Dirt Gravel and Low Volume Road Program

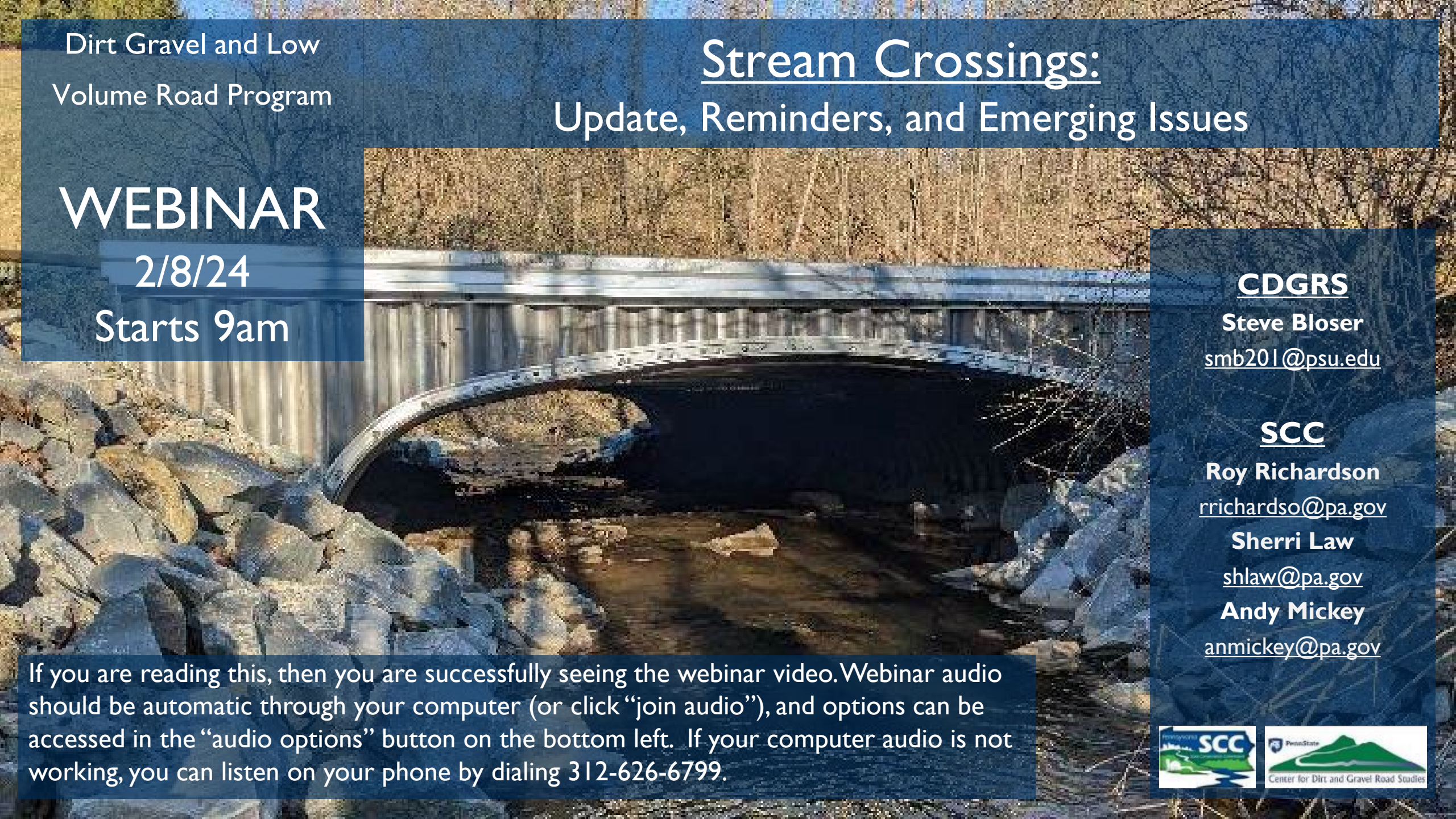
Stream Crossings:

Update, Reminders, and Emerging Issues

WEBINAR

2/8/24

Starts 9am



CDGRS

Steve Bloser

smb201@psu.edu

SCC

Roy Richardson

rrichardso@pa.gov

Sherri Law

shlaw@pa.gov

Andy Mickey

anmickey@pa.gov

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SCC

PennState Center for Dirt and Gravel Road Studies

Stream Crossing Update

Purpose

Update on implementation of stream crossing standard, including issues and reminders for CDs

Pennsylvania SCC

PennState Center for Dirt and Gravel Road Studies

Stream Crossing Update

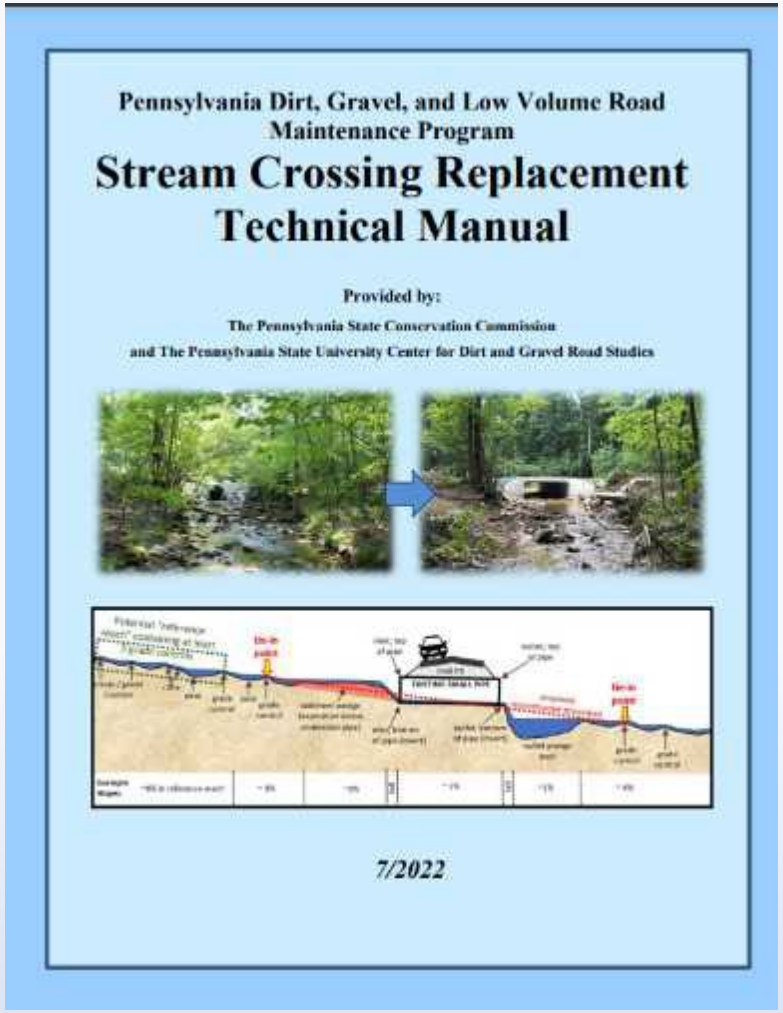
- **Implementation Update**
- *Emerging Issues*
- *CD Responsibilities*
- *Other Considerations*

Pennsylvania SCC
State Conservation Commission

PennState
Center for Dirt and Gravel Road Studies

Stream Crossing Standard Update

- DGLVR Stream Crossing Replacement Standard required for contracts signed after 6/30/22
- Standard has NOT changed since initial approval
- Status
  - Projects completed under standard: 0
  - Projects in progress under standard: ~30?
- 2023-24: a lot of “almost standard” projects…



Stream Crossing Standard Update

- **2023-24: a lot of “almost standard” projects…**
  - Large number of projects contracted before 6/30/22
  - Do not have to follow standard
  - **Many CDs went above and beyond, working with CDGRS/SCC to get them as close to the standard as possible**
    - Some examples:

Stream Crossing Standard Update

“Almost standard” projects… WASHINGTON COUNTY

DGR funds: $106,600.00
In-kind: $19,405.79

Problem being addressed:

- The existing stream crossing was multiple pipes
- the stream’s bankfull width is 12.9 ft

“Almost standard” projects… WASHINGTON COUNTY

Project details:

- The district worked closely with the CDGRS to incorporate updated guidance into the stream crossing design.

- Bank margins, a low flow channel, and 3 riffles were constructed to establish a stable, continuous stream channel upstream, through, and downstream of the road crossing.

“Almost standard” projects… WASHINGTON COUNTY

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"Almost standard" projects… WASHINGTON COUNTY

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Stream Crossing Standard Update

“Almost standard” projects… WASHINGTON COUNTY

Project details:

- A 16’ W x 4’3” H aluminum bottomless box culvert on express foundations was installed.
- Road ditch turnouts were also installed to disconnect road drainage from the stream crossing.

