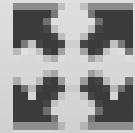


DGLVR Stream Crossing Replacement Policy

Toggle Fullscreen mode with this button above



3/13/15

Starts at 10am

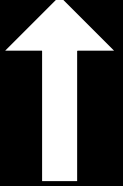
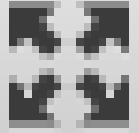
Use Chat box to ask Questions

If you are reading this, then you are successfully seeing the webinar video. In addition to audio on the webinar, we have opened a phone conference line to allow attendees to listen and ask questions directly: **866-823-7699**. Please use either the webinar audio or conference line, but not both (will produce feedback).

Audio also available via phone: 866-823-7699

For assistance, call: 814-865-5355

**Toggle Fullscreen
mode with this button
above**



**Use Chat box to
ask Questions**

Participant phone lines will be muted
until after initial presentation

Audio also available via phone: 866-823-7699
For assistance, call: 814-865-5355

Special Thanks to Jake Tomlinson at Trout Unlimited and Mike Lovegreen with Bradford County for many of the pictures and slides used in this webinar.





- **Background & Purpose**
- **Policy Overview**
- **Impacts of undersized crossings**
- **Bankfull**
- **Policy Details**
- **Evaluation Form**
- **Summary**



- **Background & Purpose**
- **Policy Overview**
- **Impacts of undersized crossings**
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- **Background**

- “**Stream Crossing**” in presentation and policy applies to ANY structure (bridge, pipe, box...).
- This policy applies to **STRUCTURAL REPLACEMENT ONLY** (*you can always fund work around crossing*)

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- **Background**

- Replacement of stream crossing structures has always been an eligible expense.
- The Program has not replaced many large (8' or bigger) structures. **Why?**

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For assistance, call: 814-865-5355

- **Background**

- Replacement of stream crossing structures has always been an eligible expense.

- The Program has not replaced many large (8' or bigger) structures. **Why?**

\$

Audio also available via phone: 866-823-7699
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- **Background**

- With more funding comes new funding requests.
- Many districts getting pressured from County or others to fund bridge replacements.
- Needed a policy to prevent Program from becoming a bridge replacement program, but still allow for the replacement of structures where it provided an environmental benefit.

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- Background & Purpose
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- **Policy Overview**

- Program replacement eligibility not based on structural condition of bridge (there is other money for that).
- Program replacement eligibility based on environmental impacts caused by bridge (undersized).

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- **Simplified Policy Overview**

- If a structure is significantly undersized compared to the stream channel, it may be eligible for replacement with an appropriately sized structure.
- Details of policy to come.
- Why focus on opening size???



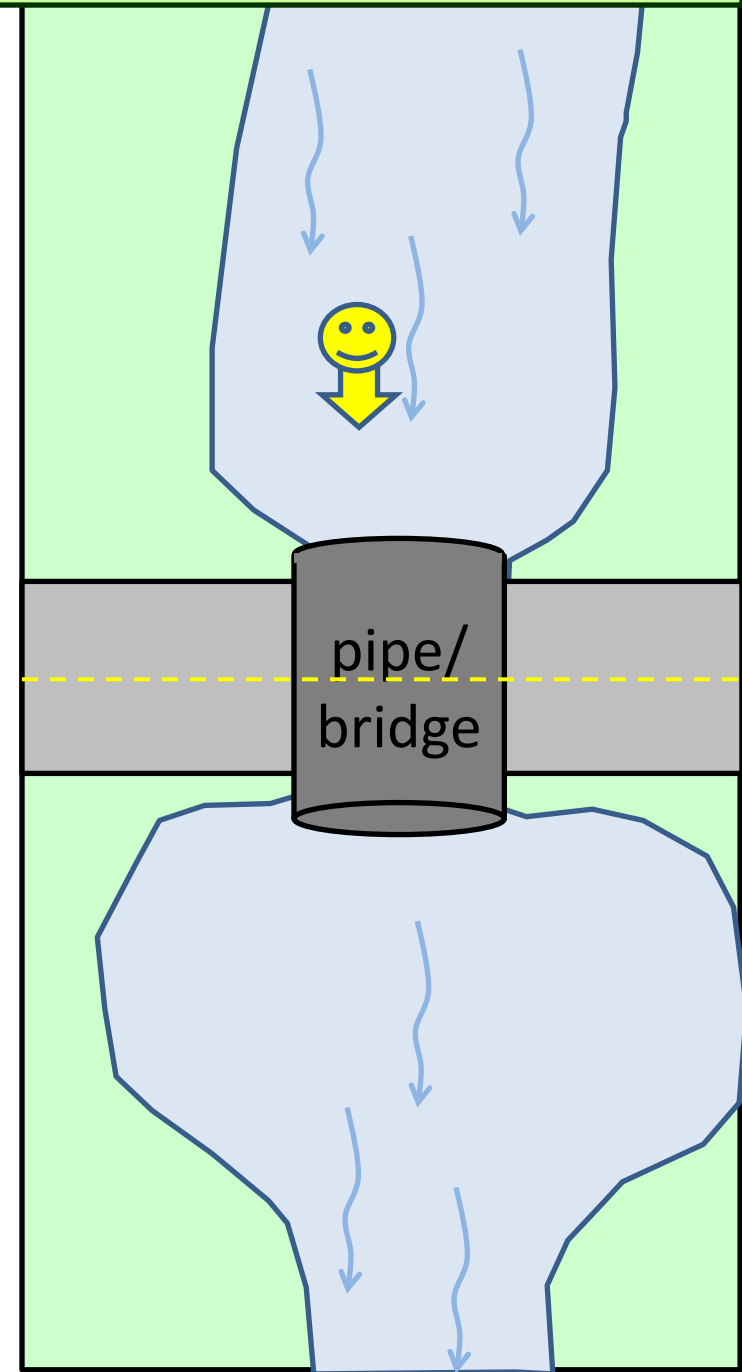
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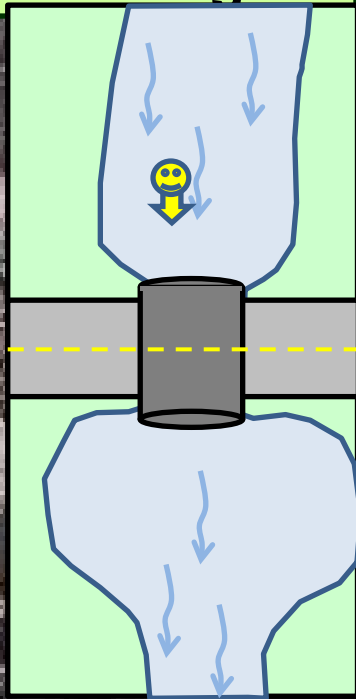


