

# Ridge Corporation Aerodynamic Skirt Development

Arkansas Trucking Association

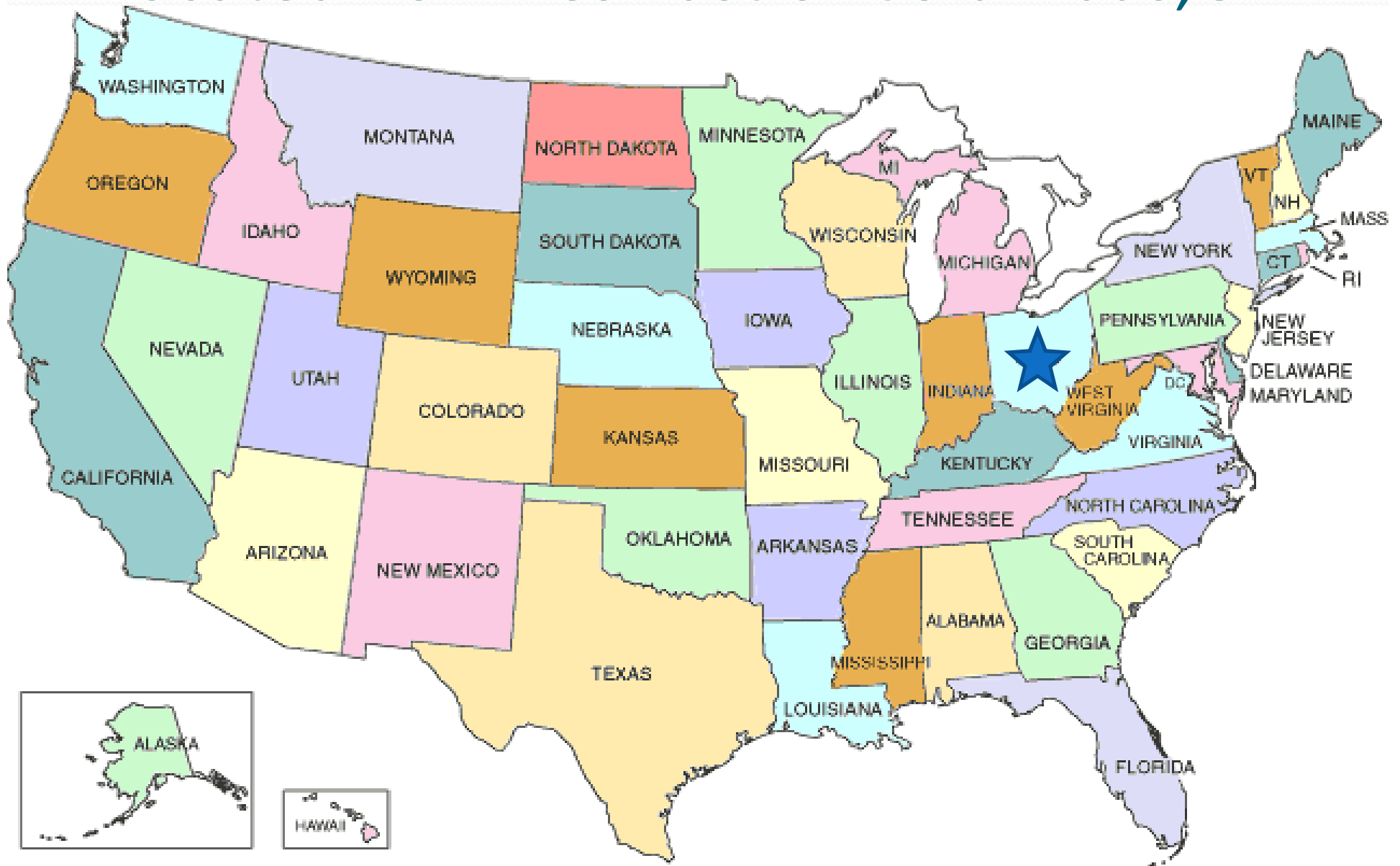
11/17/2011



# Presentation Overview

- History
- CARB and Smartway Requirement Review
- Design criteria
- Development
  - Automotive Research Center
  - SmartWay
- Methods
- Real world examples
- Market demands – Please give us feedback
- Questions

Located 20 miles East of Columbus, OH





Our Production Facility in Pataskala, OH, USA...

90,000 square feet with expansion possibilities near by.