Stream Crossing Standard Update

“Almost standard” projects… WASHINGTON COUNTY

Stream Crossing Standard Update

“Almost standard” projects… CLARION COUNTY

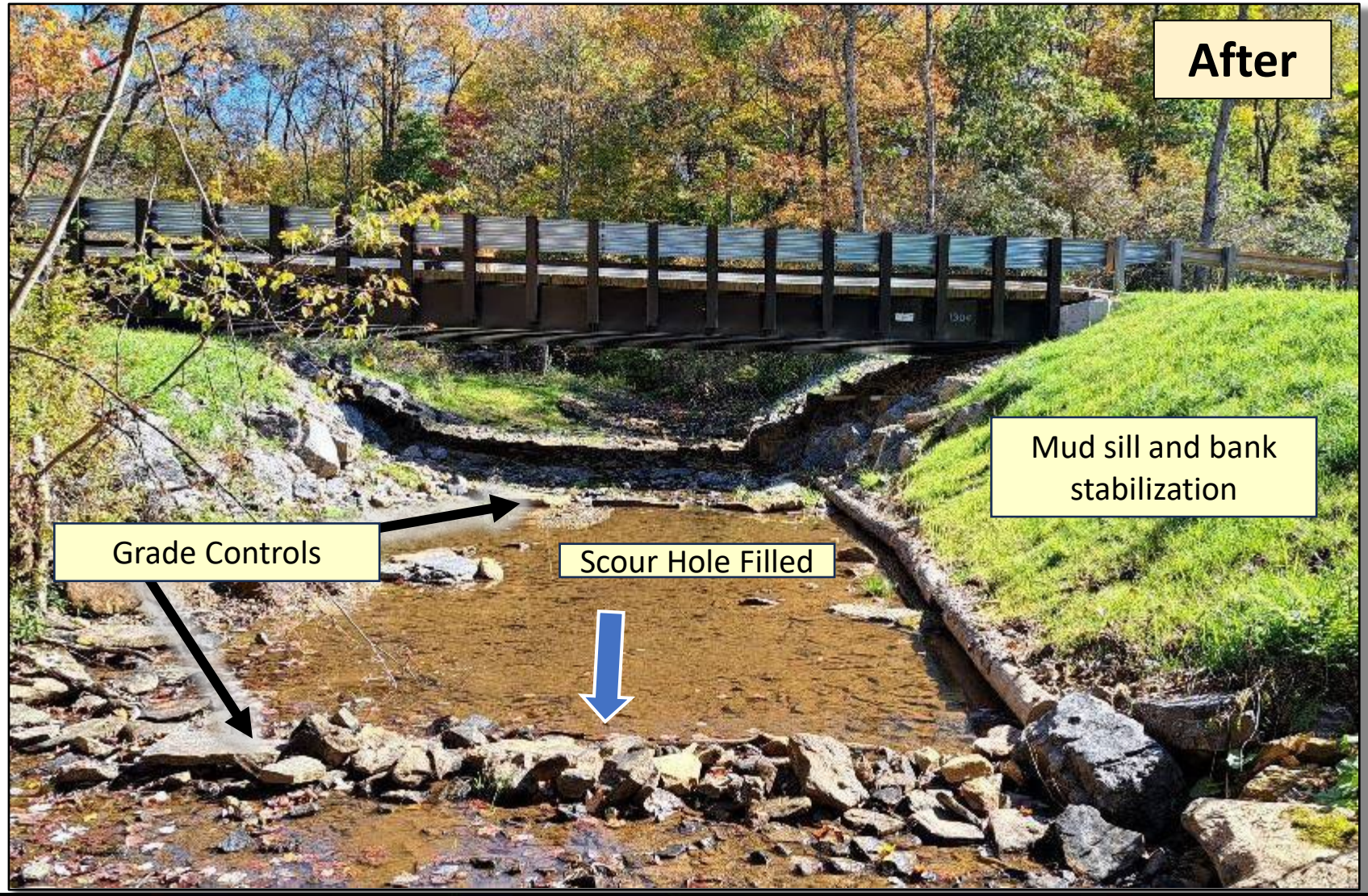
Stream Crossing Standard Update

“Almost standard” projects… CLARION COUNTY

- Existing was pipe stuck into an old bridge opening
- Frequent flooding
- Installed Spread Footer Bridge
- Significant channel work

Stream Crossing Standard Update

“Almost standard” projects… CLARION COUNTY



- Existing was pipe stuck into an old bridge opening
- Frequent flooding
- Installed Spread Footer Bridge
- Significant channel work

Stream Crossing Standard Update

- **2023-24: a lot of “almost standard” projects…**
  - Still many “pre-standard” crossings to be installed in 2024
  - Recommend to use elements from the Standard to try to make them as functional and resilient as possible
  - SCC/CDGRS staff available for assistance
  - First project designed to full DGLVR Standard will go in this Spring.
    Stay Tuned!

Stream Crossing Update

- Implementation Update
- ***Emerging Issues***
- ***CD Responsibilities***
- ***Other Considerations***

Pennsylvania SCC

PennState Center for Dirt and Gravel Road Studies

Emerging Issues

Problem: A few significant issues have come up early in 2024

- Wanted to share them as examples and reminders for other districts.
- Counties will be kept anonymous

Example 1

- Contracted after 7/1/22
- Standard not followed
- Structure already installed

Emerging Issues

Example 1 CENSORED County

Emerging Issues

Example 1 CENSORED County

Emerging Issues

Example 1 CENSORED County

- District attended stream training, but did not ensure Standard was followed.
  - Proper long pro survey not completed
  - No review of plan to meet Standard (grade controls, slope, channel shape and composition, etc.)
- CDGRS assisted with long pro June 2023 – not used in design
- Installation mostly complete (by twp) in December 2023 when SCC/CDGRS learned it was in progress.
- Engineer fell short on design requirements, especially stream channel reconstruction

Emerging Issues

- **Example 1**

After

Inside Culvert (DS View)

MISSING:
- Channel Shape
- Bank Margins
- Grade control
- Proper substrate
- Embedment depth
- Slope and elevation

Inside Culvert (US View)

Emerging Issues

- **Example 1**

After

Outlet

- Pipe installed high
- 18-24” drop at outlet

Downstream

Emerging Issues

- **Example 1**

After

Inlet

Upstream

Emerging Issues

Example 1 CENSORED County

- Update:
  - Standard cannot be met: pipe installed too high.
  - As is, this site would not even meet the old policy (pre-standard).
  - CDGRS working with CD, twp, and engineer on remediation plan to make the site as stable and continuous as possible.
  - Meetings planned, still active site as of today 2/8/23.

Example 2

- Contracted after 7/1/22
- Standard not followed
- Structure already purchased

Emerging Issues

Example 2 CENSORED County

- District completed site assessment with CDGRS staff and provided recommendations to engineer
  - District did not complete satisfactory review of draft plan set before submittal
  - Insufficient design in permit plan set
- **CD DGLVR Staff changed twice (so far) in life of project.**
- Replacement structure purchased prior to permit approval
  - (Permit not reviewed or approved currently)
  - Structure chosen exceeds 1.25x bankfull (12’ bkfll, 16’ box culvert)
    - However, structure will likely not meet Q100 requirements
      - 80% structure rise & key pieces stability

Emerging Issues

- **Example 2**

Before

Upstream

Upstream

Emerging Issues

- **Example 2**

Before

Downstream

Downstream Scour

Emerging Issues

Example 2 CENSORED County

- Update:
  - H&H analysis being conducted by engineer
    - Will determine if structure can be used as purchased (unlikely)
  - Potential Options
    - Scrap invert, place structure on footers and raise elevation
      - Inside of footer will encroach beyond inside of culvert wall
      - Leaves insufficient room to place stable bank margins while maintaining bankfull width channel through structure
      - Concrete footers will need to serve as bank margins
    - Purchase new structure
  - Significant additions/changes to plan details need to be made regarding stream channel reconstruction

Example 3

- Contracted before 7/1/22
- Old Policy Applies
- **Bidding Issues**

Emerging Issues

- **Example 3: Bidding difficulties**

  - **Township bidding a stream crossing replacement**
    - 14 ft wide bottomless structure
    - Est $250,000 - $300,000 budget

  - **First time the project was bid:** no bidders

  - **Second time it was bid:** one bid: $610,000

  - **What to do?**

  - **How to get a reasonable bid?**

Emerging Issues

- **Example 3: Resolution???**
  - Options:
    - Accept the high bid
    - Reject the bid and cancel the project
    - Reject the bid and rebid to get a more reasonable cost
      - Tips on the following slides
  - Considerations:
    - Is additional funding available?
      - Program funds or in-kind
    - Timeline
      - Contract expiration, spending deadlines, seasonal restrictions, etc.
    - SCC and Center are available to discuss options

- **Example 3: How to get a reasonable bid?**

Review the bid package

- Longer / complicated bid package often mean higher bids.
  - **Potential issues**:
    - Difficult to find important DGLVR information
    - Bidders may not read the whole package
    - Bidders may submit a higher bid due to the extra work of understanding and following a large bid package
  - **Suggestions**:
    - Shorten the bid package
    - Ensure grant requirements are clear (include a short narrative, etc.)

Note: reviewing stream crossing bid packages is now required

- **Example 3: How to get a reasonable bid?**

Better advertising

- Don't just meet the bare minimum advertising requirements
  - **Suggestions**:
    - Advertise in multiple places
    - Ask contractors where they typically find projects, and advertise there
    - **Invite bidders**
      - Many conservation districts have lists of contractors who have completed or expressed interest in DGLVR projects
      - Road owner can send bid packages directly to contractors and invite them to bid on the project

- **Example 3: How to get a reasonable bid?**

Other considerations

- Project participant can buy the structure through **CoStars**
- Consider mandatory **onsite pre-bid meeting/site showing**
  - Ensures all parties understand the plan and what the project entails.
  - Note: if only one bidder participates, could lead to an artificially inflated bid.

- **For more guidance on bidding: Recorded DGLVR webinars**

April 14, 2020: Municipal Bidding

This webinar reviewed various aspects of the municipal bidding process as it relates to municipal projects funded through the DGLVR Program. It covered an overview of the bidding process and provided additional resources.

Webinar Download (66.3 MB): MP4 format *(~ 1 hour 8 minutes)*

Presentation Downloads: Adobe PDF (8.81 MB) MS Powerpoint (16.9 MB)

June 9, 2020: COSTARS and Purchasing

As part of the 4/14/20 "Municipal Bidding" webinar, there was some discussion and a request for more information about the COSTARS program, a cooperative purchasing program designed to make purchasing both easier and price competitive for public entities. Felicia Campbell & Kim Bullivant, two representatives from COSTARS, presented information and answered available for questions.