- Background & Purpose
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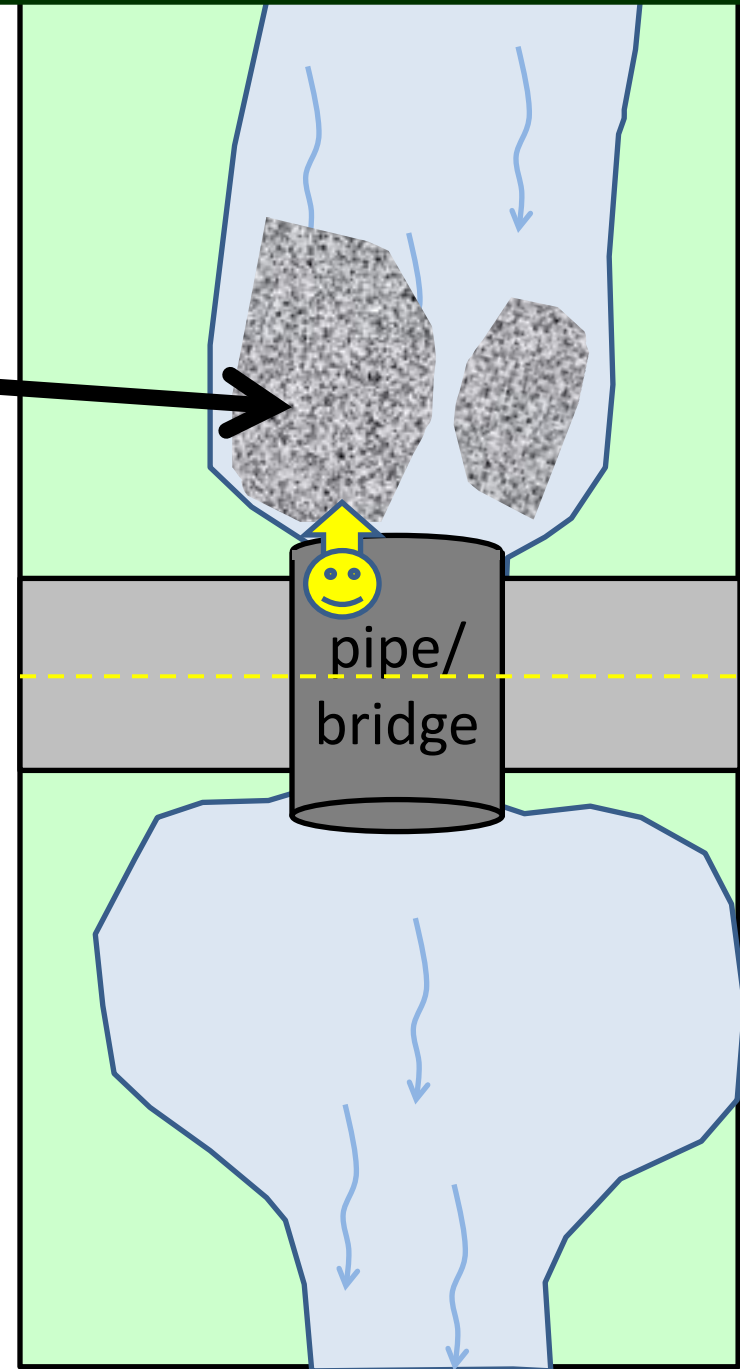
- **Hourglass caused by undersized crossing**



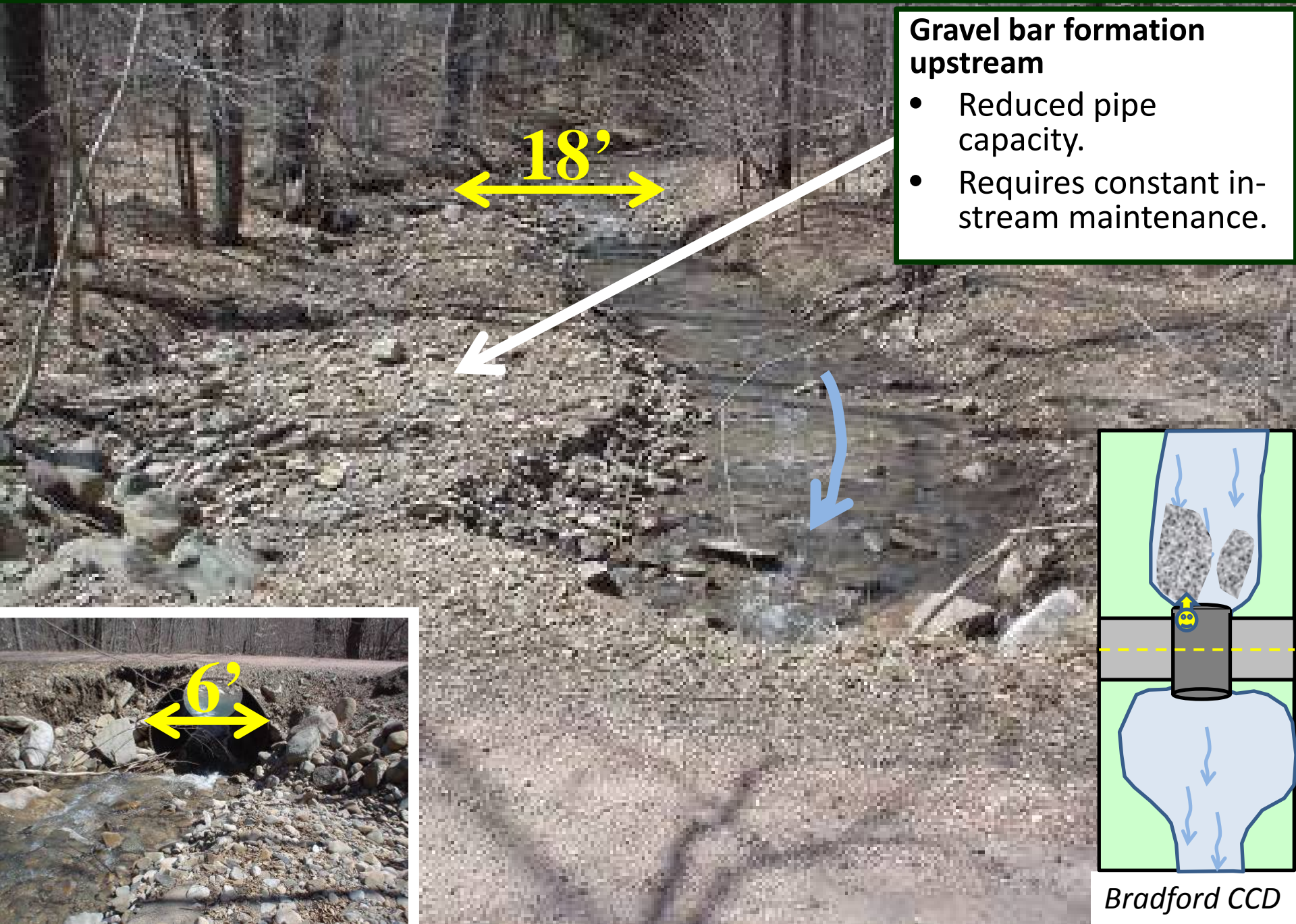
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- **Hourglass caused by undersized crossing**
- **Gravel bar formation upstream**
 - Reduced pipe capacity.
 - Requires constant in-stream maintenance.

