($\chi 2 = 6.6$, $df = 1$, $p < 0.01$). The majority of those who died by jumping from the bridge following the removal of the safety barriers were young male psychiatric patients, with psychotic illnesses. Following the removal of the barriers from the bridge the rate of suicide by jumping in the metropolitan area in question did not change but the pattern of suicides by jumping in the city changed significantly with more suicides from the bridge in question and fewer at other sites. Conclusions: Removal of safety barriers from a known suicide site led to a substantial increase in the numbers of suicide deaths by jumping from that site. These findings appear to strengthen the case for installation of safety barriers at suicide sites in efforts to prevent suicide deaths, and also suggest the need for extreme caution about the removal of barriers from known jumping sites.

[7] Reisch, T., & Michel, K. (2005). Securing a suicide hot spot: Effects of a safety net at the Bern Muenster Terrace. *Suicide and Life-Threatening Behavior*, 35, 460–467.

Abstract: The city of Bern has a high percentage of suicides by jumping (28.6%). Related to other local hotspots, the highest number of deaths (mean 2.5 per year) is found at the Muenster Terrace in the old city. In 1998, after a series of suicides, a safety net was built to prevent people from leaping from the terrace and to avoid further traumatization of people living in the street below. We analyzed the numbers of suicides by jumping before and after the installation of the net. We also assessed the number of media reports referring to this suicide method. After the installation of the net no suicides occurred from the terrace. The number of people jumping from all high places in Bern was significantly lower compared to the years before, indicating that no immediate shift to other nearby jumping sites took place. Furthermore, we found a moderate correlation between the number of media reports and the number of persons resident outside Bern committing suicide by jumping from high places in the city.

[8] Golden Gate Bridge. (2018). *Saving Lives at the Golden Gate Bridge*.

Description: Webpage describes a physical barrier being constructed along the Golden Gate Bridge in San Francisco, CA to prevent people from jumping and reduce the chance of death if an individual attempts to jump.

Related Measures

- Anti-trespass panels
- Identify funding opportunities
- Incident cost estimation
- Landscaping treatments to restrict access
- Public messaging to prevent suicide
- Public messaging to prevent trespass
- Right-of-way fencing
- Warning signs