Webinar Download (178 MB): MP4 format *(~ 1 hour 19 minutes)*

Presentation Downloads: Adobe PDF (7.3 MB) MS Powerpoint (8.72 MB)

Example 4

- Contracted after 7/1/22
- Small “that’s not a stream” site
- Completed 2023

Example 4 CENSORED County : Small Streams

Small Streams

- When does the DGLVR stream crossing policy apply?

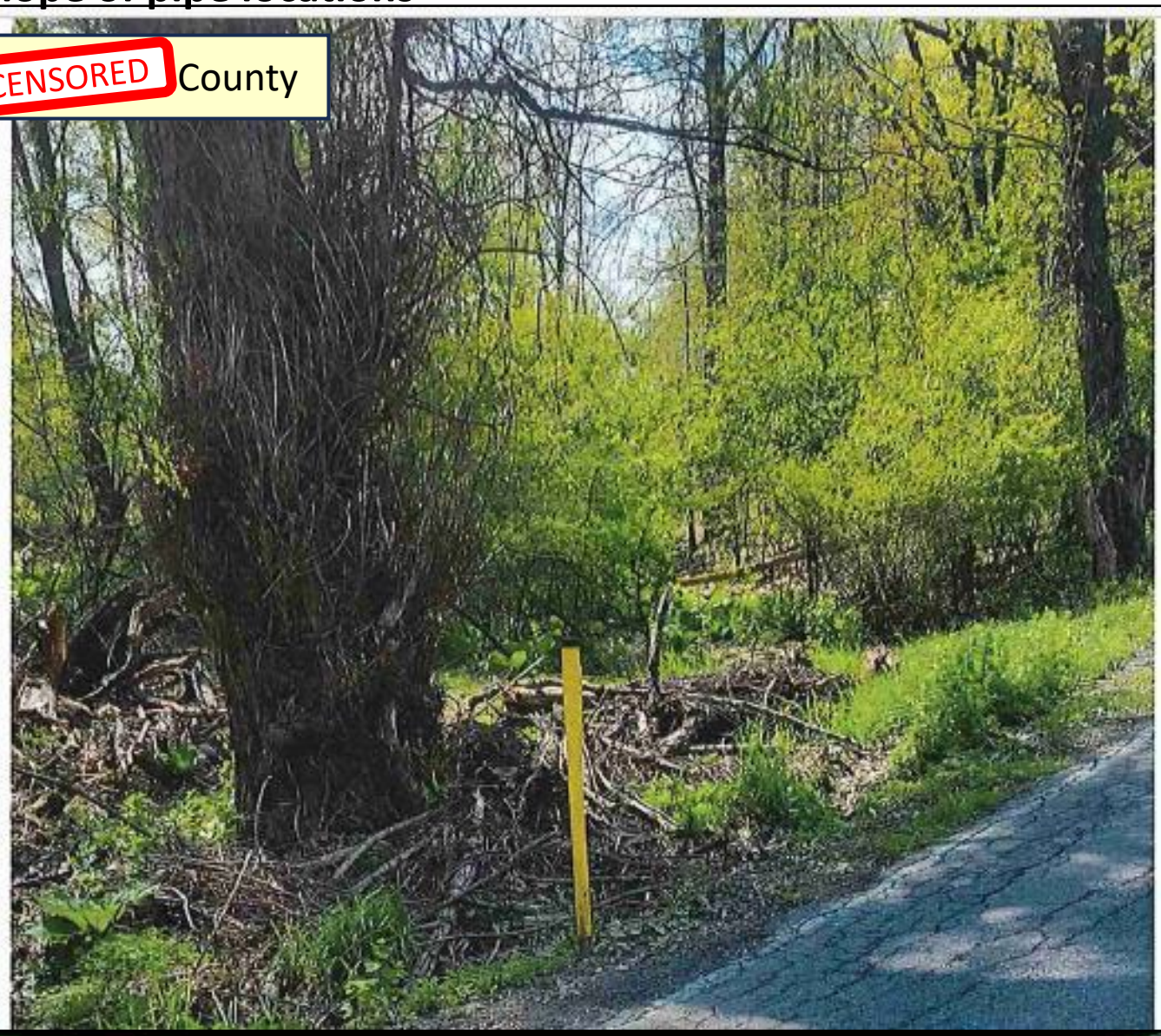
Admin Manual 7.1.2.3: Where the DGLVR Stream Crossing Policy Applies

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.*** See section 7.1.3 for more information on Automatic and SCC-requested exemptions from the DGLVR Stream Crossing Standard. Contact the State Conservation Commission in questionable circumstances.

Emerging Issues

Site during pre-app meeting (summer) – looking upslope of pipe locations

2023-24 Project: CENSORED County



Emerging Issues

Same site after construction (winter)

Emerging Issues

Same site after construction (winter)

Example 4 CENSORED County : Small Streams

- Need to determine if the water coming to a pipe:
  - Is groundwater seeping up to the surface?
  - Is storm runoff being collected and carried in the roadside ditch?
  - Is a channel or stream?
    - **If surface or groundwater channelizes before it reaches the road, the DGLVR stream crossing policy may apply**
    - Look for bed and bank
    - **Why? Because channelized flows require different environmentally sensitive practices than typical groundwater or stormwater issues**

Example 4 CENSORED County : Small Streams

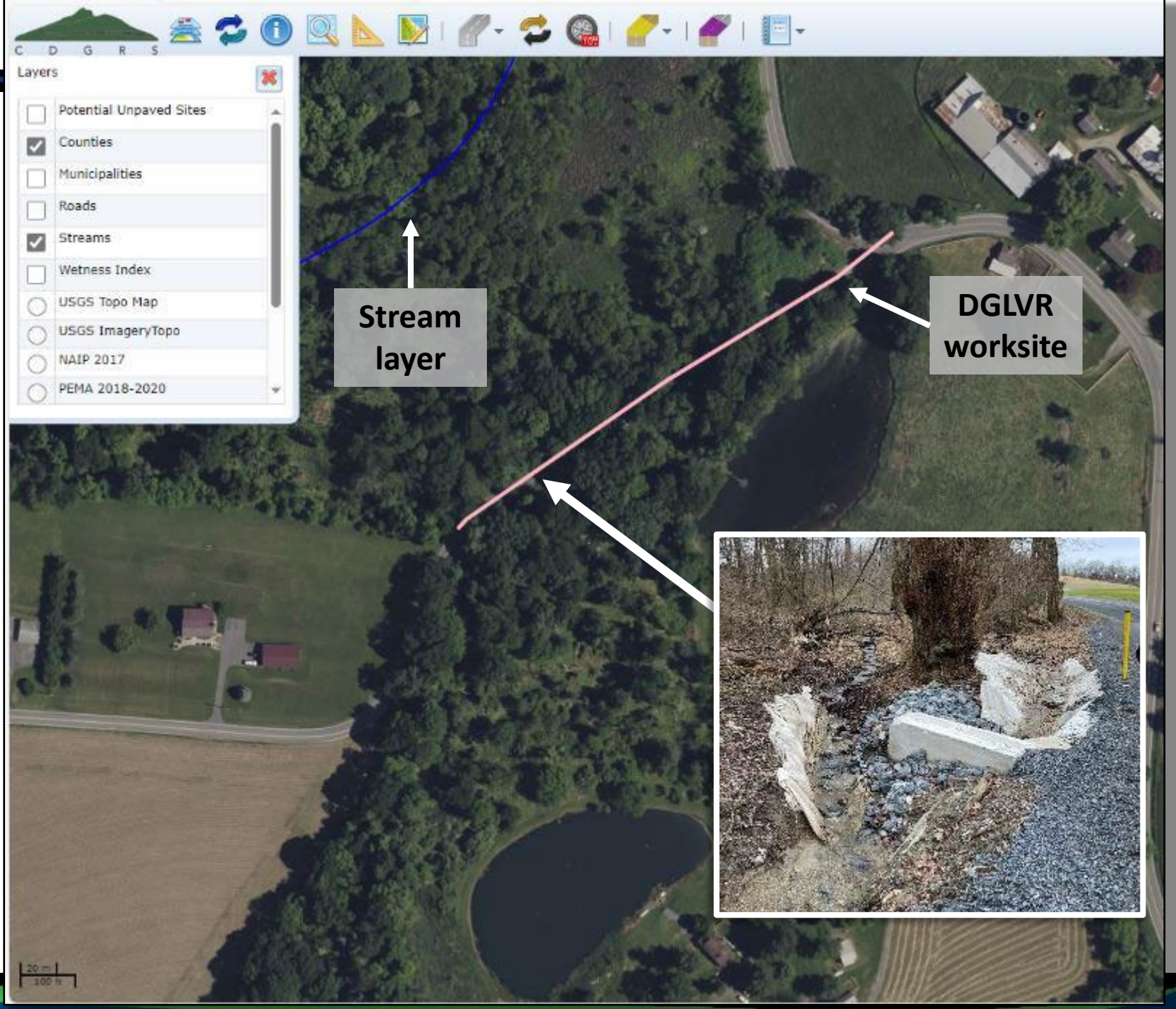
How to find out if there are bed and banks:

- **Field assessment**: **walk upslope**
- **Consider time of year**:
  - Summer is difficult: dry weather and leafy vegetation
  - Revisit the site during other times of year if possible
  - Talk to the road owner about whether there is ever running water entering any of the cross pipes
  - Dry channels may have indicators of stream flow (riffles, pools, etc.)
- **Wet site indicators**:
  - If the area is known to have roadside springs, saturated road base, wetland conditions, is in the headwaters to larger streams, etc.
  - These are all indicators you should investigate for small channels
- **Maps**