# Our History

- Ridge staff with many years experience in truck trailer industry
- Owned by Gary Grandominico, Ray McDonald, Nick Grandominico
- Incorporated in 2004
- Dymondply 2005
- Polar X 2006
- Initial skirt designs 2008
- Grown from 12 associates in 2009 to 75+ associates 2011





# Dymondply and DymondGuard

- Dymondply and Dymondguard were the first products produced by Ridge.
- Designed to save weight and reduce maintenance costs
- First pilot build was for Vanguard National Trailer in Monon, IN





Dymondply and Dymondguard System on a Vanguard Maxcube Trailer





# POLARIS

US Patent No. 7829165



- Integral wall concept eliminates fasteners that reduce a trailer's thermal efficiency
- Saves weight by eliminating aluminum scuff
- Reduced install time at factory
- Reduced maintenance costs for the fleet



# GREEN WING AERODYNAMIC SKIRT





# California Air Resources Board – CARB

<http://www.arb.ca.gov/cc/hdghg/hdghg.htm>

- *95300 Purpose.*
- The purpose of this subarticle is to reduce greenhouse gas emissions from heavy-duty(HD) tractors and 53-foot or longer box-type semitrailers (trailers) that transport freight
- on a highway within California.
  
- *95301. Applicability.*
- (a) This subarticle applies to owners and drivers of the following equipment when driven on a highway within California, as well as motor carriers, California-based brokers, and California-based shippers that use, or cause to be used, the following equipment on a highway within California:
  - (1) HD tractors that pull 53-foot or longer box-type trailers; and
  - (2) 53-foot or longer box-type trailers that are pulled by HD tractors.





# Definitions

- 95302. *Definitions.*
- (a) The following definitions apply to this subarticle:
- (1) “*Aerodynamic technologies*” means components designed to reduce wind resistance on the tractor or trailer resulting in improved overall tractor fuel economy and reduced carbon dioxide emissions.
- (2) “*Box-type trailer*” means a dry-van trailer or refrigerated-van trailer





# Large Fleet Requirements

- *95303 Requirements and Compliance Deadlines.*
- *53-foot Dry-Van Trailer Requirements.*
- (B) equipped with both:
  - 1. tires that are U.S. EPA Verified SmartWay Technologies; and
  - 2. any combination of dry-van trailer aerodynamic technologies that has been demonstrated to the U.S. EPA to meet or exceed a 5 percent fuel savings in accordance with the requirements defined by the U.S. EPA SmartWay Partnership Program.
- 53-foot Refrigerated-Van
- (B) equipped with both:
  - 1. tires that are U.S. EPA Verified SmartWay Technologies; and
  - 2. any combination of dry-van trailer aerodynamic technologies that has been demonstrated to the U.S. EPA to meet or exceed a 4 percent fuel savings in accordance with the requirements defined by the U.S. EPA SmartWay Partnership Program.

# Large Fleet Requirements

California Environmental Protection Agency | AIR RESOURCES BOARD

## FACTS ABOUT

### **Compliance Information for Large Fleets of 53-Foot Trailers**

#### *Tractor-Trailer Greenhouse Gas Regulation*

The California Air Resources Board (ARB) approved the Tractor-Trailer Greenhouse Gas regulation to significantly reduce greenhouse gas emissions produced by certain heavy-duty tractor-trailers. The regulation requires the use of United States Environmental Protection Agency SmartWay verified aerodynamic technologies and low rolling resistance (LRR) tires on vehicles operating on California highways. The regulation also provides exemptions and delayed compliance deadlines for certain refrigerated trailers, along with phase-in options and credit for early compliance.

#### **Who is affected by the regulation?**

This regulation applies to all 53-foot or longer box-type trailers, including both dry-van and refrigerated-van trailers operating in California, and the heavy-duty tractors that pull them.

#### **How does the regulation define a large fleet?**

A large fleet is any fleet operating 21 or more trailers. Fleets with 20 or fewer trailers are small fleets.

#### **What does the regulation require of fleets, and when will the requirements take effect?**

This regulation applies to all affected vehicles operating on California highways, regardless of where they are registered. Owners of tractors subject to the regulation must either purchase new SmartWay certified tractors or retrofit existing tractors with low rolling resistance tires. Owners of trailers subject to the regulation must either purchase new SmartWay certified trailers or retrofit existing trailers with SmartWay verified aerodynamic technologies and low rolling resistance tires. Below are the required technology and compliance deadlines for affected tractors and trailers.



