

Dirt Gravel and Low
Volume Road Program

Stream Crossing Program Updates

12/13/21



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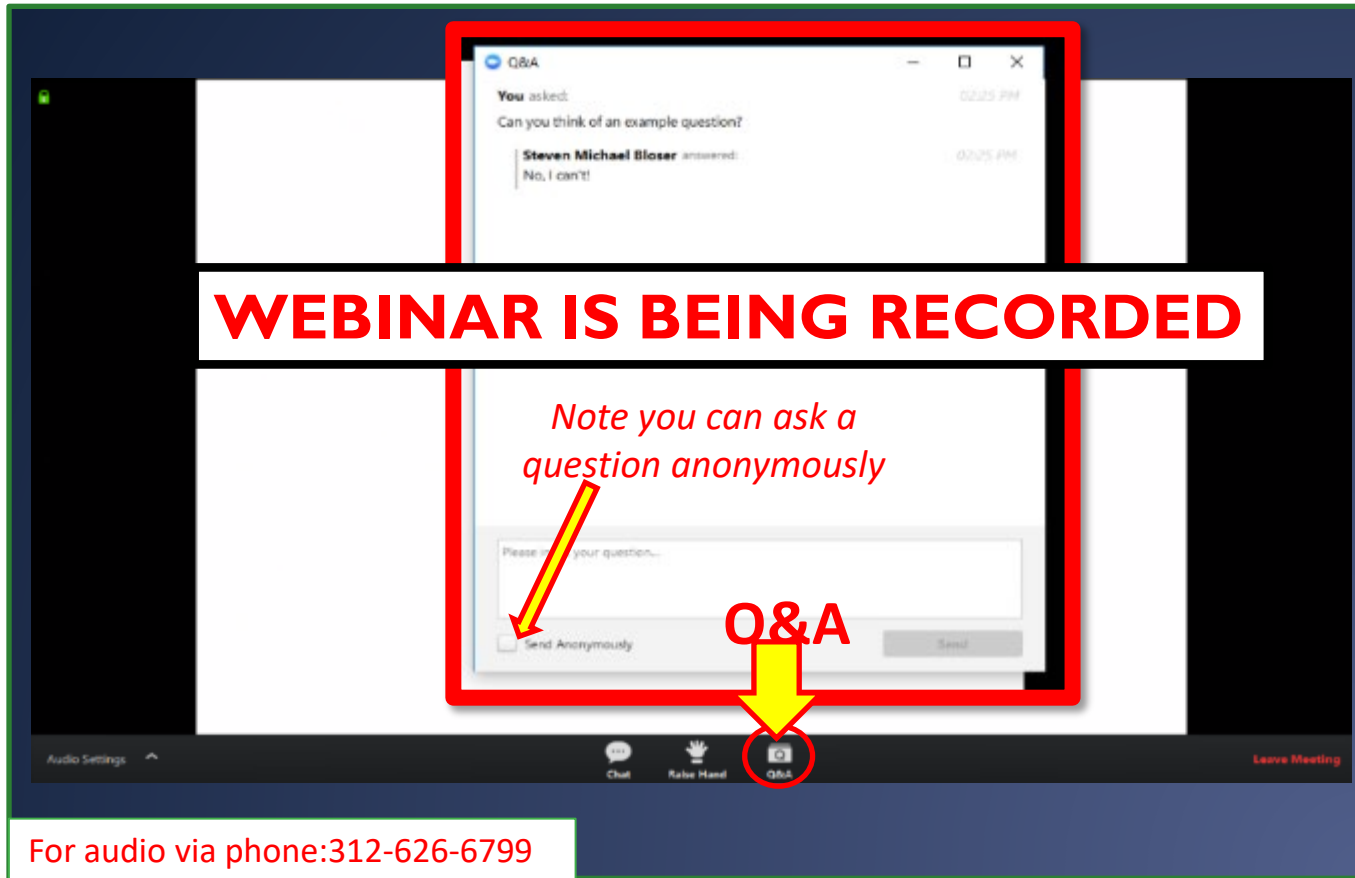
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The image shows a screenshot of a webinar interface. A red-bordered window titled "Q&A" is open, displaying a question and answer. The question is "Can you think of an example question?" and the answer is "No, I can't!". Below this, there is a text input field with the placeholder "Please enter your question...". A red arrow points from the text "Note you can ask a question anonymously" to a checkbox labeled "Send Anonymously". A yellow arrow points from the text "Q&A" to the "Q&A" icon in the bottom toolbar. The bottom toolbar also includes "Audio Settings", "Chat", "Raise Hand", and "Leave Meeting".

WEBINAR IS BEING RECORDED

Note you can ask a question anonymously

Q&A

For audio via phone:312-626-6799

Stream Crossing Program Update

12/13/21



- **DGLVR Stream Documents Available for Review**
- Why Make Changes?
- Impacts of Undersized Stream Crossings
- Designing Better Stream Crossings
- Draft DGLVR Stream Crossing Documents
 - Design & Installation Standard
 - Policy Changes
 - Stream Crossing Technical Manual
- Document Review Instructions & Timeline
- Training Curriculum In Development

Conservation Districts,

RE: DGLVR Stream Documents Available for Review

As you are probably aware, the SCC and Center have been working extensively this summer and fall on updated stream crossing replacement policy and guidance. The documents have gone through several reviews by DGLVR advisory workgroups that include staff from 15 conservation districts as well as representatives from cooperating agencies such as TU, PAFBC, and more. We are pleased to announce that the documents are ready to be reviewed by Conservation Districts and other external cooperating agencies starting today through **January 31, 2022**. See below for details, and don't forget to join the webinar Monday morning (12/13 @9am) for an overview of the documents and review process (<https://psu.zoom.us/j/95894532275>)

Overview of Documents for Available for Review: All documents are DRAFT and have NOT been approved by the SCC.

- **DGLVR Stream Crossing POLICY (Update):** This is an update that will replace section 7.1 of the DGLVR Administrative Manual. In addition to outlining project eligibility (which has not changed) and additional CD responsibilities, it also requires the use of the Standard (next bullet) for DGLVR funded stream crossings, and formalizes the exemption process for small streams or difficult situations where continuity or AOP may not be feasible. (total 5 pages)
- **DGLVR Stream Crossing Design and Installation STANDARD (NEW):** The updated policy requires the use of this standard for DGLVR funded stream crossing replacements. The standard is designed to detail the "nuts and bolts" requirements for engineers to be able to design and implement more effective stream crossings. (total 6 pages)
- **DGLVR Stream Crossing Replacement Technical MANUAL (NEW):** The technical manual contains the background and detailed guidance on DGLVR stream crossing replacements. Most of the manual, chapters 1 through 11, is written with the conservation district audience in mind, although other entities are welcome to use it. Chapter 12 is written with the design engineer in mind and attempts to expand on and explain components of the Standard. Please note that we tried not to "hide" policy or requirements in the manual, in other words, if the manual says "must", then that same "must" should appear in the policy or standard. (total 74 pages plus appendices). The manual also includes a host of appendices including a handful of checklists and 5 technical bulletins.

Review Procedures:

- All of the documents now are available for review on the Center's website at: <https://www.dirtandgravel.psu.edu/dglm-stream-crossing-document-review-website>
- Documents are in PDF format with line numbers for commenting/review.
- Please use the comment forms on the website if possible, as it will make sorting and addressing comments easier.

Moving Forward:

- The documents will be available for review through **January 31, 2022**.
- SCC and Center will review comments, make edits, and likely meet with advisory workgroups again in February 2022
- The final versions of the documents will need to go through legal and policy review at the Commission in February/March.
- Any final edits will need to be made to the documents.
- The earliest possible date for any SCC action on the document would be May 2022. The timeline for effectiveness or implementation of the new policy is still to be determined, but it will only apply to new projects contracted after the new policy becomes effective.
- In the meantime, we are working internally and with an advisory workgroup on developing some more robust **Stream Crossing Trainings** to begin in 2022, more details on that to follow.

Please don't hesitate to contact myself or Roy Richardson at the State Conservation Commission (rkrichardson@psu.gov) if you have questions or want to discuss specific topics during this review time period. Happy holiday reading!