Emerging Issues

Maps:

- DGLVR GIS includes a stream layer
  - Only shows larger streams
  - Other tools available to help identify smaller channels



Emerging Issues

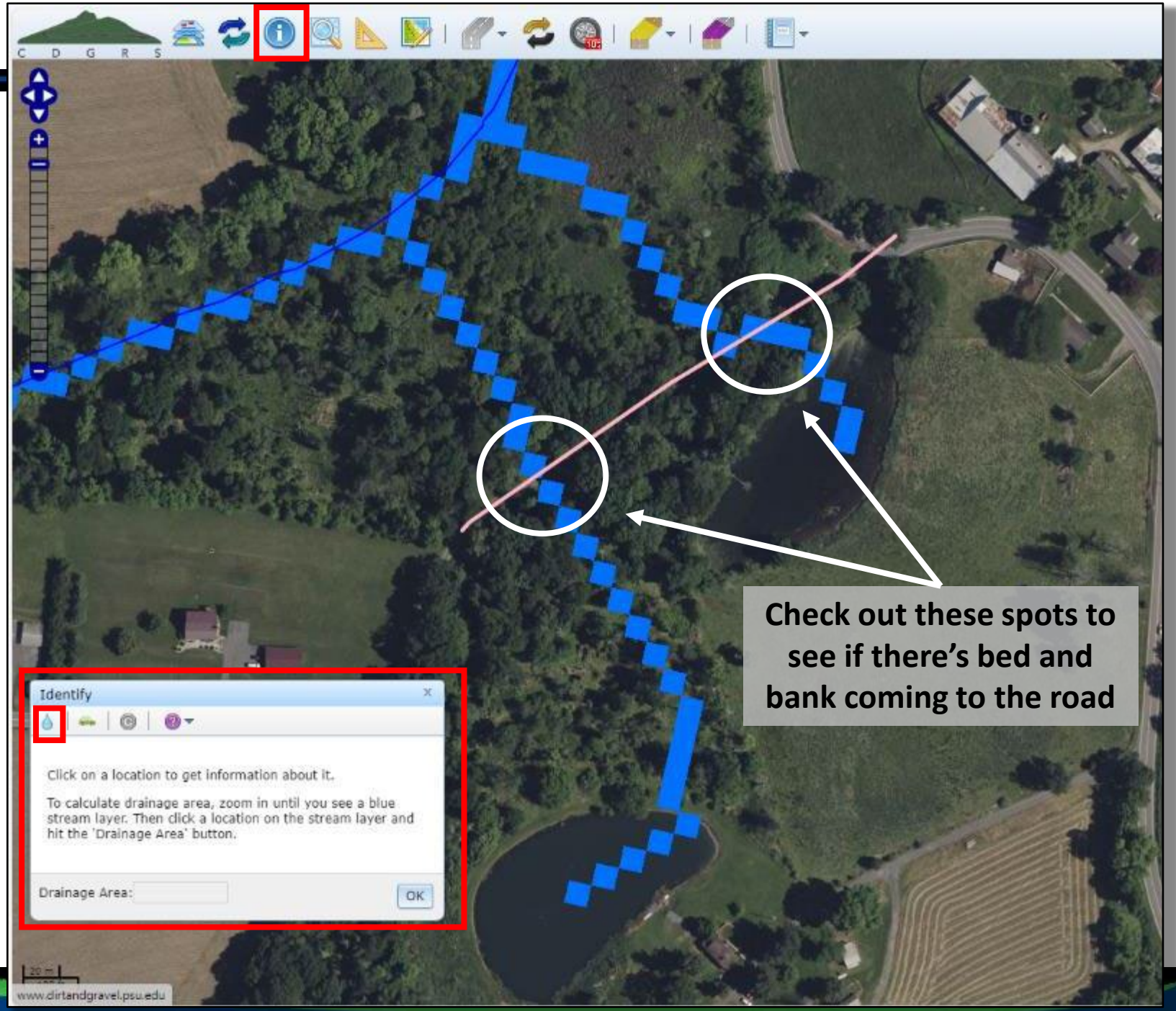
Maps: StreamStats

- USGS web tool

https://www.usgs.gov/streamstats

- DGLVR GIS references StreamStats when identifying drainage area

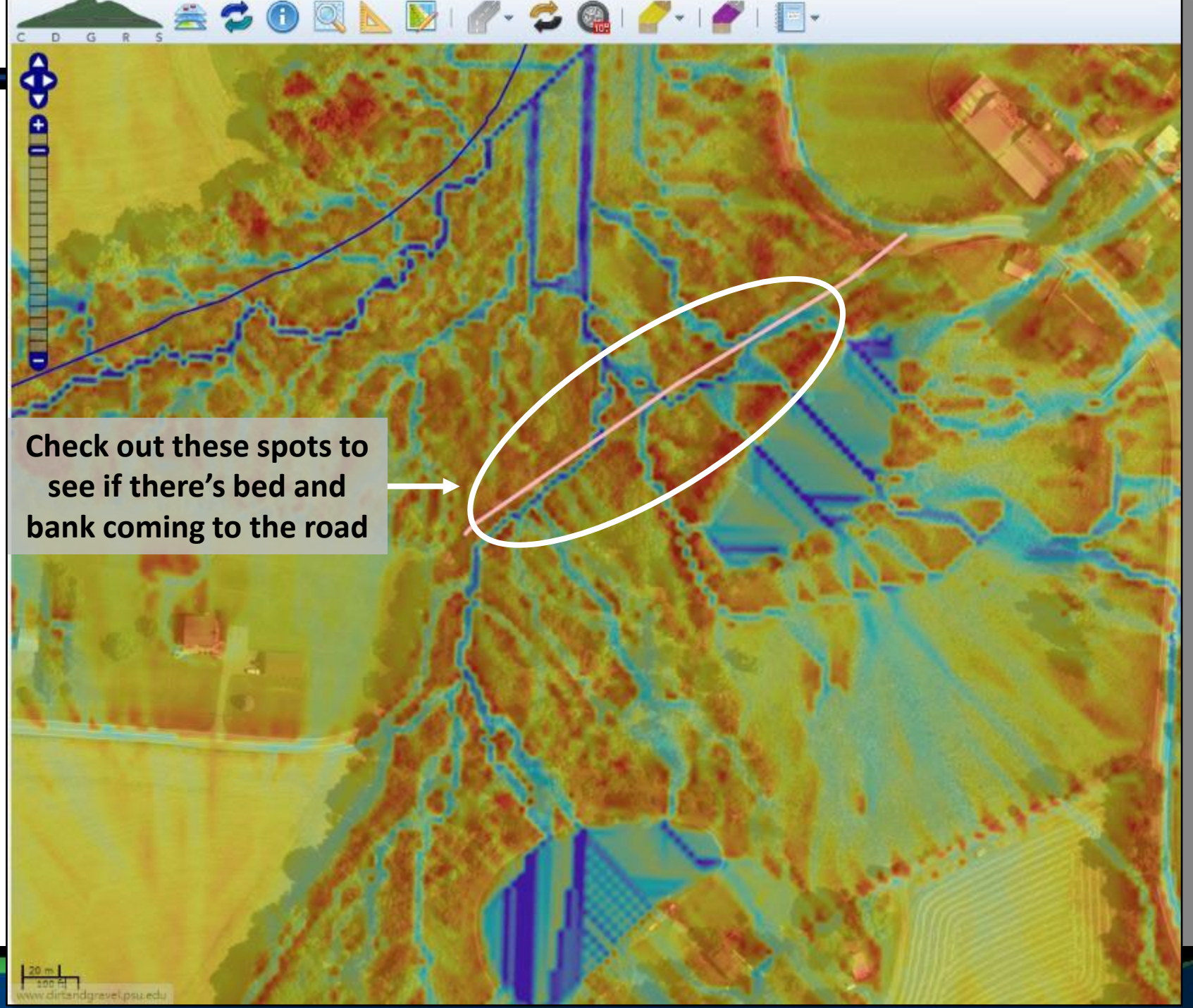
- Shows more detail than typical stream maps



Emerging Issues

Maps: wetness index

- Specific to DGLVR GIS
- Shows low spots in the landscape where water is expected to flow



Recorded webinars

December 17, 2020: GIS Updates: Topographic Wetness Index, Project Error Checker, Financial Updates

Some of you may have noticed a new "topographic wetness index" layer has been added to the GIS. CD staff will likely find this layer useful in many of the programs they administer. This webinar introduced that layer and go over some basics of how it was made and how it can be of use. It also demonstrated a new "Project Error Checker" tool designed to catch data entry errors for completed projects, along with a brief discussion on Administrative and Education spending.

Webinar Download (200 MB): MP4 format *(~ 55 minutes)*

Presentation Downloads:

- Adobe PDF (2.34 MB)
- MS Powerpoint (1.5 MB)

January 5, 2023: Stream Crossing Exemptions and Notifications

This webinar reviewed the notification and exemption process for stream crossings with some examples. Includes info about StreamStats in DGLVR GIS.