# Large Fleet Requirements

## Trailer Requirements:

Affected Trailers*	Requirements	Compliance Date
2011 MY and newer dry vans	SmartWay Certified or retrofitted with LRR tires + 5% fuel saving aerodynamic technologies	January 1, 2010
2011 MY and newer refrigerated vans	SmartWay Certified or retrofitted with LRR tires + 4% fuel saving aerodynamic technologies	January 1, 2010
2010 or older MY box-type trailers	SmartWay Certified or retrofitted with 5%/4% fuel saving aerodynamic technologies	January 1, 2013
	SmartWay verified LRR tires	January 1, 2017
2003-2004 MY refrigerated van trailers	SmartWay Certified or retrofitted with LRR tires + 4% fuel saving aerodynamic technologies	January 1, 2018
2005-2006 MY refrigerated van trailers	SmartWay Certified or retrofitted with LRR tires + 4% fuel saving aerodynamic technologies	January 1, 2019
2007-2009 MY refrigerated van trailers	SmartWay Certified or retrofitted with LRR tires + 4% fuel saving aerodynamic technologies	January 1, 2020

\*Applies to 53-foot or longer box-type trailers in California

MY – model year

LRR – low rolling resistance

Information about specific SmartWay verified technologies is available from the U.S. EPA website at:

<http://www.epa.gov/smartway/transport/what-smartway/verified-technologies.htm>.





# Large Fleet Compliance Deadlines

## Option 1 ... sign up July 1, 2010

- (A) 5 percent beginning January 1, 2011
- (B) 15 percent beginning January 1, 2012
- (C) 30 percent beginning January 1, 2013
- (D) 50 percent beginning January 1, 2014
- (E) 75 percent beginning January 1, 2015
- (F) 100 percent beginning January 1, 2016



# Large Fleet Compliance Deadlines

## Option 2 ... sign up July 1, 2011

- (A) 20 percent beginning January 1, 2012
- (B) 40 percent beginning January 1, 2013
- (C) 60 percent beginning January 1, 2014
- (D) 80 percent beginning January 1, 2015
- (E) 100 percent beginning January 1, 2016



**SmartWay**<sup>SM</sup>

The Smart Way to Save Fuel,  
Money, and the Environment

- [Green Wing\Documentation\Designated Tractors and Trailers Technology SmartWay US EPA.htm](#)



EPA VERIFIED DESIGN – 5% FUEL SAVINGS FOR ADVANCED TECHNOLOGY  
(DECEMBER 2009)

IMPORTANT DESIGN CHARACTERISTICS TO CONSIDER :

“AERODYNAMIC

“DURABLE

“SIMPLE INSTALLATION

“ADAPTABLE TO MULTIPLE TRAILER TYPES AND MANUFACTURERS

“VISUALLY APPEALING





# Initial Design Criteria

- Single piece skirt panel with mounting flange
  - Reduces installation time
- Durability
  - Continuous glass reinforced thermoplastic panels
  - Expands and contracts at the same rate as the base rail...will not oil can
  - Stays flexible - cold weather, ground impact
  - Dent proof – maintains aerodynamic form
  - 15,000 hour UV protection
- 100% Recyclable
- Less than 200 pounds
- Shortest ROI
- Resist corrosion
- Repairable materials





Proven in the RRWT  
ARC - Indianapolis



PROVEN IN THE WIND TUNNEL





# EnergO Tests – Green Wing V-Brace Design

## August 2010



SmartWay<sup>SM</sup>

The Smart Way to Save Fuel,  
Money, and the Environment

# Energo Tests

## June 2011

- 7.17%
- SAE J1321
- Reality?



SmartWay<sup>SM</sup>

The Smart Way to Save Fuel,  
Money, and the Environment





# EPA Plans?

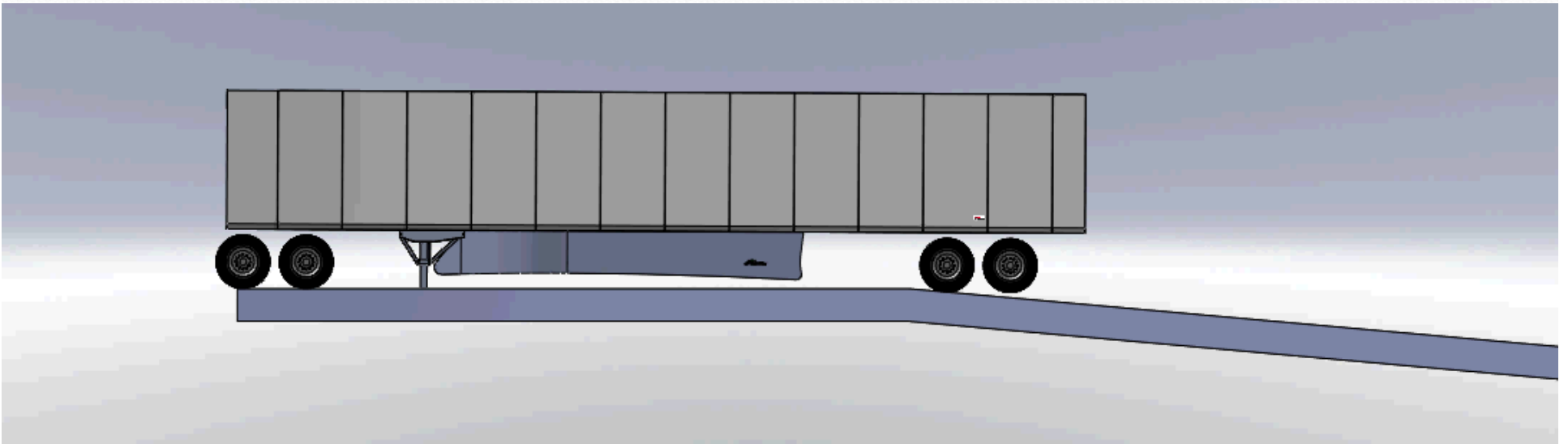
(our opinion)