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- Draft documents emailed 12/10/2021
- Collaborative effort between CDGRS, TU and the SCC to write documents
- Initial review completed by
 - Policy & Planning Workgroup
 - Education & Outreach Workgroup
 - Partner Agencies – TU, PA F&B
- Preliminary overview presented to SCC at November meeting
- **DOCUMENTS HAVE NOT BEEN APPROVED BY THE SCC**
 - Public comment due by January 31, 2022

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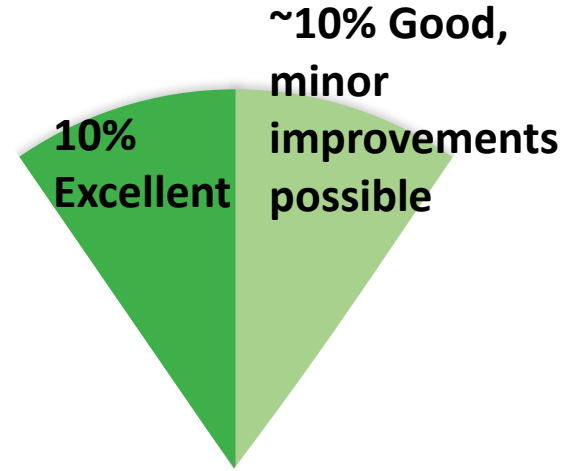
Why Make Changes?

Approximate breakdown of the stream crossings the SCC & CDGRS are seeing in the field.



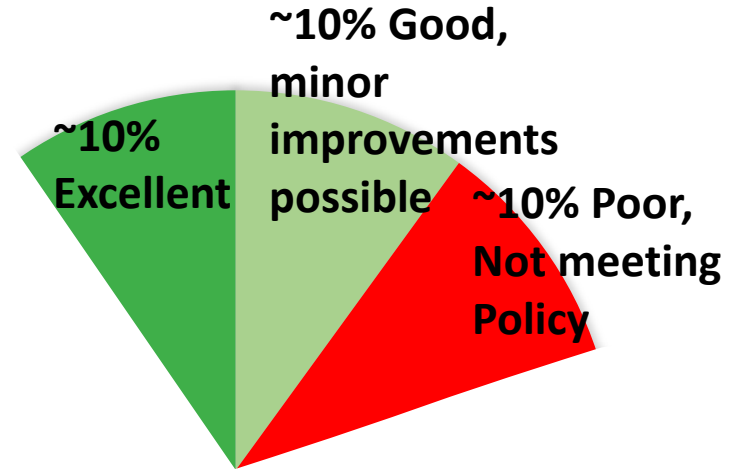
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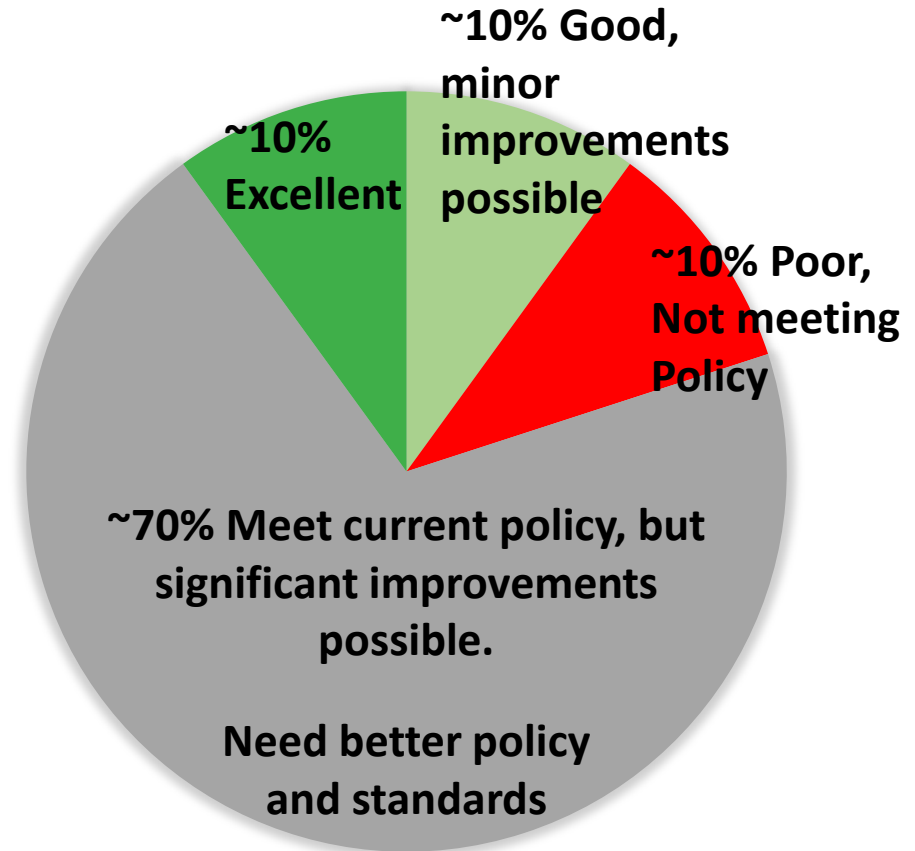
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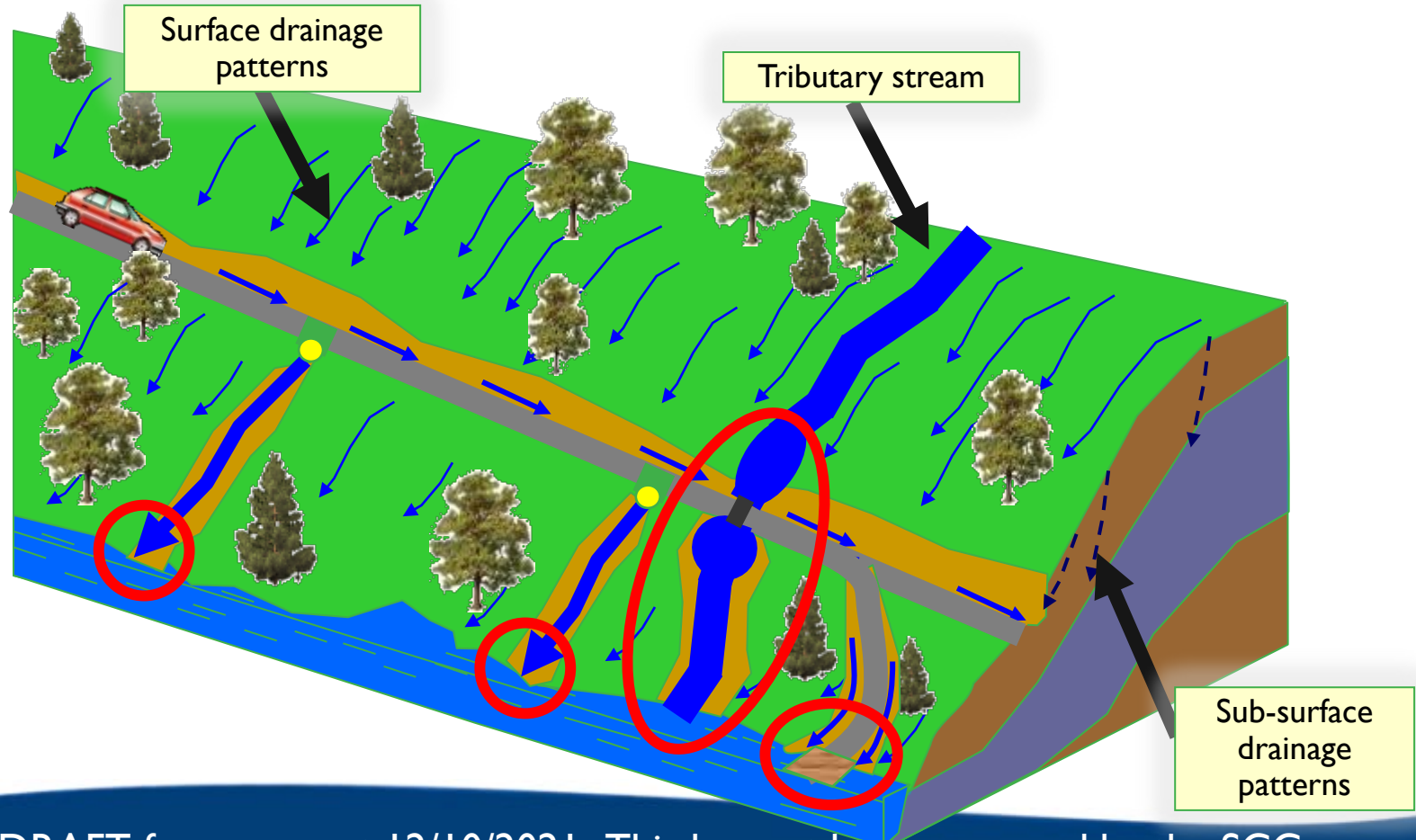