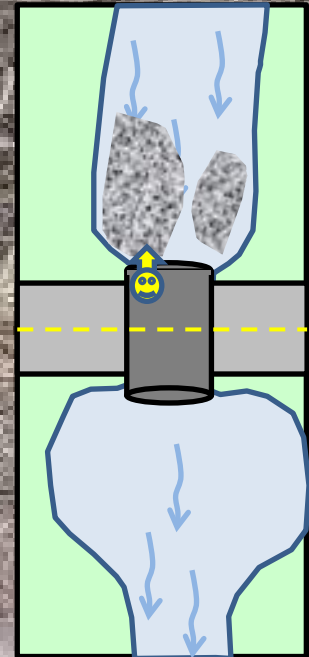


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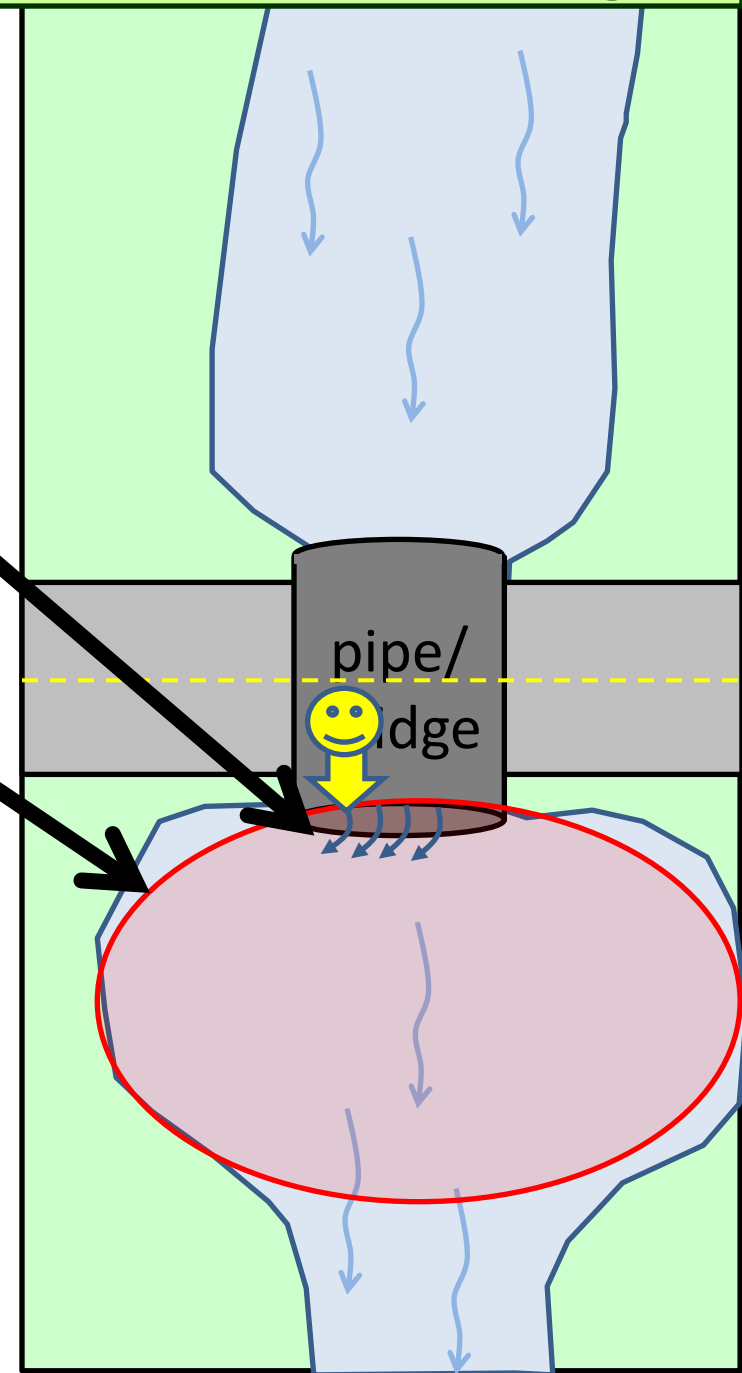
Gravel bar formation upstream

- Reduced pipe capacity.
- Requires constant in-stream maintenance.

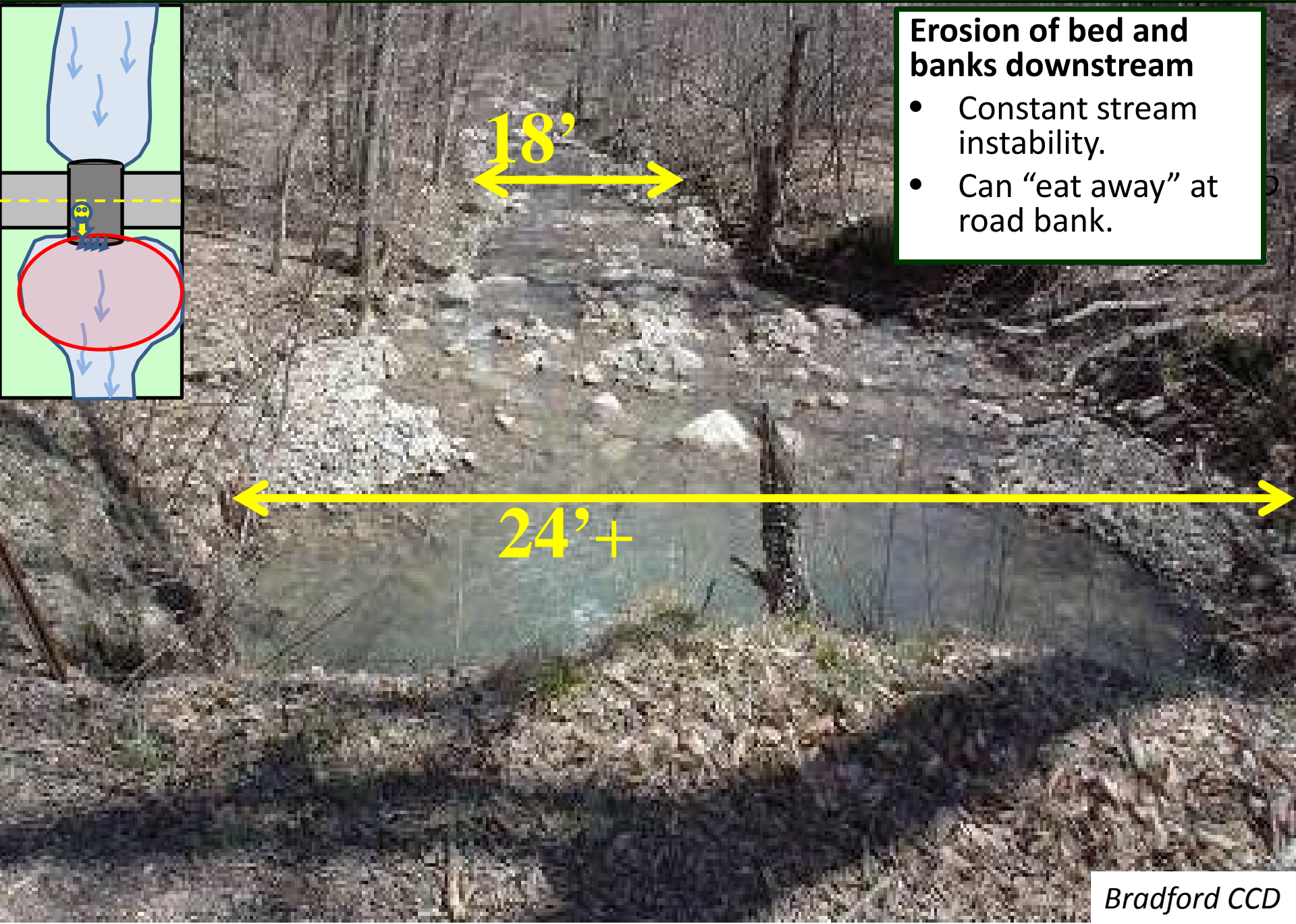
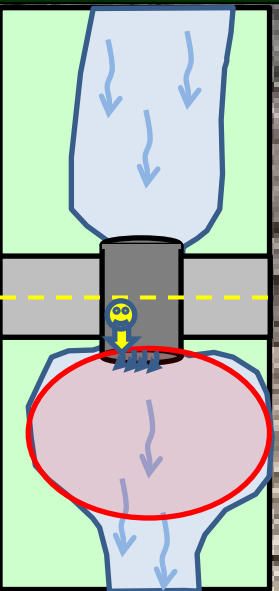


