

## What Not to Do



Presentation by  
Kelli Peters and Mary Sheets

## Issues Roadway Design corrects after construction is complete:

- Barriers
  - Guardrail
  - Handrail
- Sidewalk Obstructions
- Poorly placed poles

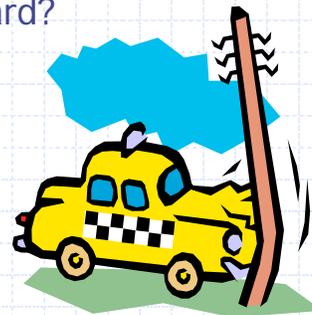
## How do the "issues" happen?

- Lack of field reviews during scoping and design.
- Poor QA/QC.
- Lack of follow through with last minute changes.
- Lack of mentoring for less experienced team members.

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## Barriers

- What is the purpose of a barrier?
  - Protect an object?
  - Keep people out of my yard?
  - Delineate path?
  - Keep you out of an area?



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## No!

- The purpose of a barrier is to protect a driver or a pedestrian from a drop off or hazard.



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## Types of barriers

- Guardrail
  - Protects cars from drop offs or hazards
- Handrail
  - Protects pedestrians/cyclists from drop offs.



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## Bad Guardrail Placement

Would you want to walk or ride here?

Which hazard are we protecting the driver from?



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## What went wrong?

- Missed in reviews.
- Lack of field review to determine pedestrian/bicycle usage.
- Evaluation of alternatives not provided.

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## What is the criteria for guardrail?

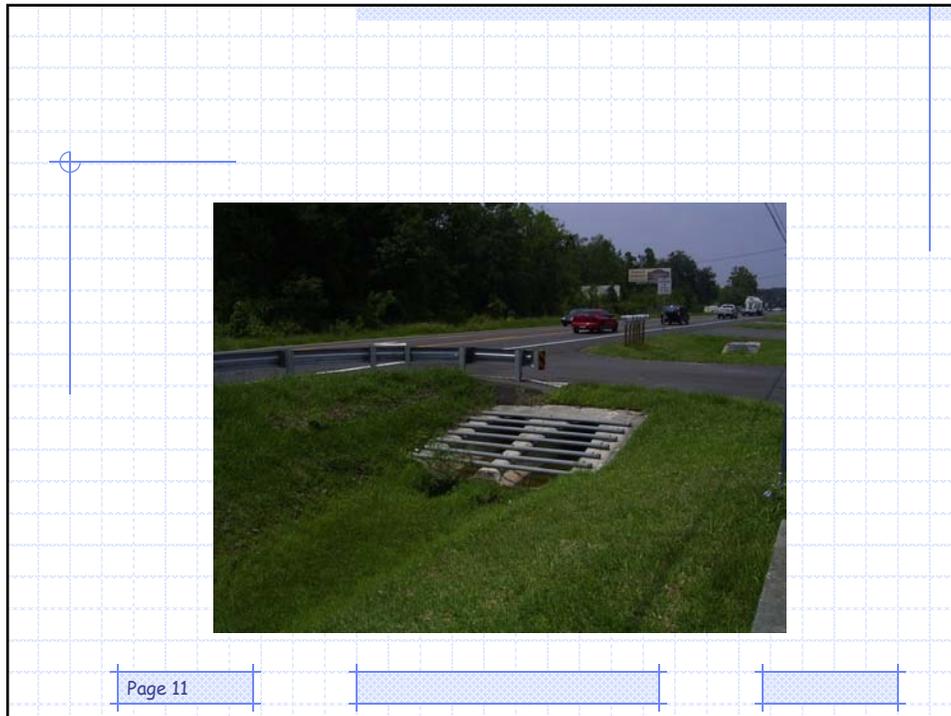
- From the Plans Preparation Manual: Roadside barriers are warranted when hazards exist within the clear zone, hazards cannot be cost effectively eliminated or corrected, and collisions with the hazards will be more serious than collisions with the barriers.
- From the Standard indexes : Guardrail should be considered on flush shoulder sections where fill slopes are steeper than 1:3 within the clear zone and fill heights are 6' or greater. Curbed sections where fill slopes are steeper than 1:3 and fill heights are 6' or greater within 22' of the traveled way should be evaluated for installation of guardrail.

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## Site met the criteria



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## Installation was correct, but it was not right. How did we fix it?