Webinar Download (112 MB): MP4 format *(~41 minutes)*

Presentation Downloads:

- Adobe PDF (6.88 MB)
- MS Powerpoint (3.54 MB)

Example 5

- Contracted after 7/1/22
- Standard followed
- **Q100 sizing and design issues**

Emerging Issues

Example 5 CENSORED County

- Existing 6’ metal pipe
- Bankfull of 9’
- Proposed 24’ bottomless box culvert to meet Q100 in the Standard.
- District is working through the Standard with CDGRS assistance

Emerging Issues

Example 5 CENSORED County

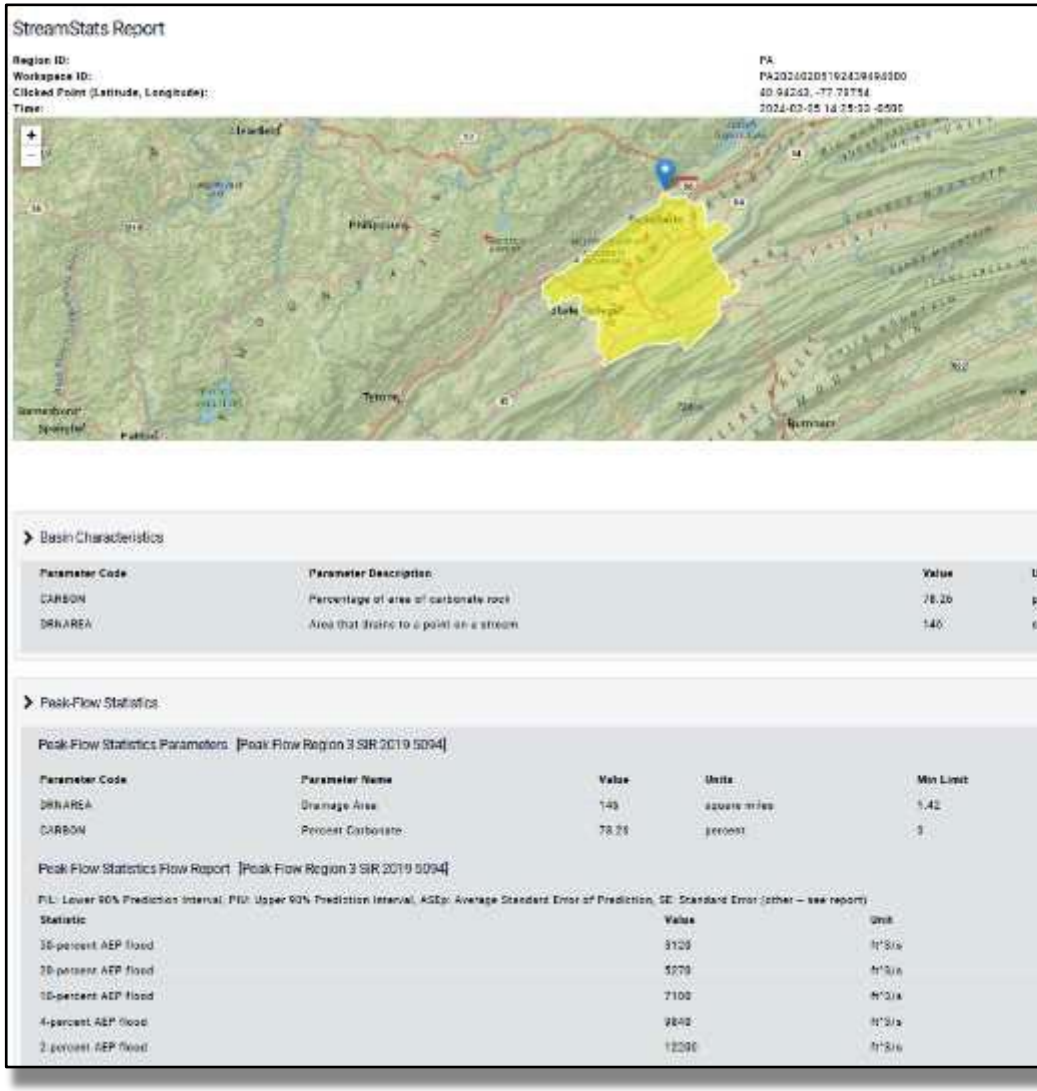
- Existing 6’ metal pipe
- Bankfull of 9’
- Proposed 24’ bottomless box culvert to meet Q100 in the Standard.
- District is working through the Standard with CDGRS assistance

- Initial calculations show that the new 24’ structure will not accommodate Q100 (100-year) flow as required.

STRAMSTATS Caution

STREAMSTATS

- Extremely useful USGS watershed model
- Estimates watershed size, bankfull width, flow probabilities and more
- **Useful, but it is a <u>model</u>.**
- Have seen repeated overestimations of flows, **specifically Q100,** for small drainages.
- **Limited "resolution":**



The smaller the watershed the bigger the potential error

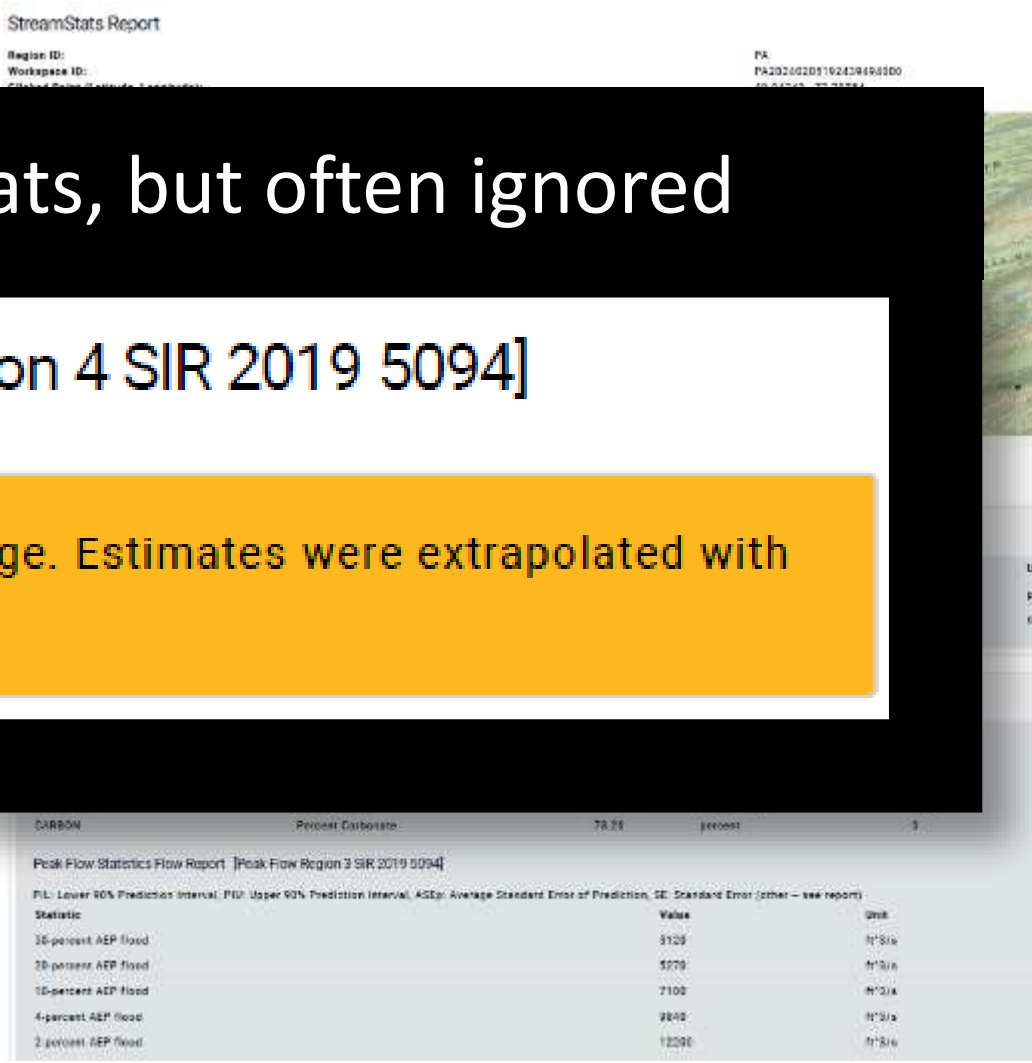
STREAMSTATS

Error Warning is built into streamstats, but often ignored

Peak-Flow Statistics Disclaimers [Peak Flow Region 4 SIR 2019 5094]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