Bradford CCD

- **Hourglass caused by undersized crossing**
- **“Firehouse effect”**
- **“Waterfall” at pipe outlet**
 - Prevents AOP
- **Erosion of bed and banks downstream**
 - Constant stream instability.
 - Can “eat away” at road bank.



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For assistance, call: 814-865-5355



Erosion of bed and banks downstream

- Constant stream instability.
- Can “eat away” at road bank.



1979

“Waterfall” at pipe outlet

- Prevents Aquatic Organism Passage



1998

US Forest Service

- **Over 8,000 stream crossings on D&G worksites**
 - Only includes “blueline” streams and no LVRs
- **Recent surveys indicate up to 85% may be undersized**
 - Increased sedimentation
 - Increased maintenance costs
 - Increased risk of failure
 - Aquatic organism barriers



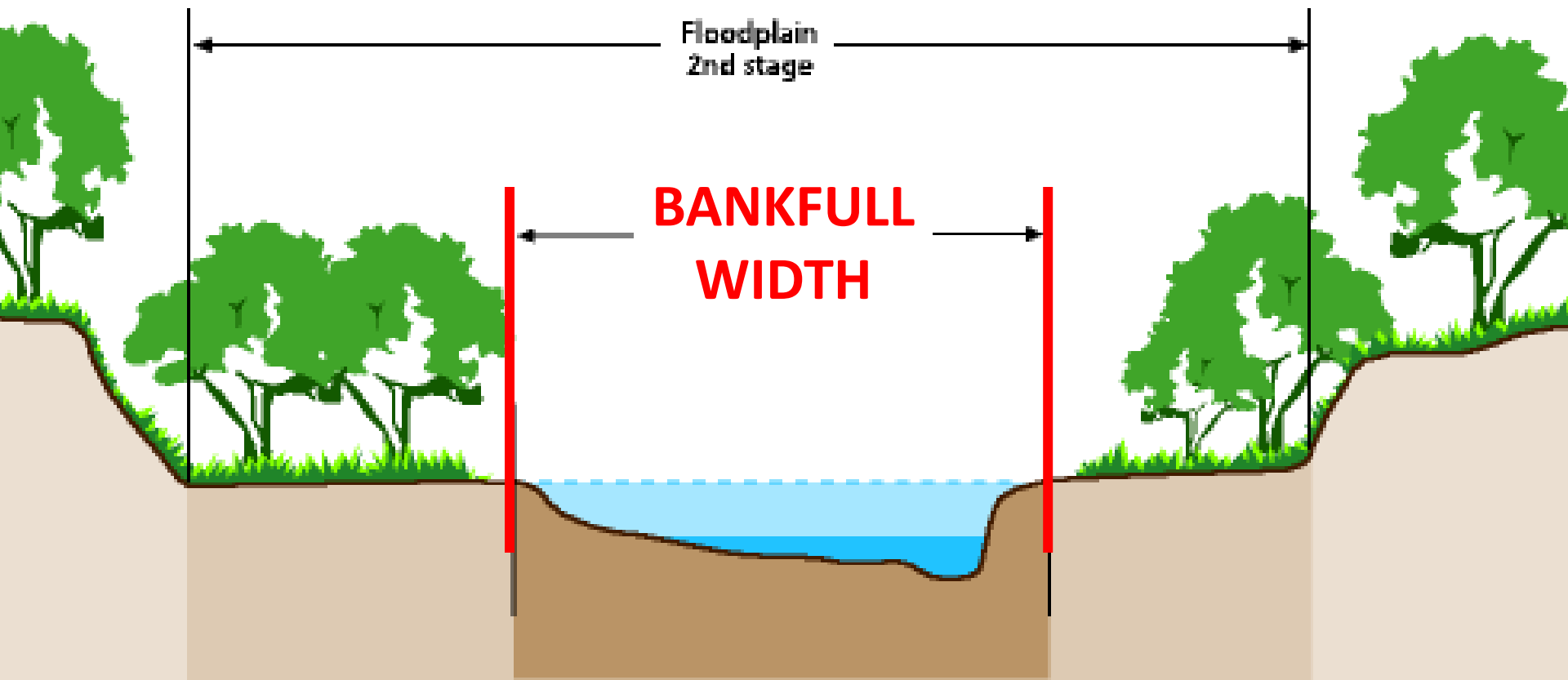
- Background & Purpose
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- **DGLVR Program policy is based on “Bankfull”**

Note: Bankfull is a complicated concept that can't be taught in a webinar. What follows in an overview/primer only.

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For assistance, call: 814-865-5355



- **Bankfull elevation:** Point where water fills the channel just before accessing floodplain
- **Bankfull width:** Width of channel at bankfull elevation.



Bankfull Width



- **Bankfull width:** Width of channel just before water accesses floodplain.
- **Bankfull Indicators:**
 - Elevation at the top of the highest depositional features such as point-and mid-channel bars.
 - Changes in slope on banks.
 - Changes in particle size on banks.
 - Changes in vegetation on banks.
 - Erosion and scour features (only when other features not present)



Bankfull Width

POLL:

What is the comfort level of someone at your District in determining bankfull elevation and width on a stream.



- Background & Purpose
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Stream crossings **OVER** 7ft² opening (3' diameter)

In order to be eligible for replacement, EXISTING structures must:

1. Have a structure to bankfull width ratio of 50% or less.
2. Show signs of streambank erosion.
3. Show signs of streambed erosion/aggradation.

Stream crossings **OVER** 7ft² opening (3' diameter)

In order to be eligible for replacement, EXISTING structures must:

1. Have a structure to bankfull width ratio of 50% or less.
2. Show signs of streambank erosion.
3. Show signs of streambed erosion/aggradation.

The NEW REPLACEMENT structure must (*all four*):

1. Have a structure width at least equal to bankfull width (**100% ratio**).
2. Be properly aligned with the channel.
3. Consider additional floodplain connectivity when possible.
4. Be designed and constructed to accommodate the passage of aquatic organisms through the structure.