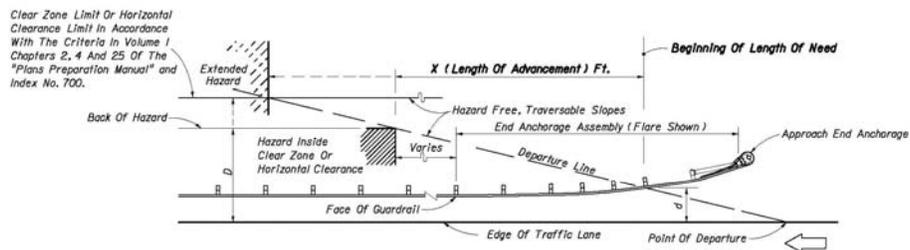
- Fast response contract was necessary to relocate the guardrail.
  - Field review was performed to evaluate possible corrections.
  - Evaluated the installed curb & guardrail to see if they could be relocated or removed.
  - Determined guardrail could not be removed so new location selected.

# Better Barrier Solution



# Barrier Placement

- Standard Index 400 sheet 2 of 24.



Design Speed mph	X (Length Of Advancement) Ft. <sup>2</sup>
≤ 45	= 16 (D-d)
≥ 50	= 13 (D-d)

## Is this too close?



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## What is the purpose of Handrail?

- Aesthetics?
- Protect people from cars?
- To be used instead of guardrail?
- To hold on to?



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## No again.

- The purpose of a handrail is to protect a pedestrian/bicyclist from a drop off.



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## Choosing a handrail

- For roadway design there are two basic types to choose from.
  - Pedestrian/bicycle picket rail
  - Pedestrian/bicycle pipe guiderail

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## When is the best use of each type?

- For picket rail the best use is for a drop off greater than 2'-6".
- For pipe guide rail the best use is for a drop off less than 2'-6" but more than 6".

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## Is this the right type of rail?

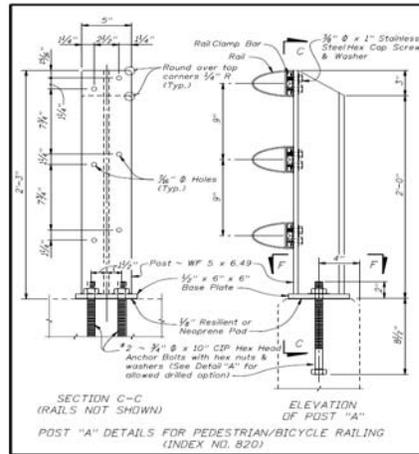
Should this rail be used on a roadway or a bridge?



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## Standard Index 822

A bridge.



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## Is this the correct use of handrail?

Do we use handrail to shield an object?

Is there a 6" or greater drop off behind the sidewalk?



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## Picket rail – Standard Index 850

Picket rail is often improperly placed.

- Can create sight obstructions.
- Can be ugly when overused.
- Often improperly used to protect an object.
- Can add significant cost to a project that could be avoided.
- Often used when pipe guiderail or fill should be used.

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## Poor Picket Rail Placement

Can you see the approaching traffic?



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## What went wrong?

- This was the correct rail and placement was satisfactory based on the drop off. However, a sight obstruction was created when it was placed. A field review prior to construction could have caught this.

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## How did we fix it?

- A field review indicated there was a sight obstruction for vehicles leaving the complex.
- Several options were evaluated to determine if some of the panels could be removed.
- We chose the option of adding fill and removing two panels.

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## Better Visibility



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## Side by side



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## What should be reviewed before using picket rail?

- Check driveways for sight obstructions
- Check to see if a little fill can be added to avoid the picket rail.
- Make certain that it makes sense.



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## Drop off less than 2'-6"



Before

After

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## Drop off less than 2'-6"



Before



After

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## Design Error?

- Yes, both examples could have easily been corrected in design
- QC of the plan views would have shown the potential sight line obstructions
- Comparisons of sight line and obstruction elevations would have shown the sight line window was not available

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## Should we have rail here?



Probably not here. Is there a drop off? Is it greater than 2'-6"?

Oh, and there is already a fence.

## How about here?

Probably here, but does it obstruct the driveway?



## And here?

But how about here?

Could we have designed this differently?

Do we need it for the entire length, could we use pipe guiderail?



## Additional Problems That Occur...



How does this happen?



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Or even this?

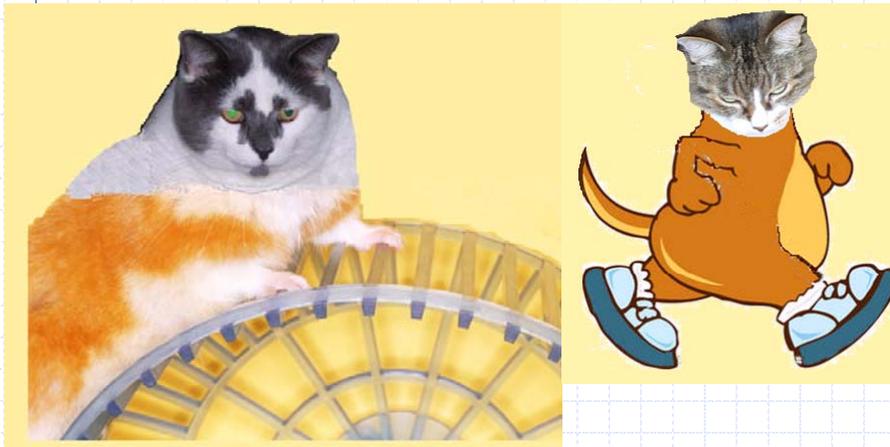


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# Too much cat food!