# Generation 1 Clearance Arc



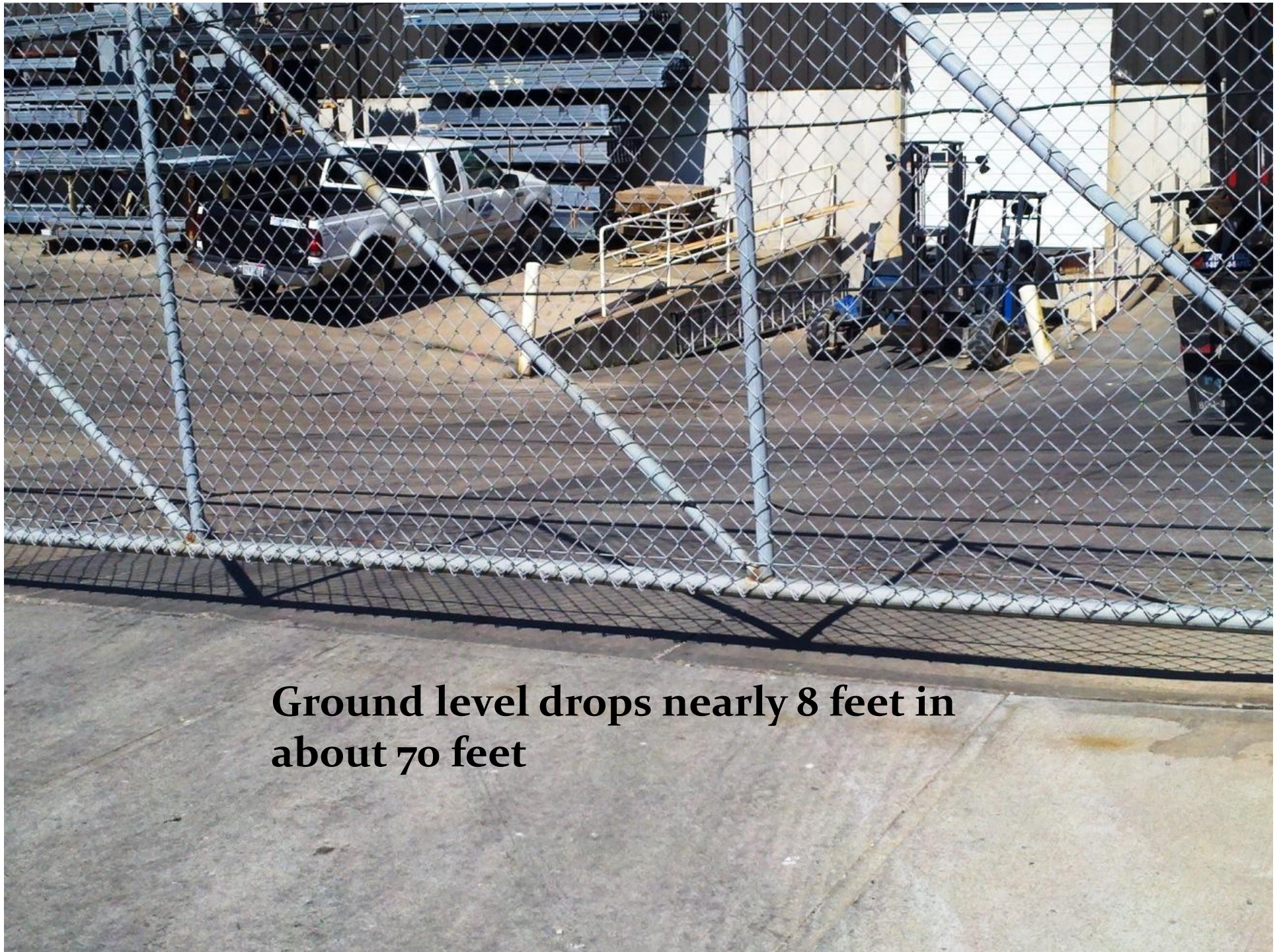


# Sunken Docks...we've done our homework





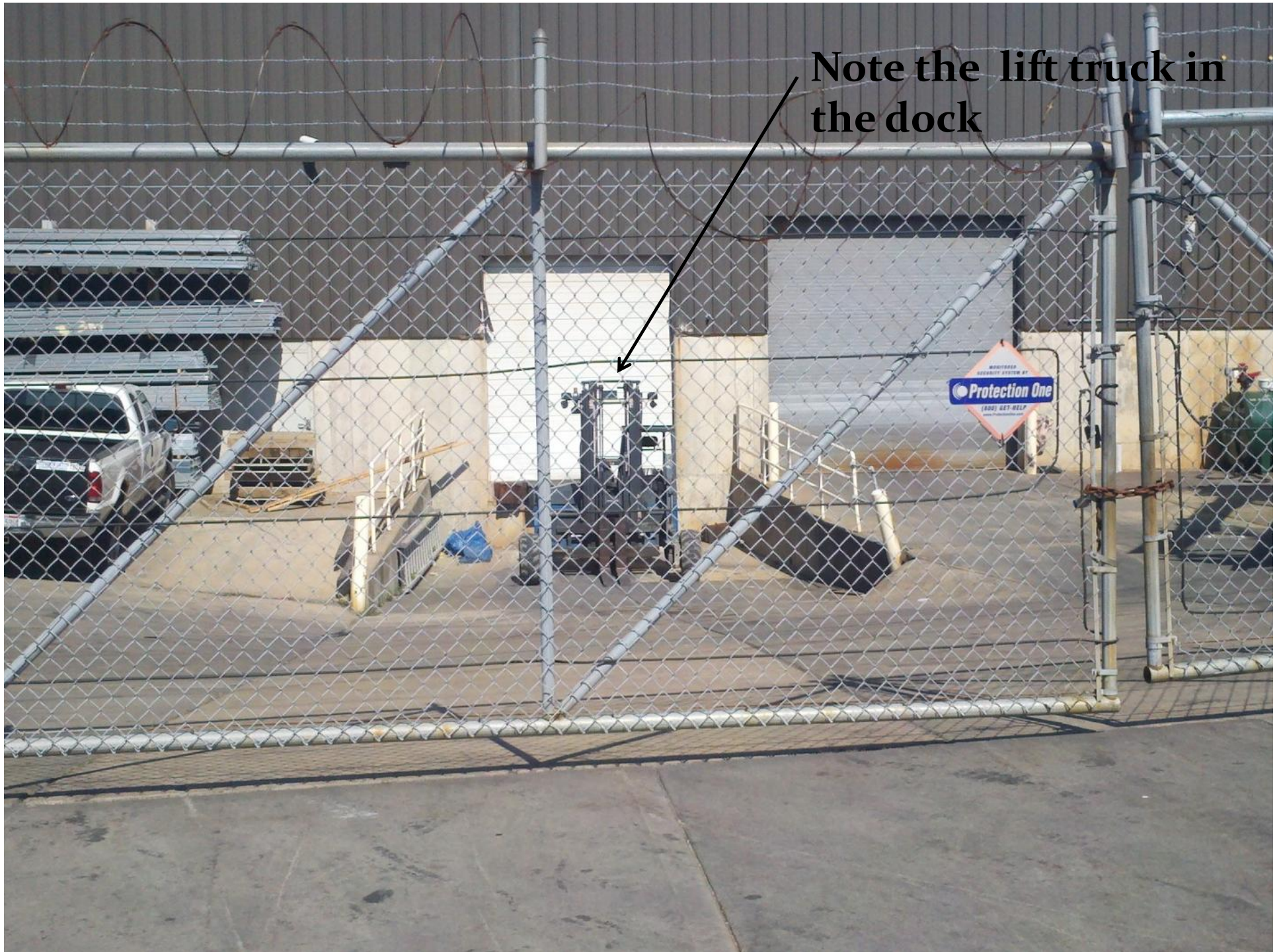