Stream crossings **UNDER** 7ft² opening (3' diameter)

~~In order to be eligible for replacement, EXISTING structures must:~~

- ~~1. Have a structure to bankfull width ratio of 50% or less.~~
- ~~2. Show signs of streambank erosion.~~
- ~~3. Show signs of streambed erosion/aggradation.~~

The NEW REPLACEMENT structure must (all four):

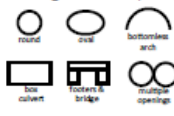
1. Have a structure width at least equal to bankfull width (**100% ratio**).
2. Be properly aligned with the channel.
3. Consider additional floodplain connectivity when possible.
4. Be designed and constructed to accommodate the passage of aquatic organisms through the structure.



- Background & Purpose
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Stream Crossing Evaluation Form

PA Dirt Gravel and Low Volume Road Program—Stream Crossing Evaluation Form

Reviewer Information: _____
Site Information
 Date: _____ County _____ Township _____
 Reviewer: _____ Road Owning Entity _____
 Entity: _____ Structure Ow _____
 Existing Structure (circle): Road Name **Site Info** _____

 Stream Name _____ tributary to _____
 Latitude _____ N Longitude _____ W
 Site notes: _____
 Other: (describe/draw)

Existing Conditions: quantitative assessment

Measuring Bankfull Channel Width: Begin first measurement, outside the area of influence of the structure (preferably upstream and at least 5 bankfull widths away from structure) and in a relatively stable area free from influences that may impact cross section (such as debris jams, floodplain obstructions such as fill/roads/etc.). Additional bankfull widths should be measured so that a total of three (with 5 preferred) are collected upstream of the crossing. The second bankfull width measurement should be collected 1/2 bankfull width upstream of the first measurement. Continue spacing the width measurements 1/2 bankfull width upstream of the first measurement.

required

Bankfull width _____ ft

A. Avg. Reference width _____ ft

B. Existing structure width _____ ft

optional

C. Structure / Bankfull ratio _____ % Structure width divided by average bankfull width. (Line B divided by line A)

D. Max downstream pool width _____ ft Width of widest spot on plunge pool (if applicable).

E. Max downstream pool depth _____ ft Depth of water in plunge pool at typical flow (if applicable).

F. Vertical Drop at outlet _____ in Drop or "waterfall" from structure outlet to water level in plunge pool at typical flow.

Site Evaluation: width considerations

Existing Conditions: qualitative assessment

G. Stream Bank Erosion	upstream	none	slight	moderate	high	severe
Erosion of banks immediately upstream and downstream of structure						severe
H. Stream Bed						severe
Evidence of headcut or plunge pool formation						severe
J. Stream Bed						severe
Evidence of gravel bar formation	downstream	none	slight	moderate	high	severe
K. Bank Armoring		unknown	none	intact	failing	

Site Evaluation: erosion considerations

Eligibility for Crossing Structural Replacement with Program Funds

Is the existing structure a trestle or structure with signs of streambank erosion? Is streambank erosion present (line G above)? **YES-Eligible** _____ %

Is the existing structure a trestle or structure with signs of streambed erosion/aggradation? Is streambed erosion/aggradation present (line H&J above)? **YES-Eligible** _____ %

Stream crossing eligible for replacement with Program funds? **YES** **NO**

Eligibility Determination

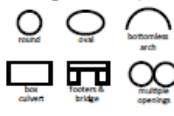
Audio also available via phone: 866-823-7699
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Stream Crossing Evaluation Form

PA Dirt Gravel and Low Volume Road Program—Stream Crossing Evaluation Form

Reviewer Information: _____
Site Information: _____

Date: _____ County _____ Township _____
 Reviewer: _____ Road Owning Entity _____
 Entity: _____ Structure Ow _____

Existing Structure (circle):

 Road Name _____
 Stream Name _____ tributary to _____
 Latitude _____ N Longitude _____ W
 Site notes: _____

Existing Conditions: quantitative assessment

required

Measuring Bankfull Channel Width: Begin first measurement, outside the area of influence of the structure (preferably upstream and at least 5 bankfull widths away from structure) and in a relatively stable area free from influences that may impact cross section (such as debris jams, floodplain obstructions such as fill/roads/etc.). Additional bankfull widths should be measured so that a total of three (with 5 preferred) are collected upstream of the crossing. The second bankfull width measurement should be collected ½ bankfull width upstream of the first measurement. Continue spacing the width measurements ½ bankfull width upstream of the first measurement.

Bankfull width _____ ft
 A. Avg. Reference width _____ ft
 B. Existing structure width _____ ft
 C. Structure / Bankfull ratio _____ % Structure width divided by average bankfull width. (Line B divided by line A)
 D. Max downstream pool width _____ ft Width of widest spot on plunge pool (if applicable).
 E. Max downstream pool depth _____ ft Depth of water in plunge pool at typical flow (if applicable).
 F. Vertical Drop at outlet _____ in Drop or "waterfall" from structure outlet to water level in plunge pool at typical flow.

optional

Existing Conditions: qualitative assessment

G. Stream Bank Erosion	upstream	none	slight	moderate	high	severe
Erosion of banks immediately upstream and downstream of structure						severe
H. Stream Bed						severe
Evidence of headcut or plunge pool formation						severe
J. Stream Bed						severe
Evidence of gravel bar formation	downstream	none	slight	moderate	high	severe
K. Bank Armoring		unknown	none	intact	failing	

Eligibility for Crossing Structural Replacement with Program Funds

Is the existing structure a box culvert or structure with a single opening? YES-Eligible
 Is there evidence of streambank erosion? Is streambank erosion present (line G above)? YES NO
 Is there evidence of streambed erosion/aggradation? Is streambed erosion/aggradation present (line H&J above)? YES NO
 Is the stream crossing eligible for replacement with Program funds? YES NO

Site Info

Site Evaluation: width considerations

Site Evaluation: erosion considerations

Eligibility Determination

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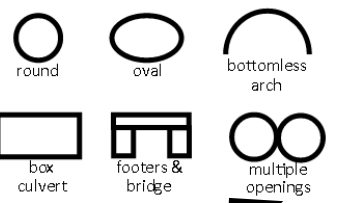
PA Dirt Gravel and Low Volume Road Program—Stream Crossing Evaluation Form

Reviewer Information: Site Information

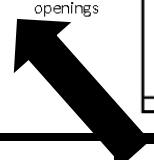
Date: _____
Reviewer: _____
Entity: _____

County _____ Township _____
Road Owning Entity _____
Structure Owning Entity _____
Road Name _____
Stream Name _____
"UNT" for unnamed tributary to
Latitude _____ N Longitude _____ W
Site notes: _____