flows, specifically Q100



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STREAMSTATS

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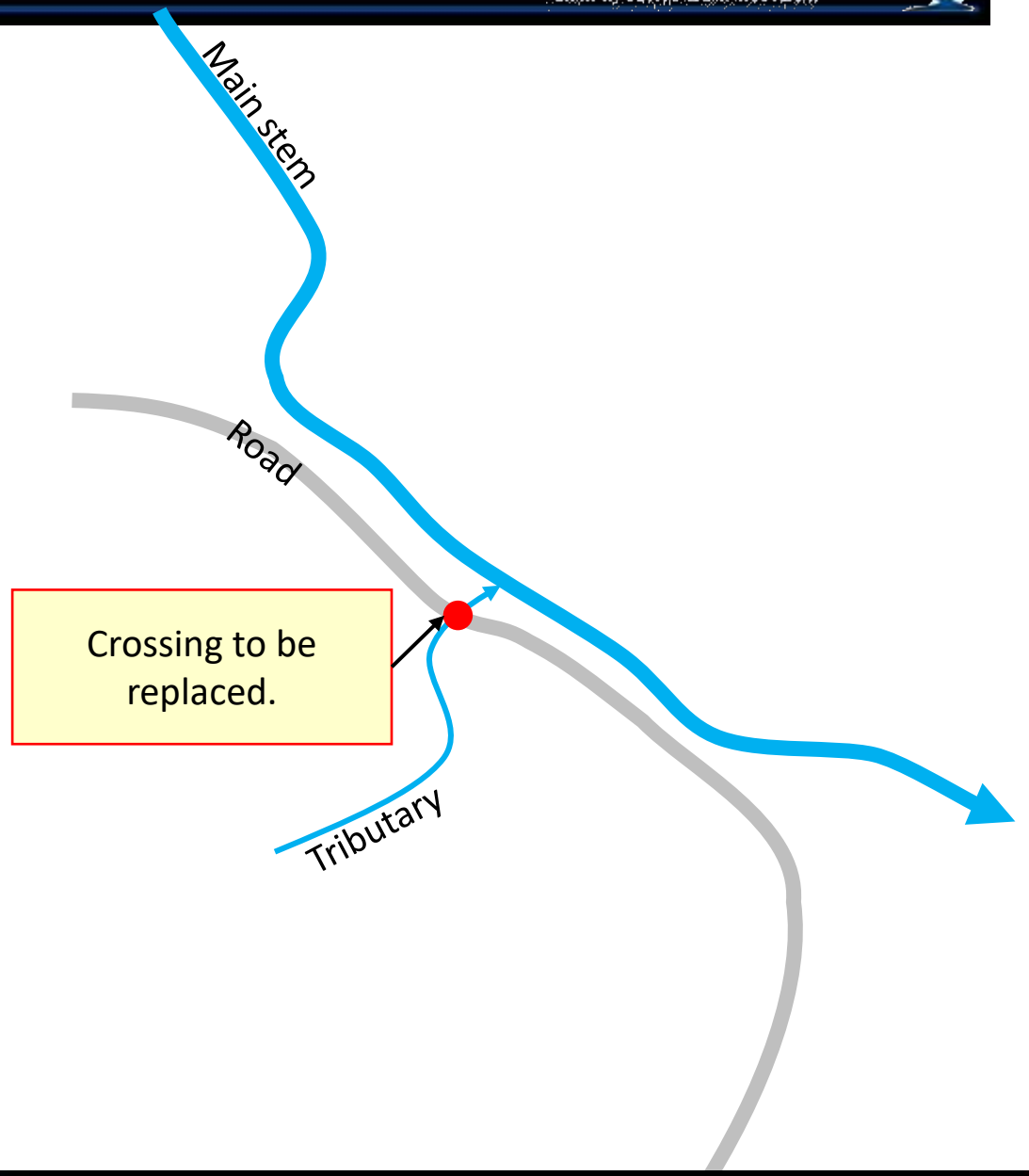

STREAMSTATS

- **Limited "resolution":**
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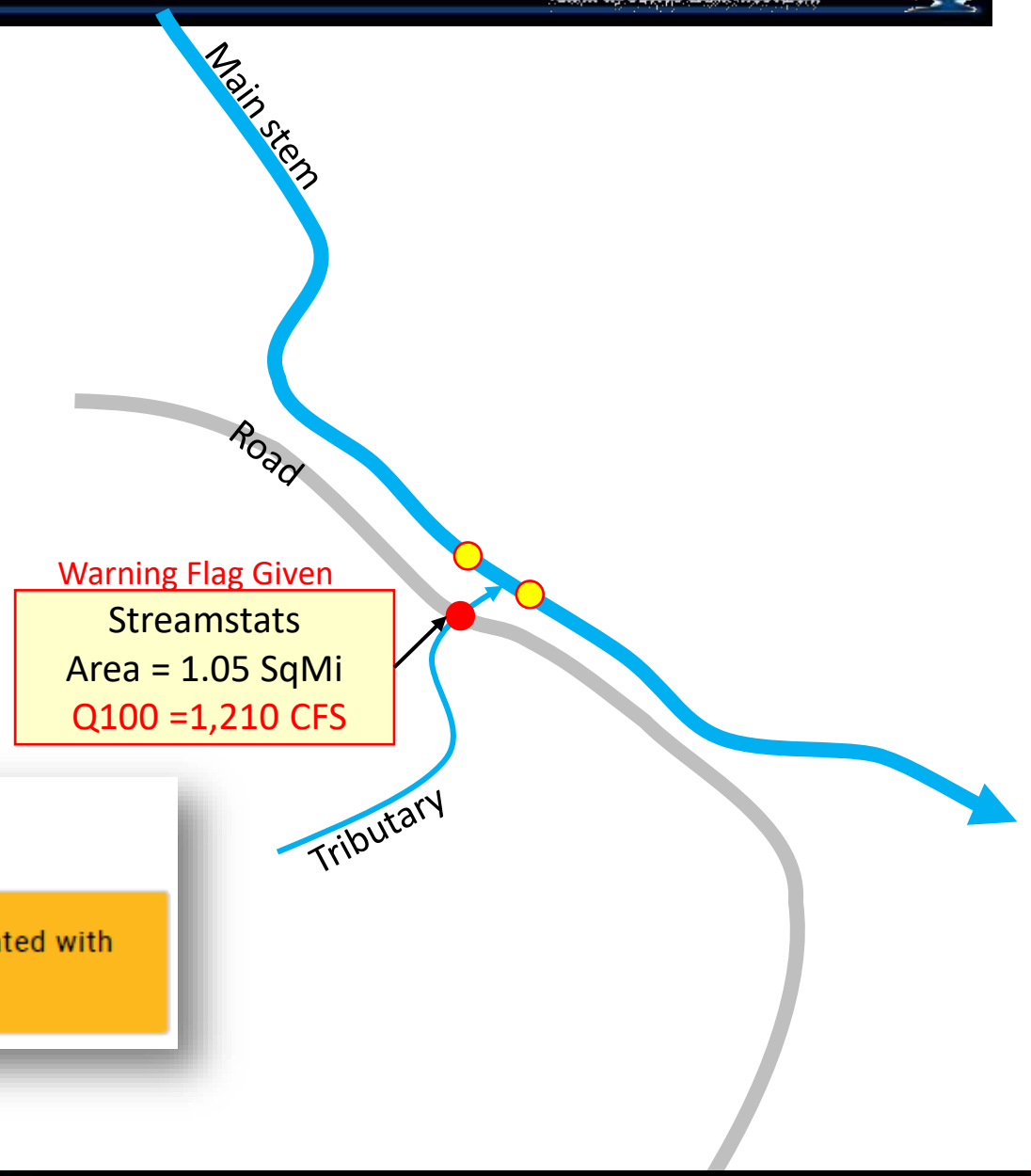
ACTUAL STREAMSTATS DATA:



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STREAMSTATS

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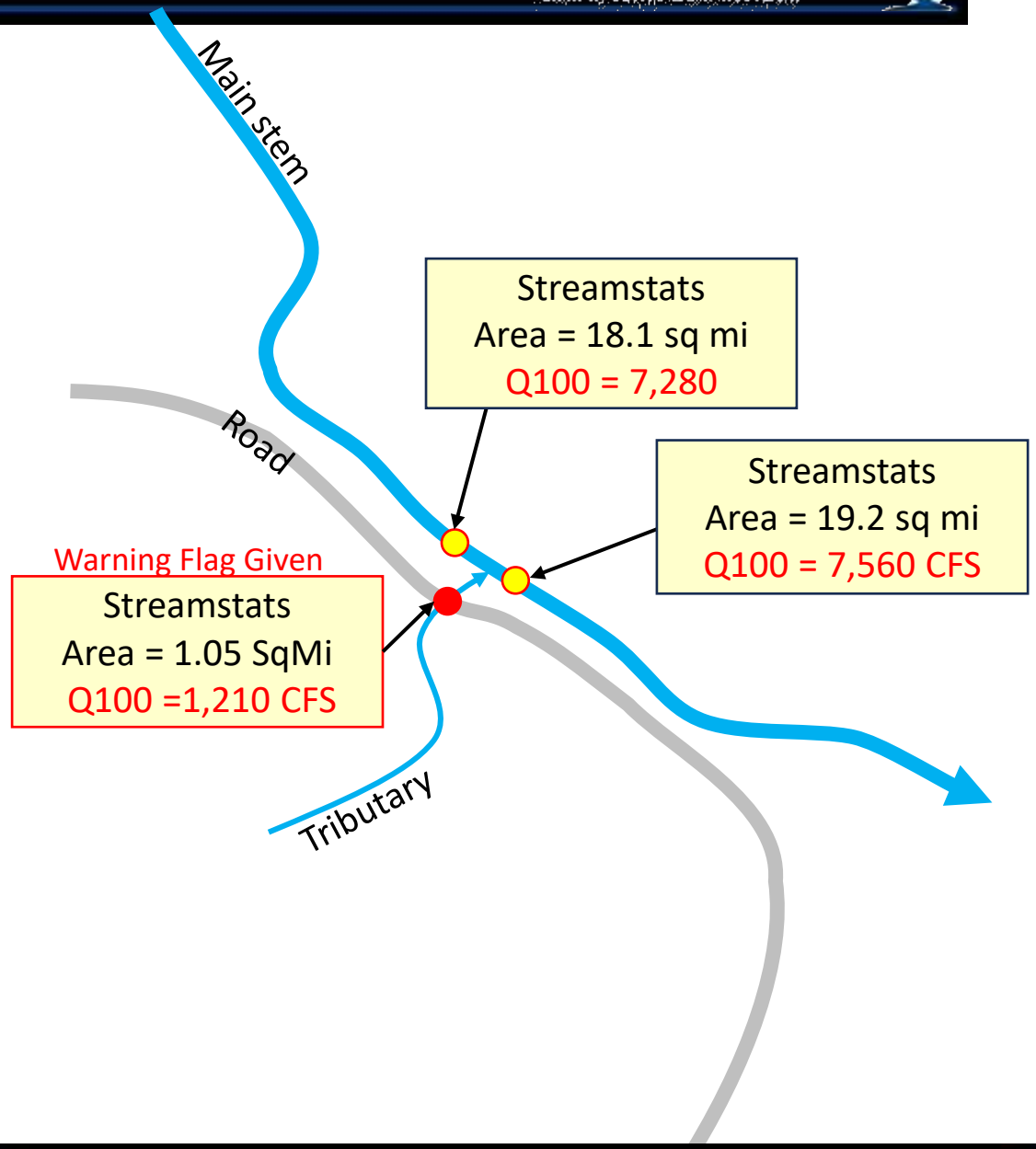