**Ground level drops nearly 8 feet in  
about 70 feet**



**Note the lift truck in  
the dock**



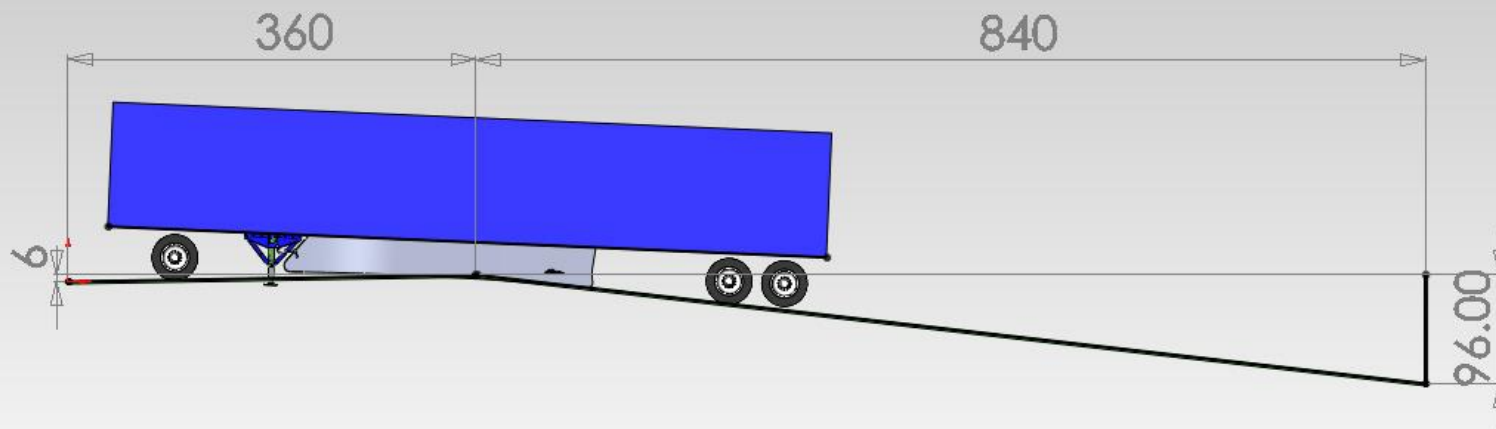