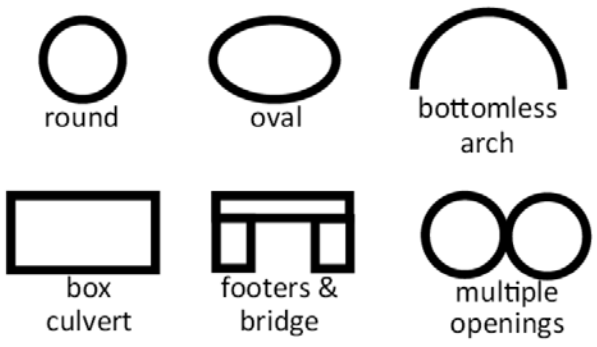
Existing Structure (circle):



Other :
(describe/draw)



Existing Structure (circle):



Other :
(describe/draw)

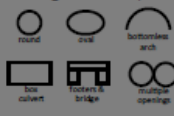
Stream Crossing Evaluation Form

PA Dirt Gravel and Low Volume Road Program—Stream Crossing Evaluation Form

Reviewer Information: _____
 Date: _____
 Reviewer: _____
 Entity: _____

Site Information

County _____ Township _____
 Road Owning Entity _____
 Structure Owning Entity _____
 Road Name _____
 Stream Name _____
 Latitude _____ N Longitude _____ W
 Site notes: _____

Existing Structure (circle):


Other: (describe/draw) _____

Existing Conditions: quantitative assessment

Measuring Bankfull Channel Width: Begin first measurement, outside the area of influence of the structure (preferably upstream and at least 5 bankfull widths away from structure) and in a relatively stable area free from influences that may impact cross section (such as debris jams, floodplain obstructions such as fill/roads/etc.). Additional bankfull widths should be measured so that a total of three (with 5 preferred) are collected upstream of the crossing. The second bankfull width measurement should be collected 1/2 bankfull width upstream of the first measurement. Continue spacing the width measurements 1/2 bankfull width upstream of the first measurement.

required

A. Avg. Referenced Bankfull width _____ ft

B. Existing structure width _____ ft

optional

C. Structure / Bankfull ratio _____ % Structure width divided by average bankfull width. (Line B divided by line A)

D. Max downstream pool width _____ ft Width of widest spot on plunge pool (if applicable).

E. Max downstream pool depth _____ ft Depth of water in plunge pool at typical flow (if applicable).

F. Vertical Drop at outlet _____ in Drop or "waterfall" from structure outlet to water level in plunge pool at typical flow.

Existing Conditions: qualitative assessment

G. Stream Bank Erosion	upstream	none	slight	moderate	high	severe
Erosion of banks immediately upstream and downstream of structure						severe
H. Stream Bed						severe
Evidence of headcut formation in plunge pool						severe
J. Stream Bed						severe
Evidence of gravel bar formation	downstream	none	slight	moderate	high	severe
K. Bank Armoring		unknown	none	intact	failing	

Eligibility for Crossing Structural Replacement with Program Funds

Is the existing structure a stream crossing? _____ YES-Eligible

Are there signs of streambank erosion? Is stream bank erosion present (line G above)? _____ YES _____ NO

Are there signs of streambed erosion/aggradation? Is streambed erosion/aggradation present (line H&J above)? _____ YES _____ NO

Is the stream crossing eligible for replacement with Program funds? YES NO

Site Info

Site Evaluation: width considerations

Site Evaluation: erosion considerations

Eligibility Determination

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Existing Conditions: quantitative assessment

Measuring Bankfull Channel Width: Begin first measurement, outside the area of influence of the structure (preferably upstream and at least 5 bankfull widths away from structure) and in a relatively stable area free from influences that may impact cross section (such as debris jams, floodplain obstructions such as fill/roads/etc.). Additional bankfull widths should be measured so that a total of three (with 5 preferred) are collected upstream of the crossing. The second bankfull width measurement should be collected ½ bankfull width upstream of the first measurement. Continue spacing the width measurements ½ bankfull width upstream of the previous measurement until the total number (3 or 5) is collected. Take preceding measurements and average together.

required

Bankfull width measurements: 1) _____ ft 2) _____ ft 3) _____ ft 4) _____ ft 5) _____ ft

A. Avg. Reference bankfull width _____ ft If it is impossible to obtain reference bankfull widths upstream of the structure, downstream widths can be used if they are taken out of the structure influence area.

B. Existing structure width _____ ft Width of structure at narrowest point. Add structure widths for multiple baseflow openings (not including any elevated floodplain pipes).

optional

C. Structure / Bankfull ratio _____ % Structure width divided by average bankfull width. (Line B divided by line A)

D. Max downstream pool width _____ ft Width of widest spot on plunge pool (if applicable).

E. Max downstream pool depth _____ ft Depth of water in plunge pool at typical flow (if applicable).

F. Vertical Drop at outlet _____ in Drop or “waterfall” from structure outlet to water level in plunge pool at typical flow.

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Existing Conditions: quantitative assessment

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Bankfull width measurements: 1) 18 ft 2) 19 ft 3) 19.5 ft 4) 17 ft 5) 16.5 ft

A. Avg. Reference bankfull width 18 ft If it is impossible to obtain reference bankfull widths upstream of the structure, downstream widths can be used if they are taken out of the structure influence area.

B. Existing structure width _____ ft Width of structure at narrowest point. Add structure widths for multiple baseflow openings (not including any elevated floodplain pipes).

C. Structure / Bankfull ratio _____ % Structure width divided by average bankfull width. (Line B divided by line A)

D. Max downstream pool width _____ ft Width of widest spot on plunge pool (if applicable).

E. Max downstream pool depth _____ ft Depth of water in plunge pool at typical flow (if applicable).

F. Vertical Drop at outlet _____ in Drop or “waterfall” from structure outlet to water level in plunge pool at typical flow.

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Existing Conditions: quantitative assessment

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required

Bankfull width measurements: 1) 18 ft 2) 19 ft 3) 19.5 ft 4) 17 ft 5) 16.5 ft

A. Avg. Reference bankfull width 18 ft If it is impossible to obtain reference bankfull widths upstream of the structure, downstream widths can be used if they are taken out of the structure influence area.

B. Existing structure width 6 ft Width of structure at narrowest point. Add structure widths for multiple baseflow openings (not including any elevated floodplain pipes).

optional

C. Structure / Bankfull ratio 33 % Structure width divided by average bankfull width. (Line B divided by line A)

D. Max downstream pool width 24 ft Width of widest spot on plunge pool (if applicable).

E. Max downstream pool depth 6 ft Depth of water in plunge pool at typical flow (if applicable).

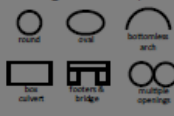
F. Vertical Drop at outlet 12 in Drop or "waterfall" from structure outlet to water level in plunge pool at typical flow.