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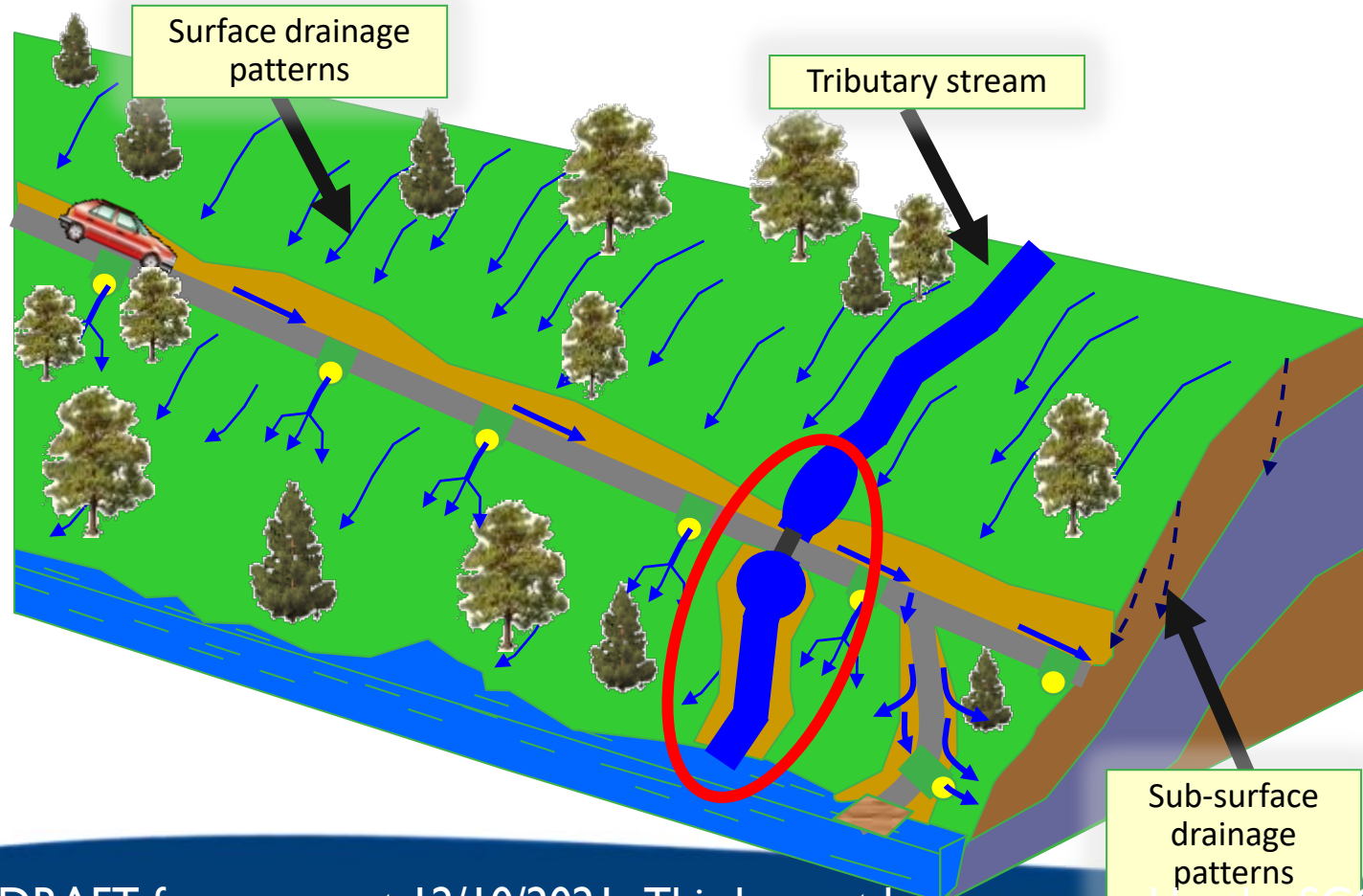