**Note the lift truck in  
the dock**

Crest of the dock entrance eight foot higher than bottom of  
dock

# Dock Dimensions

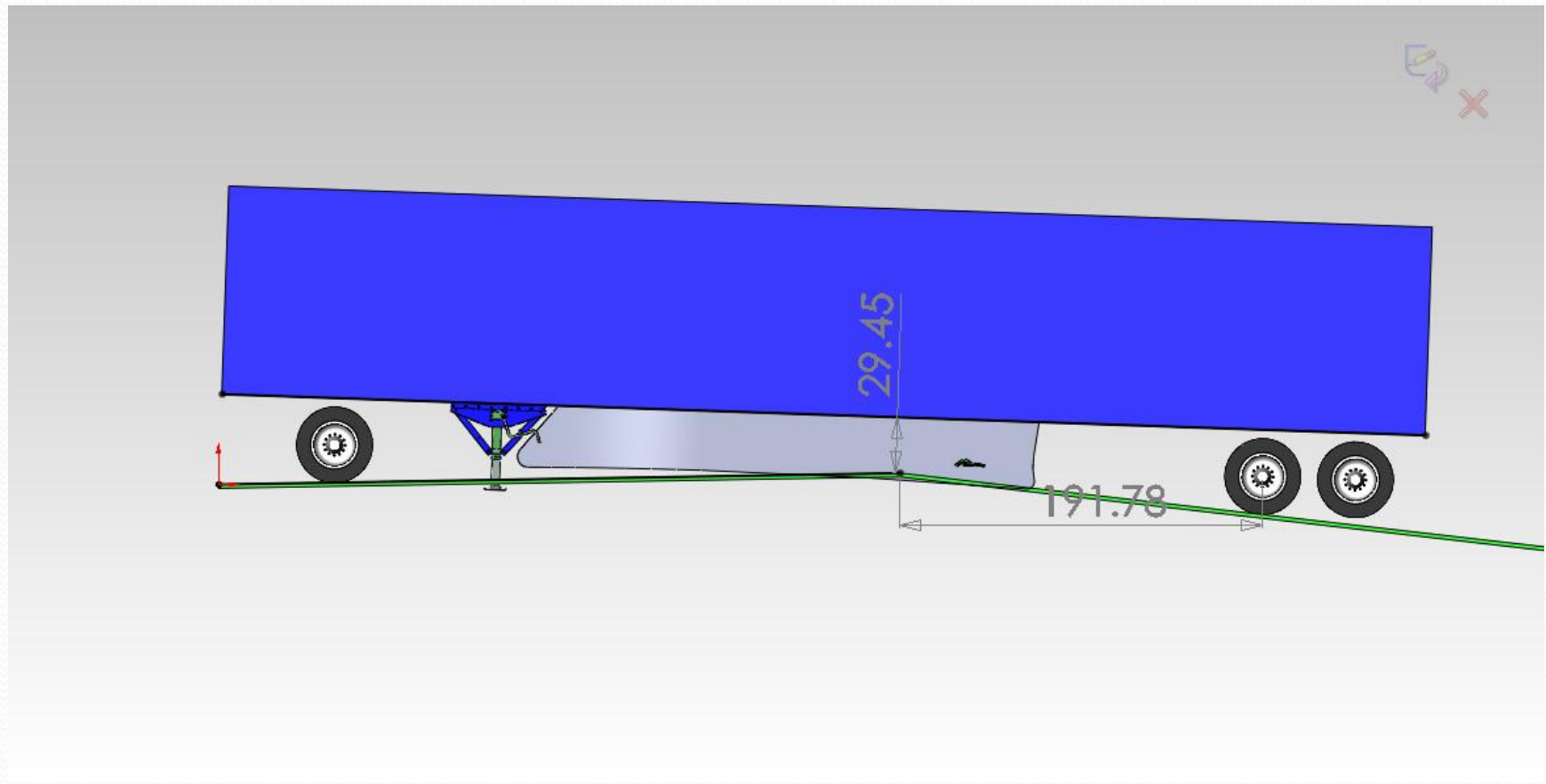