STREAMSTATS

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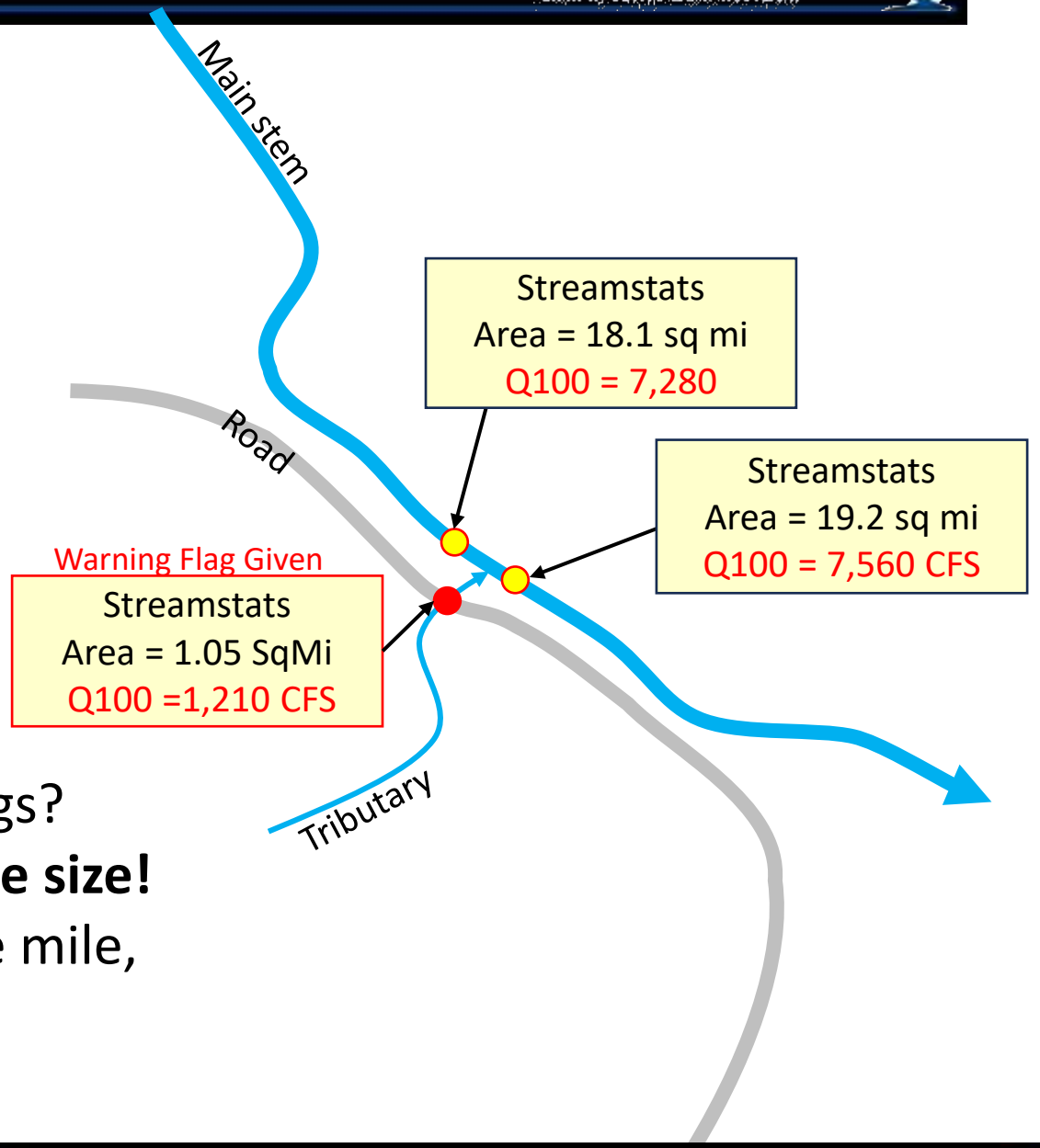


What is the Q100 flow?

- 1,210 CFS with a warning?
- 7,560 CFS – 7,280 CFS = 280 CFS with no warnings?
- **A 4X increase in Q100 CFS will drive up structure size!**
- Nearby HAS gauge estimates 420 CFS per square mile, so even this estimates ~450 CFS, not 1,210.
- *Streamstats estimates a 14.6' BF, actually 9'.*

Emerging Issues

STREAMSTATS

- Very Valuable Modeling Tool
- Limited “resolution” for determining flow (Q100):
  The smaller the watershed the bigger the potential error

ALTERNATIVES

- USDA TR-55
- USACE HEC-RAS
- HY 8 Culvert Hydraulic Analysis Program
- Gage data if on a gaged Stream – Can be gage regression or per sq mile estimations.

Stream Crossing Update

- Implementation Update
- *Emerging Issues*
- ***CD Responsibilities***
- ***Other Considerations***

Center for Dirt and Gravel Road Studies

CD Responsibilities

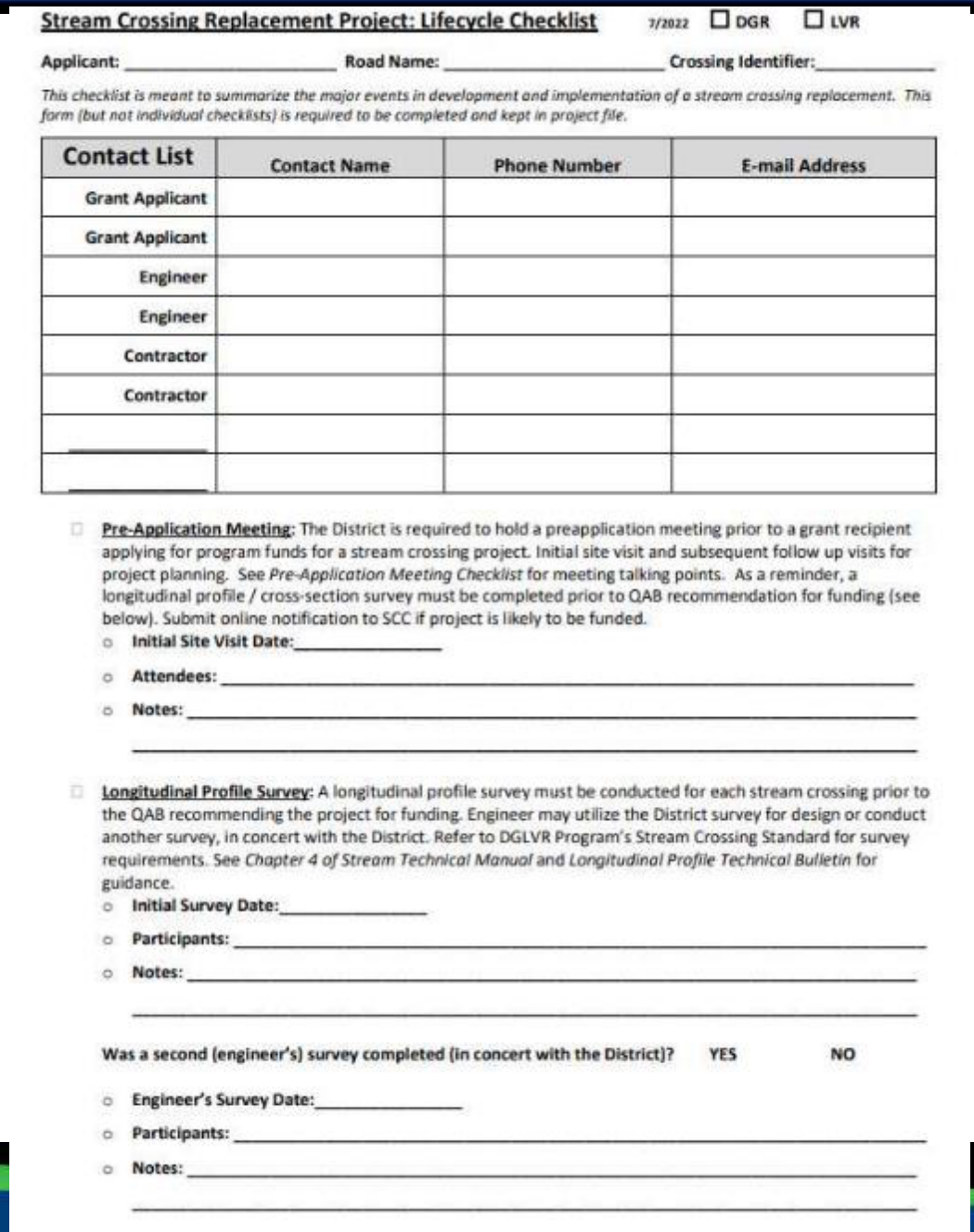
- CDs have certain defined responsibilities for stream crossing projects
  - Listed in Admin Manual section 7.1.2.6 Conservation District Requirements

  - Telling the engineer there is a standard and giving them a copy of it does NOT meet these requirements

CD Responsibilities

Project Lifecycle Checklist

- **Required** to complete and retain
- Helps ensure all required administrative and technical aspects of the project are met
- Covers project from pre-application stage to completion
  - Pre-app meeting
  - Long-pro survey
  - Contract
  - Engineer selection
  - Design Review
  - Bid Package Review
  - Bid Site Showing (recommended)
  - Construction Notice
  - Pre-Con
  - Project Inspection
  - Project Completion



Stream Crossing Replacement Project: Lifecycle Checklist 7/2022 ☐ DGR ☐ LVR

Applicant: _____ **Road Name:** _____ **Crossing Identifier:**_____

This checklist is meant to summarize the major events in development and implementation of a stream crossing replacement. This form (but not individual checklists) is required to be completed and kept in project file.