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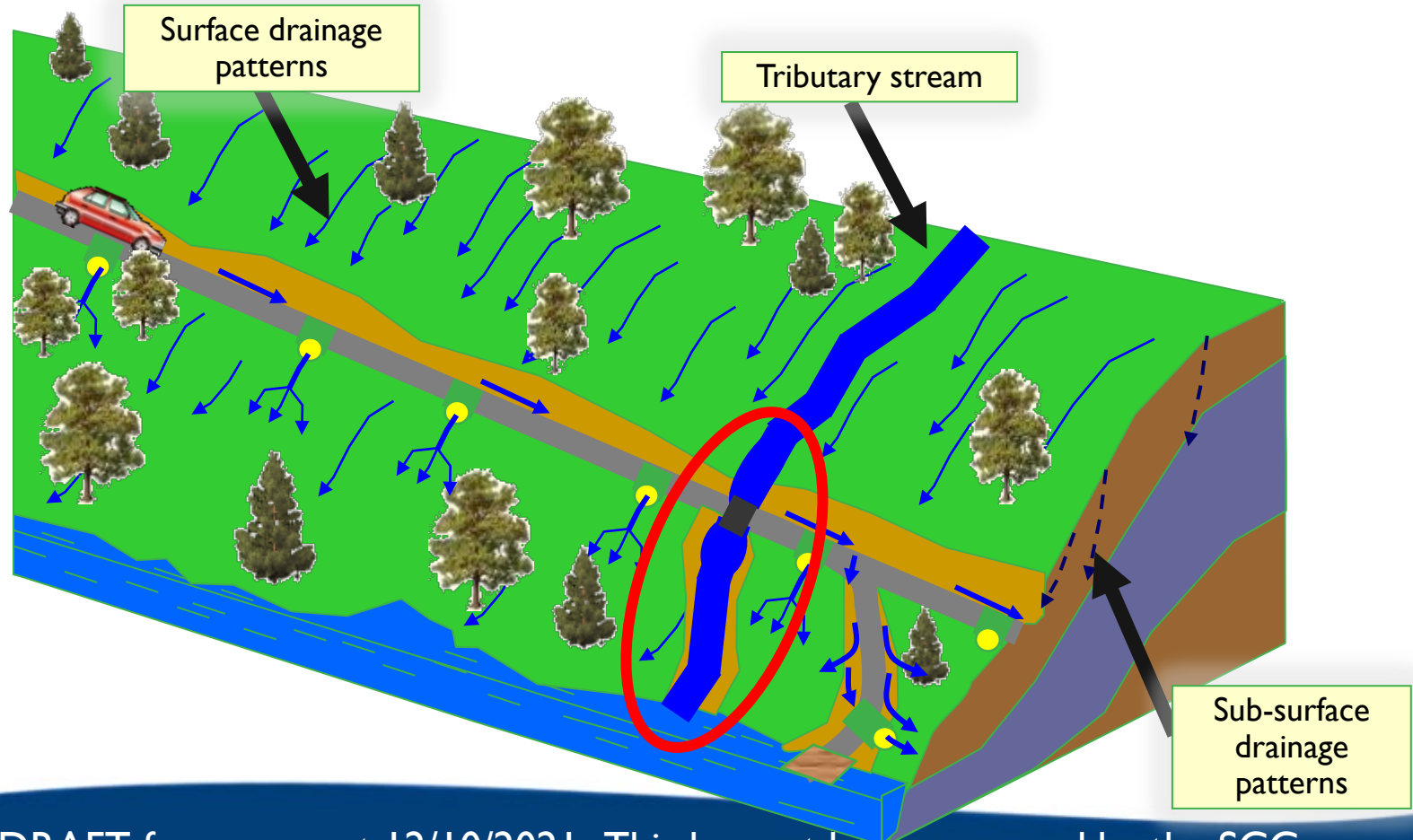
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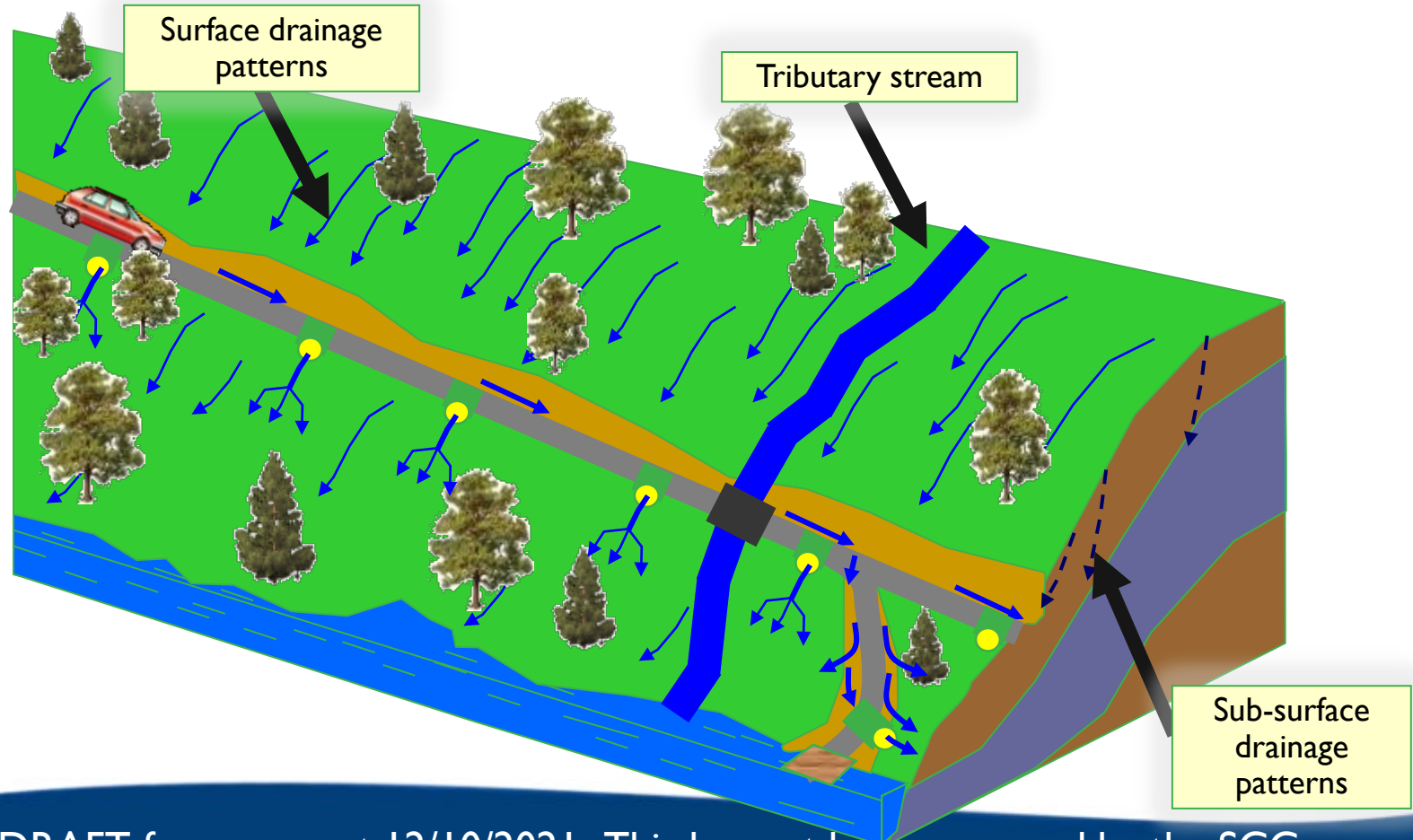
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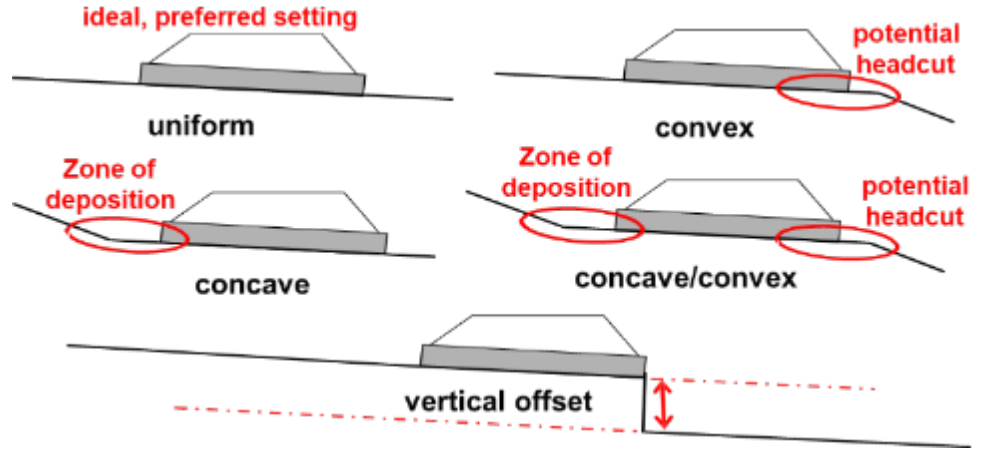
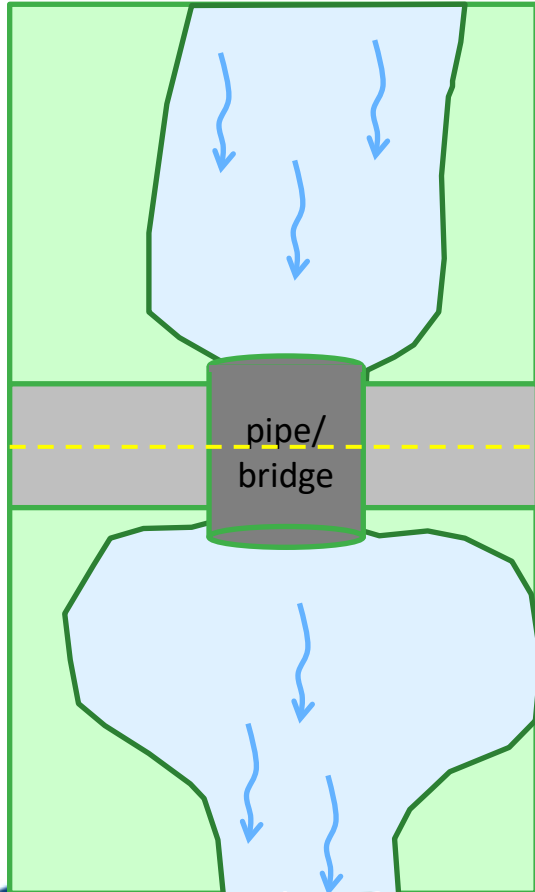
Stream Crossing Program Update