# Just Touching

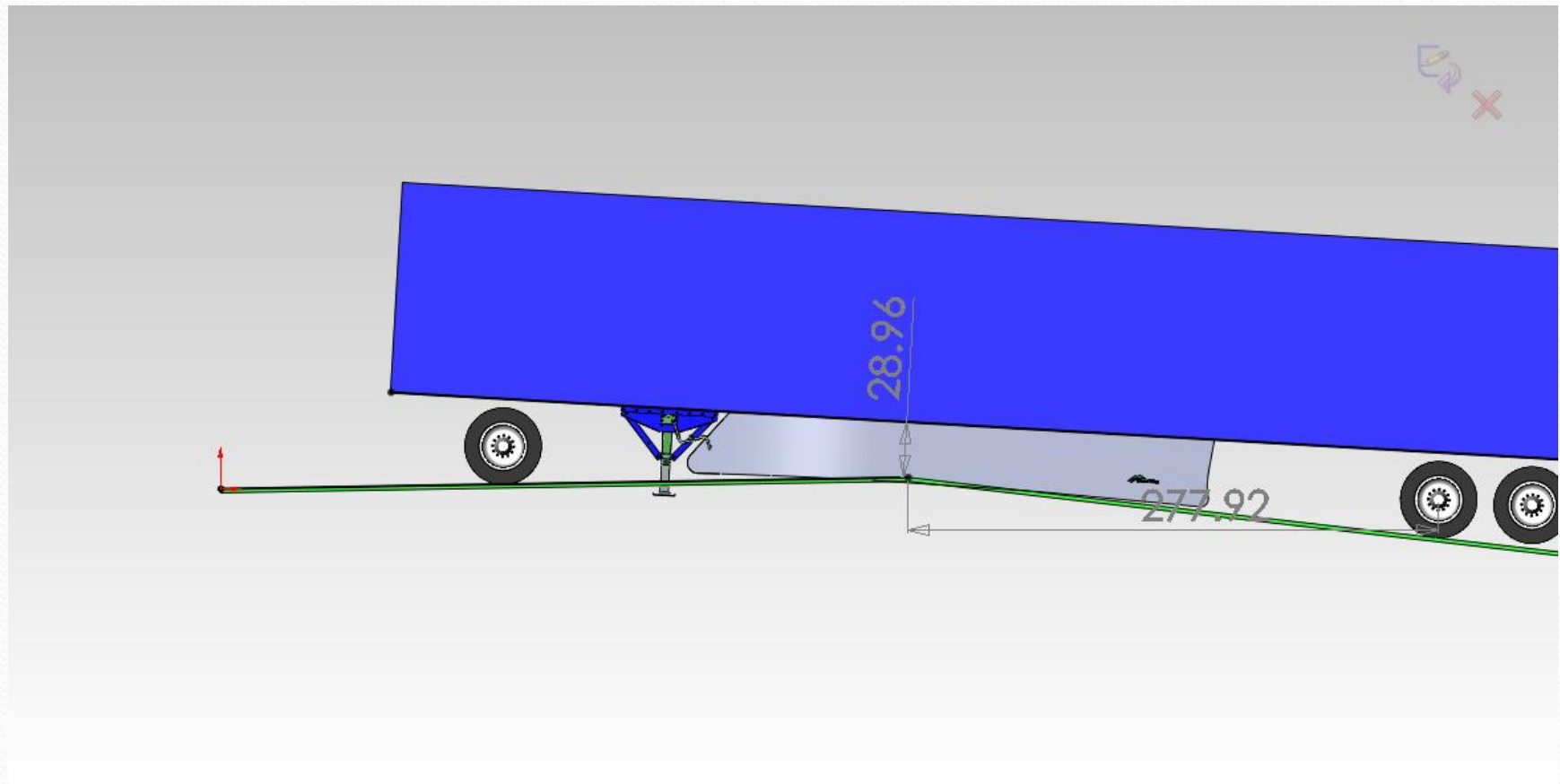


# Deflection





# Deflection





Driver awareness





Side skirt development is on-going...

