

# 2021 INNOVATION CHAMPIONS CONTEST

## Guardrail Maintainer

COUNTY: Walsh County Highway Department

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DEMO VIDEO: [https://www.youtube.com/watch?v=bcuHW\\_C6iT0](https://www.youtube.com/watch?v=bcuHW_C6iT0)

**PROBLEM STATEMENT:** Gravel, debris, vegetation, and snow accumulate between the guardrail posts. Good gravel is pushed between the posts by the snow plow, by the motor grader when blading the road, and from routine traffic on the roads. The debris and gravel between these posts catches the snow, and creates snow drifts across the roads. It is critical to remove this accumulation of material prior to snowfall. This task was typically done manually by crew of 4 people, each with their own shovel and a skid steer with a bucket. The skid steer is hauled to each site with a pickup and trailer.

**SOLUTION:** Designed and fabricated the guardrail maintainer to clean between the guardrail posts. At the guardrail site, the motor grader operator detaches 4-feet of the cutting edge and then pins the guardrail maintainer to the end of the moldboard using a wedge and mounting pin. This takes a mere 5 minutes to change out. The attached guardrail maintainer is then inserted between each post, retrieving good gravel, removing vegetation that was not taken down by the mower or weed eater, removing other debris, or snow that has built up between the posts. The guardrail maintainer is designed with a shear bolt so it will easily breakaway should the operator inadvertently hit the guardrail or if the snow is frozen. This task now requires only the operator of the motor grader versus 4 people and a skid steer.

## **LABOR, EQUIPMENT, AND MATERIAL:**

### Equipment used:

Wire feed welder  
Acetylene torch  
Grinder (used to remove paint and clean)

### **Materials:**

#### Salvage material:

- (1) 4-foot blue steel quick change edge
- (2) 17-inch long pieces of angle iron

#### New material:

- (1) 3-foot curved cutting edge
- (1) Can of spray paint
- (1) Shear bolt

**Total Labor Hours:** (No. of persons, number of hours for each)  
*(Includes time required for design and discussion.)*

2 people, 8 hours each

## **COST SUMMARY:**

Spray paint:	\$ 5.00
3-foot curved cutting edge:	\$ 45.00
Angle iron:	<u>\$ 15.00</u>
Total Cost:	\$ 65.00 plus labor

## **SAVINGS AND BENEFITS:**

Guardrails provide motorists protection from item hazards in the clear zone such as fixed objects and drop offs. Bridges may include guardrail. Over the years, vehicle weights and heights have increased. Crash testing and safety standards recognize the need for design changes to match this shift. The 27-inch W-beam guardrail height is being elevated to 31-inches. However, on the local network, the 27-inch is typically used. Maintaining this height can be challenging on gravel roads when new gravel is placed and material shifts from the mainline under the guardrail.

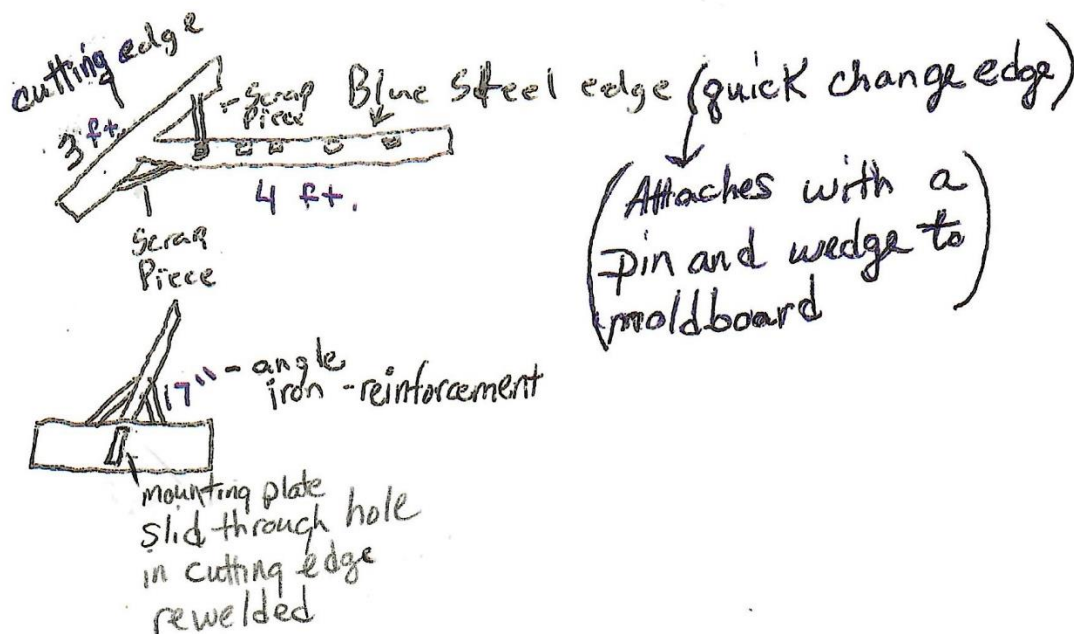
With the guardrail maintainer, the challenge of maintaining the 27" W-beam guardrail height becomes more doable. The task of reclaiming good gravel, removing excess debris, vegetation or snow buildup between the guardrail posts is done more effective and efficiently. Road crew with shovels and a skid steer are no longer working on the roadside and exposed to motor vehicles and possible injury. The task is completed by one-person verses four people. The guardrail maintainer presents increased safety, and a cost savings in money, time, labor, and equipment usage.

## ANNUAL OPERATING COSTS:

**Prior to using the innovation** – A crew of 4 people with shovels, a pickup and trailer with a skid steer were previously used to clean between the guardrail posts. Depending on the amount of accumulated gravel and debris between the posts, it took at a minimum 1 hour to clean 10 feet of guardrail. One hour in addition to travel time.

**After using the innovation** – When out blading, the motor grader operator will come to a site with a guardrail and posts. In less than 5 minutes, the operator removes a 4-foot section of the cutting edge and attaches the guardrail maintainer to the moldboard. Ten feet of guardrail is cleaned within 20 to 30 minutes. There is no additional travel time, as the operator is already at the site when out blading the road.

**DRAWING (SCHEMATIC) WITH DETAILS–** (label material parts/components in detail):



**Front of guardrail maintainer**



**Sideview of guardrail maintainer**



**Arm of guardrail maintainer that attaches to the motor grader moldboard**



**Wedge and pin used to attach guardrail maintainer to moldboard**



**Mounting plate slid through hole cutting edge and then re-welded on front and back side**



**Angle iron for reinforcement and stabilization**



**Guardrail maintainer attached to moldboard**



**Pulling debris, gravel, vegetation that has accumulated between posts**