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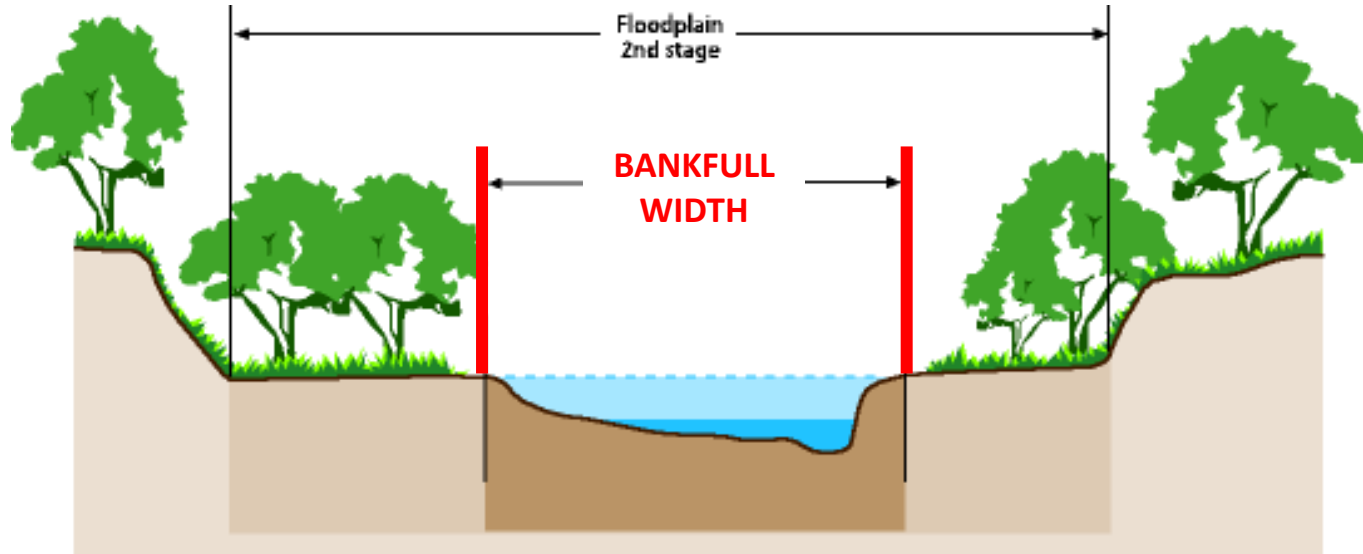


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Impacts of Undersized Crossings

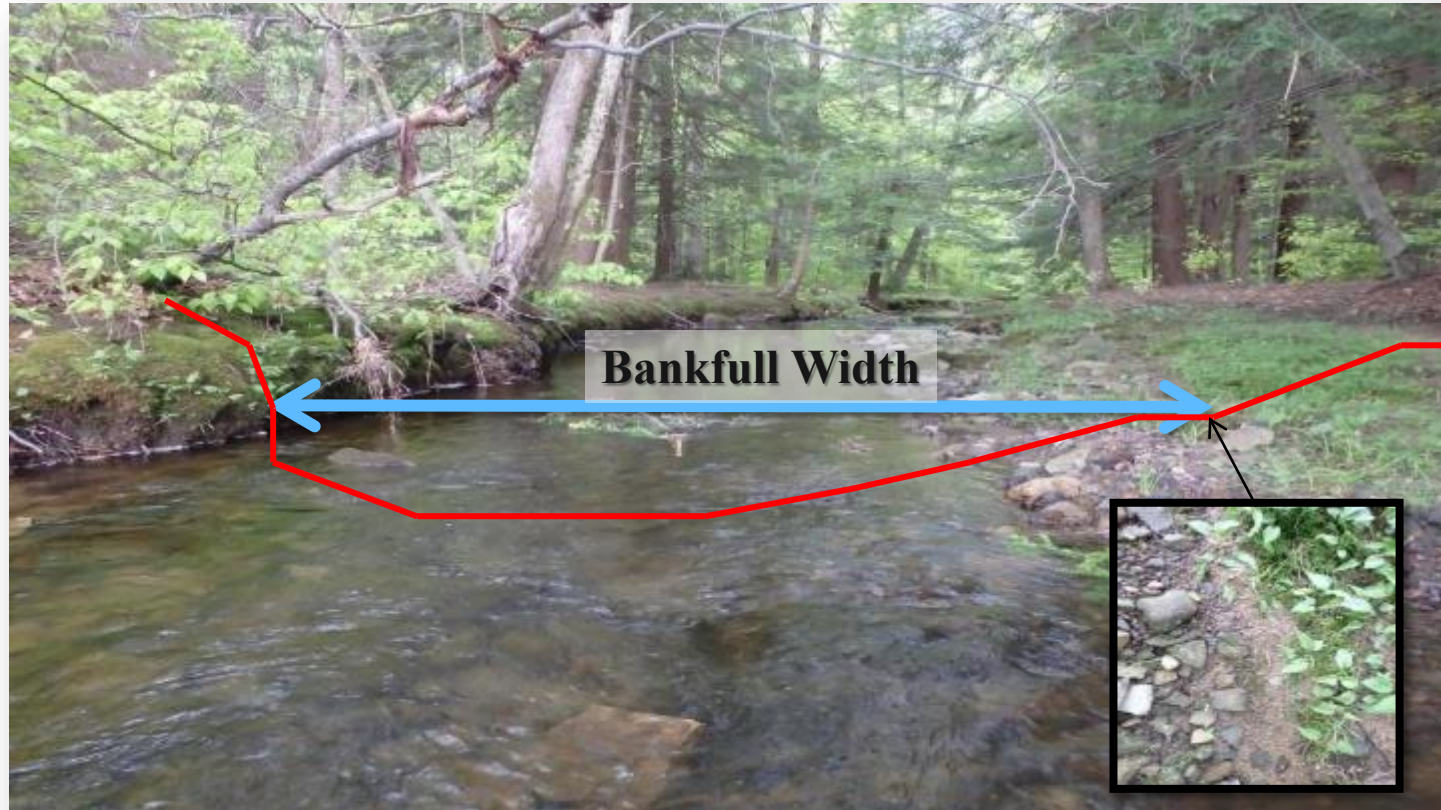


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Bankfull elevation: Point where water fills the channel just before accessing floodplain

Bankfull width: Width of channel at bankfull elevation.



- **New Replacement Structures:**

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



Impacts of Undersized Crossings



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Impacts of Undersized Crossings



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Limiting changes to road grade / approach may inhibit better structures.

- Structure height limited due to existing road grade.
- New structure is better but:
- Difficulty installing bed substrate,
- Difficult to maintain
- Cannot pass woody debris & large gravel loads



Impacts of Undersized Crossings

Existing hydraulic
control (riffle crest)

Riffle crest
(hydraulic control)
at time of
construction ?



Impacts of Undersized Crossings

BEFORE



Impacts of Undersized Crossings



DRAFT for comment 12/10/2021. This has not been approved by the SCC.

Impacts of Undersized Crossings



11' squash pipe
purchased to
accommodate bankfull



On excavation of 5' pipe, old
bridge abutments found that
were 11 feet apart!

Impacts of Undersized Crossings



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Stream Crossing Program Update

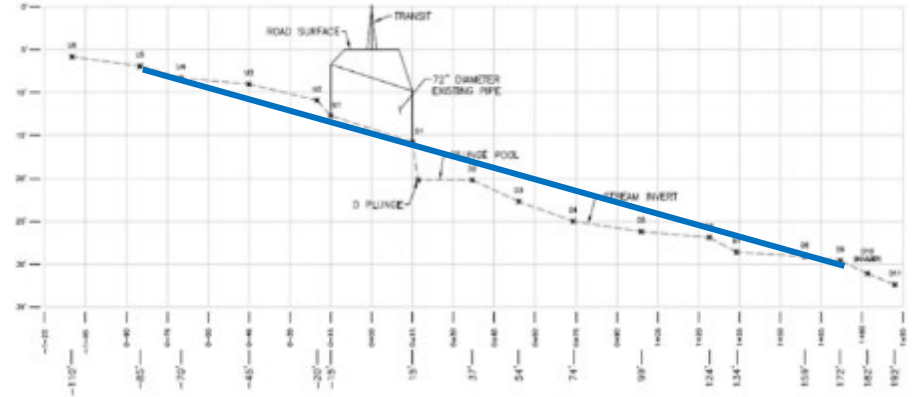
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• Continuity is the Key