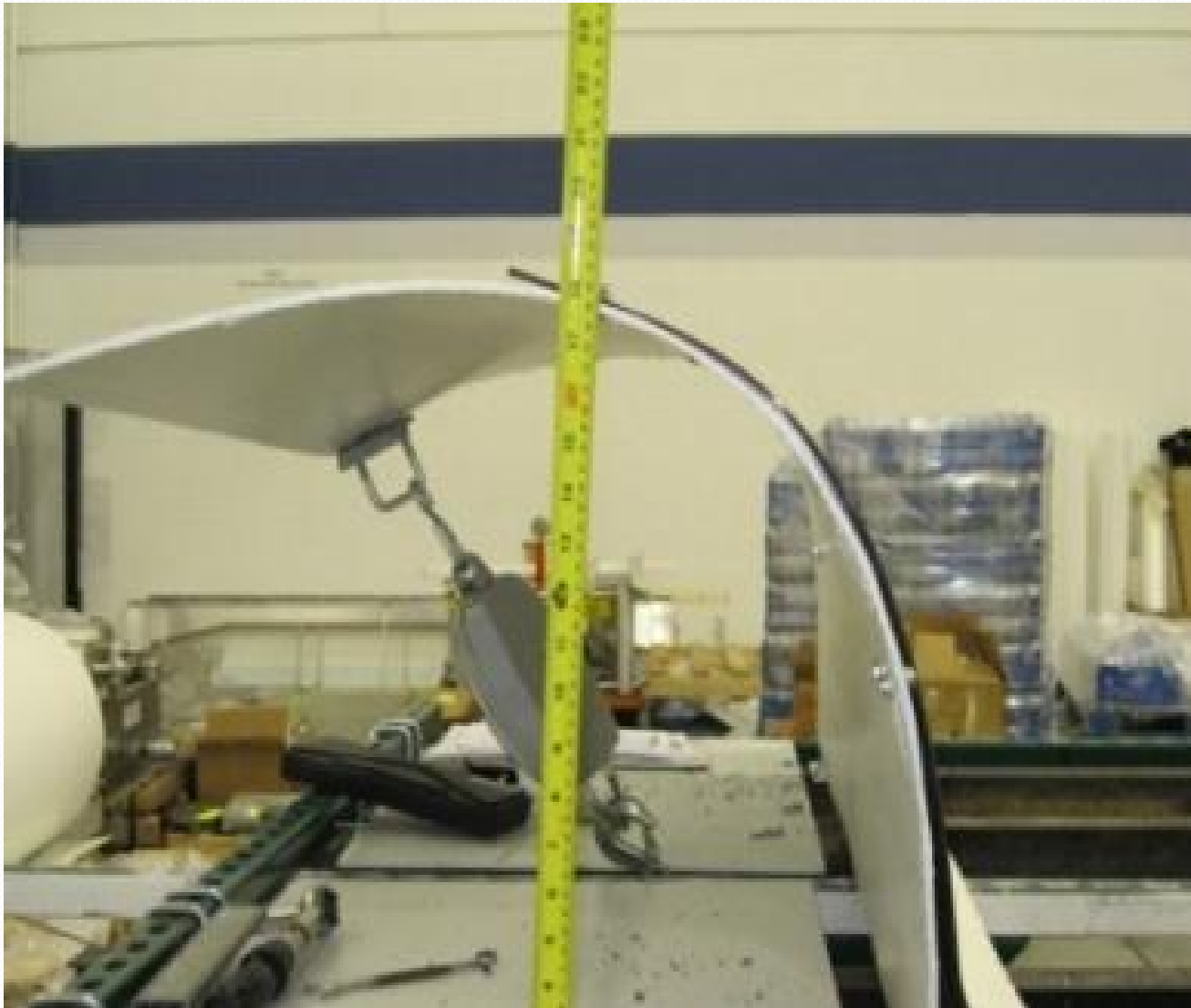


# Market demands

- Strut-less
  - Eliminate strut slippage ... pivot point
  - Eliminate downtime due to strut breakage
- More fuel efficient design with more ground clearance
  - Shorter skirt length (12 inches) Shorter height (1.5 inches)
  - Better tire clearance, no additional stop pipes, longer slider
- Reduce installation time dramatically
  - Eliminate Attachment Points:
  - Self-aligning skirt
  - Preassembly
- Attachment Design
  - No skirt slippage upon impact



# Improved flexibility



# New skirt design







# FLEX IN OR OUT





# COMPRESSION





# Why skirts are a good business decision

[Green Wing\Documentation\green\\_wing\\_ROI \(1\).xls](#)





Thank You Very Much  
Questions and Comments?