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Stream Crossing Evaluation Form

PA Dirt Gravel and Low Volume Road Program—Stream Crossing Evaluation Form

Reviewer Information: _____
Site Information: _____
 Date: _____ County _____ Township _____
 Reviewer: _____ Road Owning Entity _____
 Entity: _____ Structure Owning Entity _____

Existing Structure (circle):

 Road Name _____
 Stream Name _____ (tributary to _____)
 Latitude _____ N Longitude _____ W
 Site notes: _____

Existing Conditions: quantitative assessment

Measuring Bankfull Channel Width: Begin first measurement, outside the area of influence of the structure (preferably upstream and at least 5 bankfull widths away from structure) and in a relatively stable area free from influences that may impact cross section (such as debris jams, floodplain obstructions such as fill/roads/etc.). Additional bankfull widths should be measured so that a total of three (with 5 preferred) are collected upstream of the crossing. The second bankfull width measurement should be collected 1/2 bankfull width upstream of the first measurement. Continue spacing the width measurements 1/2 bankfull width upstream of the first measurement.

required

A. Bankfull width _____ ft
 B. Avg. Reference width _____ ft
 C. Existing structure width _____ ft
 D. Structure / Bankfull ratio _____ % Structure width divided by average bankfull width. (Line B divided by line A)
 E. Max downstream pool width _____ ft Width of widest spot on plunge pool (if applicable).
 F. Max downstream pool depth _____ ft Depth of water in plunge pool at typical flow (if applicable).
 F. Vertical Drop at outlet _____ in Drop or "waterfall" from structure outlet to water level in plunge pool at typical flow.

optional

Existing Conditions: qualitative assessment

G. Stream Bank Erosion	upstream	none	slight	moderate	high	severe
Erosion of banks immediately upstream and downstream of structure						severe
H. Stream Bed						severe
Evidence of headcut formation in plunge pool						severe
J. Stream Bed						severe
Evidence of gravel bar formation	downstream	none	slight	moderate	high	severe
K. Bank Armoring		unknown	none	intact	failing	

Eligibility for Crossing Structural Replacement with Program Funds

Is the existing structure eligible for replacement with Program funds? YES-Eligible _____ %

Are there any signs of streambank erosion. Is streambank erosion present (line G above)? YES NO

Are there any signs of streambed erosion/aggradation. Is streambed erosion/aggradation present (line H&J above)? YES NO

Is the stream crossing eligible for replacement with Program funds? YES NO

Site Info

Site Evaluation: width considerations

Site Evaluation: erosion considerations

Eligibility Determination

Audio also available via phone: 866-823-7699
 For assistance, call: 814-865-5355

Existing Conditions: qualitative assessment

G. Stream Bank Erosion Erosion of banks immediately upstream and downstream of structure	upstream	none	slight	moderate	high	severe
	downstream	none	slight	moderate	high	severe
H. Stream Bed Erosion Evidence of head-cutting at inlet or plunge pool scour at outlet	upstream	none	slight	moderate	high	severe
	downstream	none	slight	moderate	high	severe
J. Stream Bed Deposition Evidence of gavel bar formation	upstream	none	slight	moderate	high	severe
	downstream	none	slight	moderate	high	severe
K. Bank Armoring		unknown	none	intact	failing	

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Existing Conditions: qualitative assessment

G. Stream Bank Erosion Erosion of banks immediately upstream and downstream of structure	upstream	none	slight	moderate	high	severe
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H. Stream Bed Erosion Evidence of head-cutting at inlet or plunge pool scour at outlet	upstream	none	slight	moderate	high	severe
	downstream	none	slight	moderate	high	severe
J. Stream Bed Deposition Evidence of gavel bar formation	upstream	none	slight	moderate	high	severe
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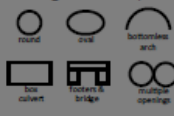
Stream Crossing Evaluation Form

PA Dirt Gravel and Low Volume Road Program—Stream Crossing Evaluation Form

Reviewer Information: _____
 Date: _____
 Reviewer: _____
 Entity: _____

Site Information

County _____ Township _____
 Road Owning Entity _____
 Structure Owning Entity _____
 Road Name _____
 Stream Name _____
 Latitude _____ N Longitude _____ W
 Site notes: _____

Existing Structure (circle):


Other: (describe/draw) _____

Existing Conditions: quantitative assessment

required

Measuring Bankfull Channel Width: Begin first measurement, outside the area of influence of the structure (preferably upstream and at least 5 bankfull widths away from structure) and in a relatively stable area free from influences that may impact cross section (such as debris jams, floodplain obstructions such as fill/roads/etc.). Additional bankfull widths should be measured so that a total of three (with 5 preferred) are collected upstream of the crossing. The second bankfull width measurement should be collected 1/2 bankfull width upstream of the first measurement. Continue spacing the width measurements 1/2 bankfull width upstream of the first measurement.

Bankfull width _____ ft

A. Avg. Reference width _____ ft

B. Existing structure width _____ ft

C. Structure / Bankfull ratio _____ % Structure width divided by average bankfull width. (Line B divided by line A)

optional

D. Max downstream pool width _____ ft Width of widest spot on plunge pool (if applicable).

E. Max downstream pool depth _____ ft Depth of water in plunge pool at typical flow (if applicable).

F. Vertical Drop at outlet _____ in Drop or "waterfall" from structure outlet to water level in plunge pool at typical flow.

Existing Conditions: qualitative assessment

G. Stream Bank Erosion	upstream	none	slight	moderate	high	severe
Erosion of banks immediately upstream and downstream of structure						severe
H. Stream Bed						severe
Evidence of headcut or plunge pool formation						severe
J. Stream Bed						severe
Evidence of gravel bar formation	downstream	none	slight	moderate	high	severe
K. Bank Armoring		unknown	none	intact	failing	

Eligibility for Crossing Structural Replacement with Program Funds

Is the existing structure a stream crossing? _____ YES-Eligible

Is the existing structure a stream crossing? _____ %

Are there signs of streambank erosion? Is streambank erosion present (line G above)? YES NO

Are there signs of streambed erosion/aggradation? Is streambed erosion/aggradation present (line H&J above)? YES NO

Is the stream crossing eligible for replacement with Program funds? YES NO

Site Info

Site Evaluation: width considerations

Site Evaluation: erosion considerations

Eligibility Determination

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 For assistance, call: 814-865-5355

Eligibility for Crossing Structural Replacement with Program Funds

Is the existing structure opening is equal to or less than 7 square feet (equivalent to a 36" diameter round pipe): **NO-see below** YES-Eligible

For larger structures, the all three criteria below must be met in order to be eligible for replacement with Program funds:

Existing structure to bankfull width ratio of 50% or less. What is the existing structure to bankfull ration (line C above): **33** %

Show signs of streambank erosion. Is stream bank erosion present (line G above): **YES** NO

Show signs of streambed erosion/aggradation. Is streambed erosion/aggradation present (line H&J above): **YES** NO

Is this stream crossing eligible for replacement with Program funds? **YES** NO

Program Funds

(equivalent to a 36" diameter round pipe): **NO-see below** YES-Eligible

be eligible for replacement with Program funds:

Existing structure to bankfull ration (line C above): **33** %

Show signs of streambank erosion (line G above): **YES** NO

Show signs of streambed erosion/aggradation present (line H&J above): **YES** NO

Is? **YES** NO

3 More Examples:

Eligibility for Crossing Structural Replacement with Program Funds

Is the existing structure opening is equal to or less than 7 square feet (*equivalent to a 36" diameter round pipe*): **NO-see below** **YES-Eligible**

For larger structures, the all three criteria below must be met in order to be eligible for replacement with Program funds:

Existing structure to bankfull width ratio of 50% or less. What is the existing structure to bankfull ration (line C above): _____%