- “Re-establish and maintain geomorphic continuity through the road/stream crossing”
 - Slope
 - Width
 - Cross-sectional dimensions
 - Thalweg (low-flow channel)
 - Bank margins
 - Bedform
 - Grade controls (riffles, steps, clusters, cascades)
 - Planform
 - Reconnection – means going beyond the footprint of the crossing





- Bridging the gap between disconnected stream segments
- Stream restoration is the critical piece
- Upstream & downstream are essential



- The stream provides the basis for design (reference reach)
 - Assessment (survey longitudinal profile and cross-sections)
 - What's broken? (offset or disconnect)
 - How to reconnect? (the 'reconstructed reach')
 - What does the reconstructed reach look like? (reference data)
 - Project estimates
 - Minimum structure size
 - Roadway adjustments?
- Design
 - Apply reference data
 - Finalize replacement structure
 - Develop concise Construction Documents



Stream Crossing Program Update

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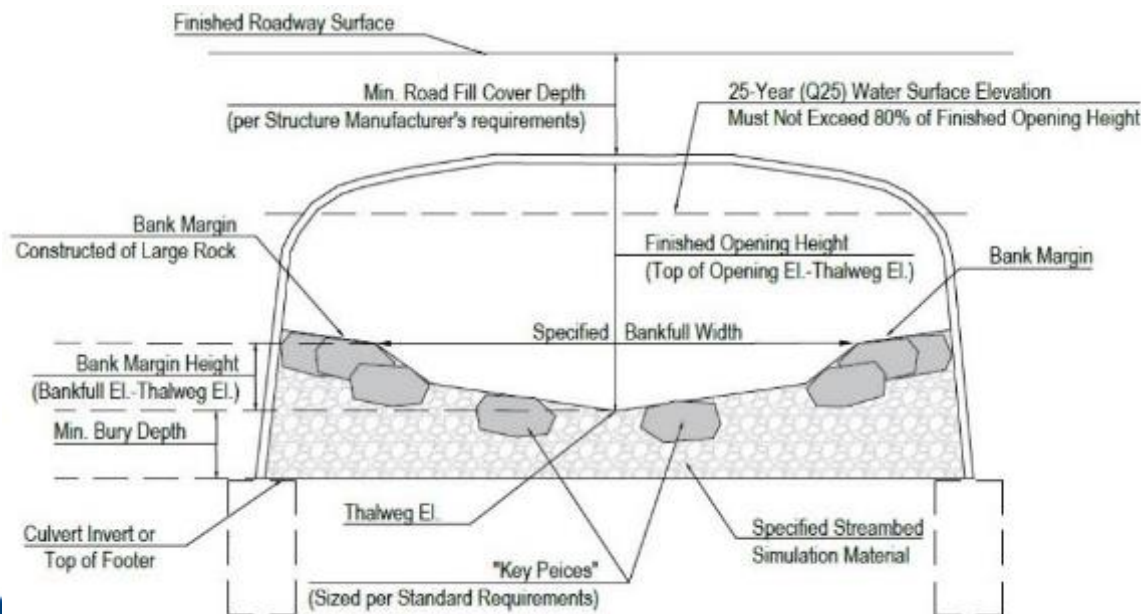
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- **Purpose and Goal**
 - More detailed guidance on the objectives to be met and how to meet them
 - Reduced maintenance
 - Flood resiliency
 - Stream stability (less erosion and sedimentation)
 - Longevity
 - More stream-centric project designs and installations (continuity)
 - More clarity and completeness in construction documents
 - More engineering involvement through the process
 - The Design Standard is the project “Rulebook”
 - How to apply policy at a project-specific scale

- **Stream Channel Considerations**
 - Longitudinal profile and cross-section surveys are required
 - Early in the process to inform project design
 - Specified type and spacing of grade control features
 - Stream reconstruction to reconnect upstream and downstream
 - Extending beyond the impact area of the undersized structure
 - Specified number, type and spacing of grade control structures
 - Specified minimum rock sizing for stable grade controls, “key pieces”, and bank margins
 - Well-defined low-flow channel and bank margins (channel cross-section)

• Structure Considerations

- Specified minimum bury depth
- Requirement for bottomless structures at Continuity Slope $>4\%$ or $>20'$ width
- Starting at 1.25x (125%) bankfull minimum width requirement (at bankfull elevation)
- “80% Rule”
 - 25-year flow elevation cannot exceed 80% of Finished Opening Height



- **Construction plans and specifications**
 - Existing site conditions and key features
 - Stream location and bankfull width.
 - Structure dimensions and critical elevations
 - Details for stream bed re-construction (profile, cross-section, extent)
 - Specified minimum material sizes (grade control, bank margins, etc.)
 - Specified streambed material and compaction method
 - Structure manufacturer's details / specifications.
 - Utilities and notification requirements (PA One Call).
 - Survey benchmarks.
 - Approved Erosion and Sedimentation Control Plan (including dewatering plan)
 - Additional site-specific requirements, as applicable (utilities, signage, load limits, etc.)

- **Plan Review / Construction / Engineering Inspection**
 - Plans must be submitted to District for review prior to permit application
 - Plan completeness & consistency with Policy / Design Standard
 - District issues review acknowledgement prior to permit application
- **Construction / Engineering Inspection**
 - District to be onsite regularly during construction
 - Ensure Program policy and Design Standards are being met
 - Engineer to inspect critical aspects of construction
 - Engineer to provide certification once project construction is complete
 - Critical aspects of construction were installed per Construction Documents and Design Standard
 - Redline markup to note field changes or deviations

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- Criteria for new structures (Standard)
- Eligibility for replacement with DGLVR Funds
- Where the policy applies/definition of a stream
- Engineering costs
- District requirements
- Exemptions
 - Automatic DGLVR Standard Exemptions
 - SCC Approval for DGLVR Standard Exemptions
 - What DOES need to be done with an exemption

- All stream crossing replacements funded in whole or in part with DGLVR funds, or listed as in-kind on a DGLVR Project, must follow the DGLVR Stream Crossing Replacement Standard (appendix X), unless a “DGLVR Standard Exemption” (see section 7.1.3) is applicable.

PA STATE CONSERVATION COMMISSION
DIRT, GRAVEL AND LOW VOLUME ROAD PROGRAM

STREAM CROSSING DESIGN & INSTALLATION STANDARD

I. DEFINITIONS

- A. **Anticipated Scour Depth:** Depth of expected scour used to determine structure bury depth based on observed maximum pool depth and a factor of safety.
- B. **Aquatic Organism Passage:** Unimpeded movement of aquatic organisms through the road/stream crossing.
- C. **Bankfull Flow:** Flow stage determined by the elevation point at which the stream typically accesses the floodplain. The bankfull flow is also known as the channel-forming or dominant discharge and roughly corresponds to a 1.5-2 year recurrence interval.
- D. **Bank Margin:** Sides of the channel outside of the bankfull channel within the stream crossing structure. Bank margins within structures should tie into existing streambanks outside the structure.
- E. **Bedform:** Typical sequence of streambed features through the project reference reach (riffles/pools, step/pool, etc.)
- F. **Continuity Slope:** The average channel slope measured upstream, through the structure and downstream to the project tie-in points. Slope continuity and channel reconnection is achieved when the reconstructed reach extends far enough to establish relatively consistent channel slopes upstream, through, and downstream of the replacement crossing.
- G. **Cross-Section:** A survey conducted across the channel (perpendicular to the longitudinal

- **Eligibility for Replacement (remains unchanged)**
 - **Small Pipes:** Existing stream crossing structures with an opening width less than or equal to 48" are automatically eligible
 - **Multiple Pipes:** Existing stream crossings consisting of multiple (side-by-side) pipes are automatically eligible for replacement
 - **All Other Structures:** For existing single-opening structures with an opening width over 48", only structures with a structure opening width to bankfull channel width" ratio of 75% or less are eligible for replacement with Program funds.
 - **SCC Notification:** Conservation districts are required to notify the SCC of proposed stream crossing replacements as soon as practical before a contract is signed.

- **Where the DGLVR Stream Crossing Policy Applies (remains unchanged)**
- For Program purposes, the stream crossing policy outlined here applies to situations where streams, including intermittent channels, with identified bed and banks are flowing into the road or the uphill ditch.