# How do we fix it? Exercise!



## Sidewalk Obstructions

- Why do we construct sidewalks?
  - To place bus benches?
  - Or newspaper boxes?
  - To create a buffer for the property owner?
  - To have a place to put utility poles?

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## Still No!

- Sidewalks and multi-use trails are to allow pedestrians and/or novice cyclists to safely travel along the roadway.



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## What defines an obstacle?

- An obstacle is something that impedes progress or stands in the way.
- Current ADA guidelines require a 36 inch minimum clear passage width for a single wheelchair around an obstacle. But the next draft of the guidelines has a 48 inch width.



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## Sidewalk Obstructions

Can a wheel chair get around the light pole?  
 Would a visually impaired person expect this obstruction?



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## What could we have done to make this better?

- A component plans QC review should have identified this as a possible obstruction.
- However, to set the pole back, a different type of lamp may be needed to achieve the required foot candles.
- Or a path around the pole should have been provided.

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## It might meet standards, but is it the best design?

Could you pass this pole on a bicycle? Or even in a wheelchair?



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## What could we have done differently?

- We could have modified the deflection angle to make the transition smoother.
- A radius could have been used instead of a 45° angle.
- The pole placement was constrained by an existing gas line at the back of sidewalk

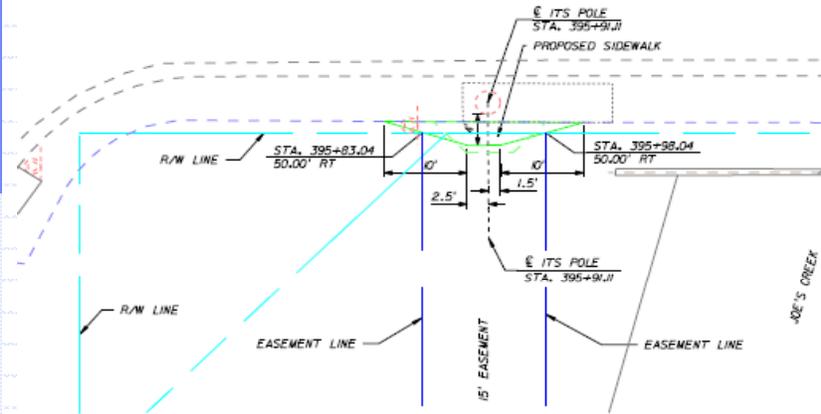
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## How did we correct it for this project?

- The available right of way easement was reviewed to determine if we had more room, and we did.
- There was enough room to create a smoother transition around the pole.

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# Better design



# As Constructed

This is better...but is this what was designed?



## Not an obstruction, but a dead end!

Where would you go?



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## Sidewalk connectivity is important.

- Consider where the pedestrian will be directed.
- Is it ever better not to build sidewalk?

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Light pole and utility pole placement requires more coordination than this.



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Without coordination

This is what happens.



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## And this



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## What Happened?

- There were about 25 light poles and utility boxes located within the ditch that were affected by standing water.
- The pole bases and utility boxes should be placed so that the bottom is a minimum of 6" to 8" above the 10 year event.

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## How did this happen?

- Lighting plans were not coordinated with the roadway plans.
- The lighting designer did not know the ditches were linear ponds.



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## How did it get fixed?

- The standing water in the light pole bases and utility boxes was corrected by relocating the utility boxes 3 to 5 feet up the ditch slope.
- In the future it would be best to cut cross sections at pole locations during the design phase to compare the pole base / utility box location and elevation with the water elevation of a normal 10 year event.

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## How should different disciplines coordinate?

- Need to use same baseline for stations and off-sets.
- Need to measure from the same edges of pavement or baselines
- Plan sets need to be referenced against each other to assure that locations match up.
- As always, we need to QC plans.

## Does this look coordinated?



And why did they build it?

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## What have we learned?

- Field review, field reviews & more field reviews. Even field reviews need QC!
- Make sure you are using the right standard for the right location.
- If you are using the correct standard for the correct location, but it still does not fit, see how you can modify it.

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## And still learning

- Make sure everyone on your team is using the same reference data.
- Coordinate, coordinate and more coordination.
- And the most important thing of all!

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## Don't overfeed fat cats



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