Show signs of streambank erosion. Is stream bank erosion present (line G above): **YES** **NO**

Show signs of streambed erosion/aggradation. Is streambed erosion/aggradation present (line H&J above): **YES** **NO**

Is this stream crossing eligible for replacement with Program funds? **YES** **NO**

EXAMPLE 1:

- Bankfull Width = **6.5 feet**
- Existing Structure width = **4 feet**
- Bank Erosion = **slight**
- Bed Erosion = **moderate**

Eligibility for Crossing Structural Replacement with Program Funds

Is the existing structure opening is equal to or less than 7 square feet (equivalent to a 36" diameter round pipe): **NO-see below** **YES-Eligible**

For larger structures, the all three criteria below must be met in order to be eligible for replacement with Program funds:

Existing structure to bankfull width ratio of 50% or less. What is the existing structure to bankfull ration (line C above): _____%

Show signs of streambank erosion. Is stream bank erosion present (line G above): **YES** **NO**

Show signs of streambed erosion/aggradation. Is streambed erosion/aggradation present (line H&J above): **YES** **NO**

Is this stream crossing eligible for replacement with Program funds? **YES** **NO**

EXAMPLE 1:

- Bankfull Width = **6.5 feet**
- Existing Structure width = **4 feet**
- Bank Erosion = **slight**
- Bed Erosion = **moderate**

$$4/6.5 = 62\%$$

NO

Eligibility for Crossing Structural Replacement with Program Funds

Is the existing structure opening is equal to or less than 7 square feet (equivalent to a 36" diameter round pipe): **NO-see below** YES-Eligible

For larger structures, the all three criteria below must be met in order to be eligible for replacement with Program funds:

Existing structure to bankfull width ratio of 50% or less. What is the existing structure to bankfull ration (line C above): **62** %

Show signs of streambank erosion. Is stream bank erosion present (line G above): **YES** NO

Show signs of streambed erosion/aggradation. Is streambed erosion/aggradation present (line H&J above): **YES** NO

Is this stream crossing eligible for replacement with Program funds? YES **NO**

EXAMPLE 2:

- Bankfull Width = **5 feet**
- Existing Structure width = **3 feet**
- Bank Erosion = **slight**
- Bed Erosion = **slight**

Eligibility for Crossing Structural Replacement with Program Funds

Is the existing structure opening is equal to or less than 7 square feet (equivalent to a 36" diameter round pipe): **NO-see below** **YES-Eligible**

For larger structures, the all three criteria below must be met in order to be eligible for replacement with Program funds:

Existing structure to bankfull width ratio of 50% or less. What is the existing structure to bankfull ration (line C above): _____%

Show signs of streambank erosion. Is stream bank erosion present (line G above): **YES** **NO**

Show signs of streambed erosion/aggradation. Is streambed erosion/aggradation present (line H&J above): **YES** **NO**

Is this stream crossing eligible for replacement with Program funds? **YES** **NO**

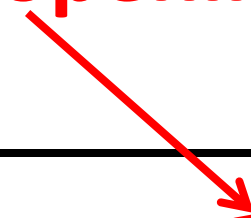
EXAMPLE 2:

- Bankfull Width = **5 feet**
- Existing Structure width = **3 feet**
- Bank Erosion = **slight**
- Bed Erosion = **slight**

~~$3/5 = 60\%$~~

YES

New structure must have 5' opening



Eligibility for Crossing Structural Replacement with Program Funds

Is the existing structure opening is equal to or less than 7 square feet (equivalent to a 36" diameter round pipe): **NO-see below** **YES-Eligible**

~~For larger structures, the all three criteria below must be met in order to be eligible for replacement with Program funds:~~

~~Existing structure to bankfull width ratio of 50% or less. What is the existing structure to bankfull ration (line C above): _____ %~~

~~Show signs of streambank erosion. Is stream bank erosion present (line G above):~~ YES NO

~~Show signs of streambed erosion/aggradation. Is streambed erosion/aggradation present (line H&J above):~~ YES NO

Is this stream crossing eligible for replacement with Program funds? **YES** NO

EXAMPLE 3:

- Bankfull Width = **10 feet**
- Existing Structure width = **5 feet**
- Bank Erosion = **severe**
- Bed Erosion = **moderate**

Eligibility for Crossing Structural Replacement with Program Funds

Is the existing structure opening is equal to or less than 7 square feet (equivalent to a 36" diameter round pipe): **NO-see below** **YES-Eligible**

For larger structures, the all three criteria below must be met in order to be eligible for replacement with Program funds:

Existing structure to bankfull width ratio of 50% or less. What is the existing structure to bankfull ration (line C above): _____%

Show signs of streambank erosion. Is stream bank erosion present (line G above): **YES** **NO**

Show signs of streambed erosion/aggradation. Is streambed erosion/aggradation present (line H&J above): **YES** **NO**

Is this stream crossing eligible for replacement with Program funds? **YES** **NO**

EXAMPLE 3:

- Bankfull Width = **10 feet**
- Existing Structure width = **5 feet**
- Bank Erosion = **severe**
- Bed Erosion = **moderate**

$$5/10 = 50\%$$

YES

New structure must have 10' opening

Eligibility for Crossing Structural Replacement with Program Funds

Is the existing structure opening is equal to or less than 7 square feet (equivalent to a 36" diameter round pipe): **NO-see below** YES-Eligible

For larger structures, the all three criteria below must be met in order to be eligible for replacement with Program funds:

Existing structure to bankfull width ratio of 50% or less. What is the existing structure to bankfull ration (line C above): **50** %

Show signs of streambank erosion. Is stream bank erosion present (line G above): **YES** NO

Show signs of streambed erosion/aggradation. Is streambed erosion/aggradation present (line H&J above): **YES** NO

Is this stream crossing eligible for replacement with Program funds? **YES** NO



- Background & Purpose
- Policy Overview
- Impacts of undersized crossings
- Bankfull
- Policy Details
- Evaluation Form
- **Summary**

Summary:

- Existing structures less than 3' opening can be replaced.
- Larger structure must be undersized at 50% of bankfull or less to be replaced
- All new structures should have openings at 100% bankfull or more.

Summary:

- Note we have no policy on what TYPE of structure you should use, only the opening size.
- Note this policy is for funding structural replacement only. You can always do work around the structure.

Is this policy perfect?

NO!

- **This policy was developed to give you support to avoid becoming a bridge replacement program.**
- **It will likely be re-evaluated and “tweaked” in the future.**

Special Thanks to Jake Tomlinson at Trout Unlimited and Mike Lovegreen with Bradford County for many of the pictures and slides used in this webinar.



Stream crossings **OVER** 7ft² opening (3' diameter)

In order to be eligible for replacement, EXISTING structures must:

1. Have a structure to bankfull width ratio of 50% or less.
2. Show signs of streambank erosion.
3. Show signs of streambed erosion/aggradation.

The NEW REPLACEMENT structure must (*all four*):

1. Have a structure width at least equal to bankfull width (**100% ratio**).
2. Be properly aligned with the channel.
3. Consider additional floodplain connectivity when possible.
4. Be designed and constructed to accommodate the passage of aquatic organisms through the structure.