- **Policy Limiting Engineering Costs**
- DGLVR Program policy limits engineering costs to 10% of the contracted amount.
- **When grant recipients procure detailed, itemized quotes from 3 or more engineering firms for project design, the cost limit for engineering is increased to 15% of the total contract between the district and the grant recipient.**
 - Quotes must be obtained using the Request for Proposal (RFP) forms provided by the Commission. Where three itemized quotes cannot be obtained, engineering costs are limited to 10% of the contract amount.

- **Education Requirement**

- Effective July 1, 2023, at least one district staff member must have attended the Program’s “Stream Crossing Replacement Training” and received a certification before the QAB can recommend or the district can approve a contract for a project involving a stream crossing. This training requirement does not apply to crossings that qualify for an automatic exemption (see section 7.1.6).

- **Meeting Participation Requirement**
 - **Pre-application:** Meeting with grant applicant (and potentially project engineer) before application submittal
 - **Pre-design:** On-site meeting with grant applicant and project engineer after contracting, and before design and permitting
 - **Bid site showing:** On-site meeting with grant recipient (and potentially project engineer) and potential bidders/contractors for structure installation before bids are due
 - **Pre-construction:** On-site meeting with grant recipient (and potentially project engineer) and contractor prior to starting construction.

- **Stream Crossing Evaluation Form**
 - A “Stream Crossing Evaluation Form” (Attachment E) must be completed by the district and kept in the project file for all stream crossing replacements, even those with DGLVR Standard Exemptions.
- **Off Right-of-Way**
 - Applicants are strongly encouraged to get verbal permission from landowners for off right-of-way work before contracting.
 - Before working outside the right-of-way, the grant recipient must obtain written permission from the landowner(s) in accordance with SCC policy. The District must keep a copy of this approval in the project hard file.
 - If landowner permission is required to achieve stream continuity and meet Program standards, but cannot be obtained, the project cannot be completed.

- **Plan Reviews**
 - The conservation district must review the documents and provide written confirmation to the grant recipient or engineer that those plans and specifications comply with DGLVR policy and standard before they are submitted (or resubmitted) for permit review. The purpose of this review is to verify consistency with DGLVR policies and standards, not to review other aspects of the permit.
- **Bid package review**
 - The conservation district must review the documents and provide written confirmation to the grant recipient or engineer that those bid documents comply with DGLVR policy and standard before they are provided to potential bidders. This purpose of this review is to verify consistency with DGLVR policies and standards. It is up to the grant recipient to comply with applicable bidding requirements.

- **Inspections**
 - Districts must be on-site regularly during construction to ensure program policies and standards are being met.
- **Longitudinal Profile Survey**
 - A longitudinal profile survey must be conducted for each stream crossing prior to the QAB recommending the project for funding.
 - Typically conducted by the conservation district or their designee and is used to support development of cost estimates and the grant application
 - Used by the conservation district to review future surveys and project plans to ensure they meet Program policies and standards.
 - If additional site surveys are done by the design engineer, the district technician is required to be on-site while the survey is being performed by the engineer and/or surveyor to observe and assist with the long-pro survey and ensure all required points are obtained.

- **New crossings**
 - In situations where no current stream crossing exists and a new crossing is to be installed, Program policy must still be followed. The district must contact the SCC for eligibility guidance. This requirement does not apply to sites that receive a DGLVR Standard Exemption (see 7.1.3.1).
 - Examples:
 - Existing fords replaced with a new crossing structure
 - Stream flows into uphill ditch, flows in uphill ditch until it reaches a crossing. New crossing installed where it meets the road.
- **Project Lifecycle Checklist**
 - Districts must complete the “Project Lifecycle Checklist” during the planning and implementation of stream crossing replacements, and the form must be kept in the project file.

- **DGLVR Standard Exemption**
 - Stream crossing replacements vary drastically around the state, and this section on DGLVR Standard Exemptions is designed to provide maximum leeway for the CD and SCC to adapt to unique situations.
 - The “DGLVR Standard Exemptions” discussed in this section only apply to DGLVR requirements, and do not exempt projects from any applicable permit requirements from DEP or other entities.
- **Two Types of Exemption**
 - Automatic Exemption
 - Exemptions with SCC Approval

- **Automatic Standard Exemptions**
- The following existing conditions may be, at the discretion of the Conservation District, considered “DGLVR Standard Exempt” without SCC approval for channels with a bankfull width of 4’ or less and:
 - The defined bed and bank coming to the road does not extend more than 500’ upslope of the road ditch, or,
 - The drainage area of the bed and bank coming to the road is 20 acres or less
- Complete the “Automatic Standard Exemption” form and keep it in project file. Automatic exemptions still need to be reported in the SCC notification system.

- **Exemptions With SCC Approval**
- Circumstances may exist where a conservation district would like to request a DGLVR Standard Exemption from the SCC on a larger stream that does not qualify for an automatic exemption
- These situations must be handled individually, and a signed “SCC standard exemption” form must be obtained from the SCC and kept in the project file.
- Examples of some conditions where a policy exemption may be requested:
 - Small channels that fall outside the automatic exemptions above
 - Existing crossings with minimal or no aquatic habitat value (dry channels, acid streams, etc.)
 - Crossings with extensive outlet drops that would make establishing connectivity impossible or extremely expensive for the amount of habitat improvement it would provide.

- **Requirements for projects granted a DGLVR Standard Exemption (either automatic or SCC)**
- Receiving a “DGLVR Standard Exemption” is not a license to just drop a pipe in and walk away
- Steps should still be taken to ensure stream crossings that receive a DGLVR Standard Exemption will still result in a stable crossing that will not lead to accelerated erosion or other issues.

- **Requirements for projects granted a DGLVR Standard Exemption (either automatic or SCC)**
- Any requirements from local, state and federal laws and all applicable permits are **not** waived as part of this exemption and must be followed
- New structures must still be a single span at a minimum of 1.25 times or 125% of the bankfull channel width unless otherwise approved by the SCC.
- Ensure the stability of the channel upstream and downstream. Grade controls must be shown on plan drawings if drawings are required.
 - Upstream: Grade control(s) are required above the inlet of the new structure to prevent head cutting
 - Downstream: Outlet stabilization is required in the form of grade controls, bank armoring, and/or filling in scour holes.

- **Requirements for projects granted a DGLVR Standard Exemption (either automatic or SCC)**
- New structures must be properly aligned with the channel, unless not feasible due to permitting restrictions or other constructability restraints.
- Consider floodplain connectivity when necessary (e.g., high water by-pass, overflow pipes, etc.).
- If permits and engineered plans are required, conservation districts are required to review all plans and specifications to ensure the project complies with DGLVR policy and requirements before they are submitted for permit review.
- Divert surface runoff and road drainage away from the stream and structure in a manner that prevents erosion and prevents discharges to the stream.

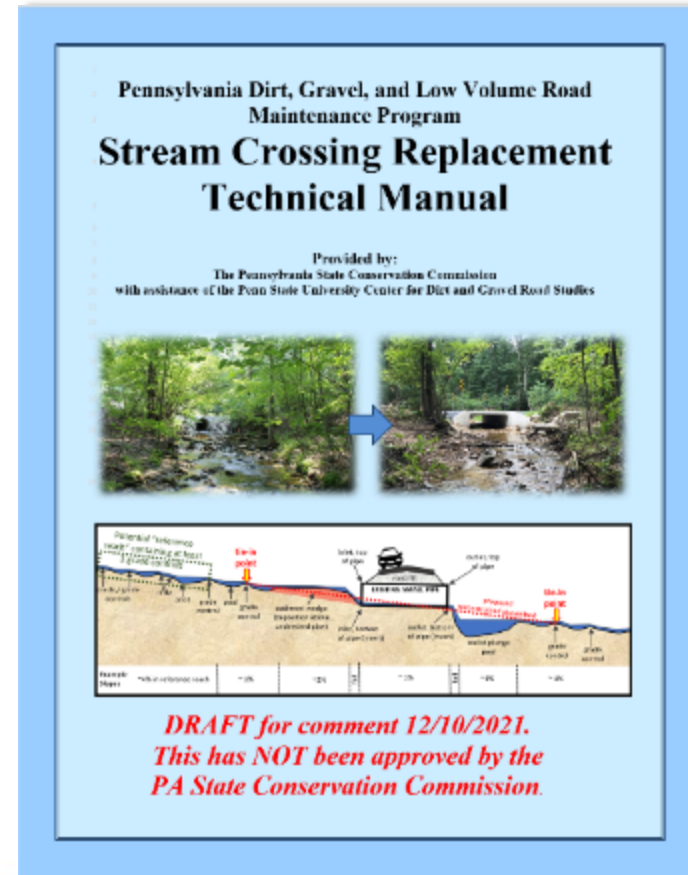
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- Guidance document that supports the Standard and Policy
- Chapters I-II follow the lifecycle of the project
 - Written for the CD Audience
- Chapter 12 for Engineers
 - References Chapters I-II
- Appendices central location for checklists, tech bulletins, forms, etc.



- **Chapter 1: Introduction**
- **Chapter 2: DGLVR Stream Crossing Standard Details**
- **Chapter 3: Initial Site Assessment**
- **Chapter 4: Longitudinal Profile**
- **Chapter 5: Grant Application**
- **Chapter 6: QAB Ranking and R**
- **Chapter 7: Contracting**
- **Chapter 8: From Contract to C**
- **Chapter 9: Construction and In**
- **Chapter 10: Final Inspection an**
- **Chapter 11: Monitoring and Ma**
- **Chapter 12: Engineering Desig**

2. DGLVR STREAM CROSSING DESIGN AND INSTALLATION STANDARD

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All stream crossing replacements funded in whole or in part with DGLVR funds, or listed as in-kind on a DGLVR Project must follow the DGLVR Stream Crossing Replacement Standard unless a "DGLVR Standard Exemption" (see section 3.3) is applicable. This chapter of the manual walks through the DGLVR Stream Crossing Design and Installation Standard and provides additional background and guidance.

Highlighted shaded text below is quoted directly from the DGLVR Stream Crossing Replacement Standard. Additional explanation and background are provided on the major points.

FP. B. All stream crossing projects shall be authorized as a cooperative work between state, private and federal laws and all applicable permits must be obtained prior to construction.

Most stream crossing projects funded by the DGLVR Program will require a permit. The type of permit required will vary from one project to another. Conservation district staff should know who to consult to ensure the proper permits are obtained. Conservation district DGLVR technicians are required to review permit applications and/or site plans for stream crossings to ensure the application complies with the DGLVR Program requirements before they are submitted to the PA Department of Environmental Protection (DEP) or the conservation district for permit review.

Because the DGLVR Program's requirements can be more stringent than permit requirements, it is possible to have a project with an approved permit that will not meet DGLVR Stream Crossing Standard. Therefore, it is very important to have a good understanding of the DGLVR Stream Crossing Standard and to review the design before a permit application is submitted. An approved permit is not a guarantee that a project can be paid for with DGLVR Program funds. A project may only be paid for with DGLVR Program funds when it meets the DGLVR Program Policy and Stream Crossing Standard.

FP. C. New stream crossing structures shall be designed to pass the 25-year, 24-hour discharge at a water surface elevation not to exceed 80% of the structure rise above streambed elevation (design flow streambed shading stream just to either the top of the culvert opening or to the lowest pipe or bridge boxwall).

This defines the flow capacity requirements for newly designed structures. By limiting the 25-year discharge to 80% of the culvert rise, the structure should also maintain some capacity for passing debris. The culvert rise is defined as the height from the finished streambed elevation at the fining to the top of the structure for pipes, or the bottom of the support beams for bridges. In some cases, structures may need to be widened (over the required 1.25x bankfull) or the road elevation may need to be raised to accommodate this requirement.

One of the purposes of this requirement is to discourage the use of low-profile structures. Low-profile structures, (for example an 11' wide, 4' high arch pipe with an invert) are poorly suited to natural stream systems since it is usually impossible to place adequate streambed in the structure without compromising the hydraulic capacity of the structure. In other words, there is not enough room for both streambed and water flow in low profile structures.

- **Appendices**
 - **DGLVR Stream Crossing Replacement Standard**
 - **Definitions and Acronyms**
 - **Stream Crossing Evaluation Form**
 - **Stream Continuity Sketches**
 - **Standard Drawings**
 - **DEP GP-11 Permit Memo**
 - **Editable Forms and Templates**
 - **Checklists**
 - **Technical Bulletins**

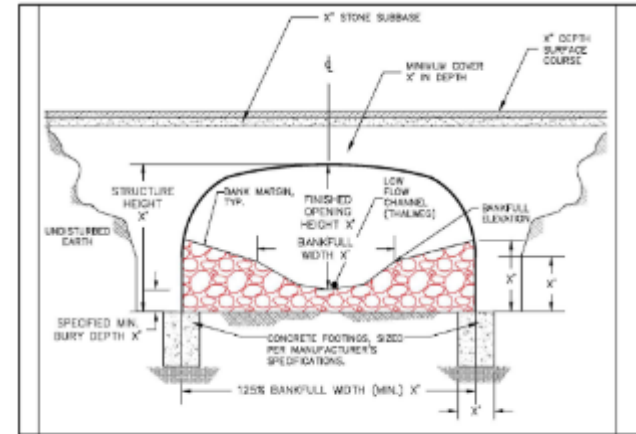


Figure 2.1 Bottomless Arch Culvert Example Detail

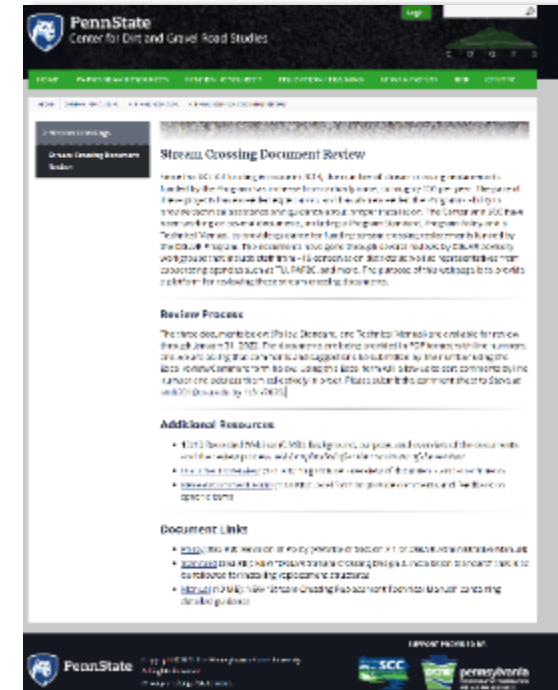
Stream Crossing Program Update

12/13/21



- DGLVR Stream Documents Available for Review
- Why Make Changes?
- Impacts of Undersized Stream Crossings
- Designing Better Stream Crossings
- Draft DGLVR Stream Crossing Documents
 - Design & Installation Standard
 - Policy Changes
 - Stream Crossing Technical Manual
- **Document Review Instructions & Timeline**
- Training Curriculum In Development

- All of the documents now are available for review on the Center's website at: <https://www.dirtandgravel.psu.edu/dglvr-stream-crossing-document-review-website>
- All CDs have opportunity to comment
- Other parties reviewing the documents:
 - DEP
 - Private Engineers
 - PA Fish & Boat
 - PA Department of Agriculture Legal / Policy
 - US Forest Service



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- **Training Curriculum In Development**

- Education & Outreach Stream Crossing Sub-Committee
 - Meeting held December 1, 2021 in State College
 - Next meeting to be determined – January 2022?
- Developing a Robust Stream Crossing Training for 2022
 - Virtual / in-person format
 - Potential for regional training locations
- Winter Webinar Series
 - Heavy focus on stream crossing topics from Manual & Standard

Stream Crossing Program Update

12/13/2021

QUESTIONS?

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Remember: Deadline to Comment 1/31/2022

DRAFT for comment 12/10/2021. This has not been approved by the SCC.