Contact List	Contact Name	Phone Number	E-mail Address
Grant Applicant			
Grant Applicant			
Engineer			
Engineer			
Contractor			
Contractor			
_____			
_____			

☐ **Pre-Application Meeting:** The District is required to hold a preapplication meeting prior to a grant recipient applying for program funds for a stream crossing project. Initial site visit and subsequent follow up visits for project planning. See *Pre-Application Meeting Checklist* for meeting talking points. As a reminder, a longitudinal profile / cross-section survey must be completed prior to QAB recommendation for funding (see below). Submit online notification to SCC if project is likely to be funded.

- **Initial Site Visit Date:**_____
- **Attendees:** _____
- **Notes:** _____

☐ **Longitudinal Profile Survey:** A longitudinal profile survey must be conducted for each stream crossing prior to the QAB recommending the project for funding. Engineer may utilize the District survey for design or conduct another survey, in concert with the District. Refer to DGLVR Program's Stream Crossing Standard for survey requirements. See *Chapter 4 of Stream Technical Manual* and *Longitudinal Profile Technical Bulletin* for guidance.

- **Initial Survey Date:**_____
- **Participants:** _____
- **Notes:** _____

Was a second (engineer's) survey completed (in concert with the District)? **YES** **NO**

- **Engineer's Survey Date:**_____
- **Participants:** _____
- **Notes:** _____

CD Responsibilities

- ☐ **Contract and Attachments:** Grant recipient reviews the contract and attachments. Acknowledge attachments and sign contract. Return to the County Conservation District.
  - **Application Submitted Date:** _____ **Request: $**_____
  - **Contract Date:**_____ **Contract Amount: $**_____
  - **Notes:** _____
    _____
- ☐ **Professional Design Services**: Program funds can be used to cover engineering, permitting, or similar consultant costs, but such costs are limited to a maximum of 20% of the total contract amount between the district and the grant recipient, with a maximum of $25,000 total. The use of the DGLVR Program's *Stream Crossing Replacement Request for Proposal Template* or an alternative which incorporates the required service details is highly recommended. Preparation or design costs such as engineering or surveying that are incurred before the contract is signed are not eligible for grant reimbursement but can be counted as in-kind.
  - **Project Engineer:** _____
- ☐ **Pre-Design Meeting**: The District, Project Participant, and Engineer/Consultant of record for the project are required to meet on site prior to the start of the design. District staff may ask technicians from TU, CDGRS or others to attend and provide assistance. See *Pre-Design Meeting Checklist* for meeting talking points.
  - **Pre-Design Meeting Date:**_____
  - **Attendees:** _____
  - **Notes:** _____
    _____
- ☐ **Pre-Permit/Design Submittal Review:** The DGLVR Program's Stream Crossing Standard requires that draft final project design package (permit, E&S Plan, construction drawings, etc.) be submitted (or resubmitted) to the conservation district for review prior to permit submittal. The district may ask for assistance in reviewing the plans from outside sources such as the SCC, CDGRS, and TU. This package must include all drawings necessary for construction. See *Design Plan Review Checklist* for review guidance.
  - **Date of plan submission:**_____ **Date of Review:**_____
  - **Plan Reviewers:**_____
  - **Notes:** _____
    _____
- ☐ **Bid Package Review**: If any subcontracted work is needed, grant recipients should follow their own bidding requirements. Bid packets or purchase orders and associated shop drawings for made to order products (ex. Stream crossing structures) must be provided to the conservation district for review and approval that they meet program policy and the DGLVR Standard prior to acknowledging an order or advertising the bid. See *Bid Package Review Checklist* for review guidance.
  - **Date of bid package submission:**_____ **Date of Review:**_____
  - **Bid package reviewer:**_____
  - **Notes:** _____
    _____
- ☐ **Bid Site Showing:** It is recommended that the Grant Recipient hold a bid site showing and invite the engineer, district, any potential bidders. The district is required to attend if a bid site showing is held. The purpose of the meeting is to walk through the project plan and allow potential bidders to ask questions in order to receive better bids for project work. See *Bid Site Showing Checklist* for meeting talking points.
  - **Bid Site Showing date:**_____
  - **Attendees:**_____
    _____

Project Lifecycle Checklist

  - **Notes:** _____
    _____
- ☐ **Construction Notification:** The project participant is required to notify the Conservation District ____ days prior to the start of construction.
  - **Date of notification:**_____ **Proposed Start Date:**_____
- ☐ **Pre-Construction Meeting:** The District is required to hold an on-site meeting prior to project work beginning and should include the grant recipient, contractor (if applicable), and the project engineer. The purpose of this meeting is to ensure all parties understand the construction plans and to answer any questions before project work begins. See *Pre-Construction Meeting Checklist* for meeting talking points.
  - **Pre-Con Meeting date:**_____ **Proposed Start Date:**_____
  - **Attendees:**_____
    _____
  - **Notes:** _____
    _____
- ☐ **Project Inspection:** District must be on site regularly to ensure program policies and standard are being met. Ensure any proposed "field changes" to what is on the plan are approved by the design engineer. See *Construction Inspection Checklist* for guidance. Note inspection visits on the log on this form.
- ☐ **Project Completion:** District and the grant recipient must meet onsite for a final project walkthrough. It is advantageous to do this immediately following construction with the contractor and engineer, so that minor issues can be addressed while equipment is still on site. See *Project Completion Checklist* for guidance.
  - **Completion date:**_____ **Inspection Date:**_____
  - **Attendees:**_____
  - **Notes:** _____
  - _____

CD Responsibilities

Project Timeline (Example)

- Pre-Application Meeting (June-October 2024)
- Longitudinal Profile Survey (June 2024-April 2025)*
- Ranking (March-April 2025)
- QAB Recommendation/Board Approval (June 2025)*
- Engineer RFP/Pre-Design Meeting (June-August 2025)
- Plan Review/Approval (October-December 2025)
- Permit Application Submission (December 2025 – January 2026)
- Bid Package Review/Approval (March-April 2026)
- Permit Authorization (April-May 2026)
- Pre-Bid Site Showing (April 2026)
- Bid Award (May 2026)
- Pre-Construction Meeting (June-July 2026)
- Construction/Construction Oversight (June-September 2026)*
- Inspection (June-September 2026)
- Project Closeout (July-December 2026)

CD Responsibilities

Pre-Design Checklist

- **Discuss goals of the project**
- **Project scope**
- **Engineer scope of work/requirements**
  - Meetings
  - Design
  - Permit
  - Bid Docs.
  - Construction Inspection
- **Provide engineer with Standard and Technical Manual**

Pre-Design Meeting Checklist for Stream Crossings ☐ DGR ☐ LVR Date: _____

Applicant: _____ **Road Name:** _____ **LAT/LONG:** _____

Applicant Reps: _____

CD Reps: _____

Additional Attendees: _____

Summarizes discussion points for an on-site meeting prior to project design. More information in Chapter 12 of the DGLVR Stream Crossing Replacement Technical Manual.

Project-Specific Discussion Points

- ☐ **Discuss/Introduce Goals & Objectives of DGLVR Program Stream Crossings**
  - Restore stream through road profile (stream continuity)
  - Flood resiliency and ensures lifespan
  - Reduced Maintenance
  - Full Aquatic Organism Passage
- ☐ **Provide Design Engineer with a copy of:**
  - Stream Crossing Design & Installation Standard
  - Stream Crossing Replacement Technical Manual

Project Management and Meetings

- ☐ **Design engineer is required to attend the pre-design meeting at the location of the road/stream crossing replacement project**
- ☐ **Design engineer may be required to attend the following additional meetings by the conservation district:**
  - Bid site showing
  - Bid selection / award meeting
  - Pre-construction meeting
  - Others: _____
- ☐ **Communications from the grantee or Design engineer may be directed to:**
  - Contact Information: _____

Off Right of Way (ROW)

- ☐ **Discuss who will obtain permission for project related Off ROW work**
  - Grantee _____ Design Engineer _____
  - Stream channel modifications including reference reach survey work
  - E&S controls areas and staging areas
  - Template Off ROW Consent Form on website

Site Survey & Mapping

- ☐ **Must provide sufficient topographic survey and mapping to define or support the following:**
  - Project boundaries and disturbance areas
  - Existing roadway elevations, grades and profiles
  - Wetlands and other jurisdictional or regulated resource areas
  - Design of replacement structure and appurtenances
- ☐ **Must establish two permanent benchmarks, located outside of disturbance area**
- ☐ **Must collect sufficient site survey to support H&H analysis**

Hydraulic Analysis

- ☐ **Must prepare an Hydrologic and Hydraulic (H&H) study that includes:**
  - Finished thalweg elevations and
  - Clearly labeled discharge values and water surface elevations at the proposed crossing inlet for Q2, Q10, Q25, Q50, and Q100
- ☐ **Provide any additional H&H analysis necessary for applicable regulatory / permit requirements**

Geomorphic Assessment

- ☐ **Required to base the project design on a longitudinal profile survey and cross-sectional surveys of existing conditions.**
  - Conservation district completed longitudinal profile and cross sections may be provided
  - Design Engineer may conduct their own longitudinal profile and cross sections
    - Conservation district must be present during engineer/surveyor collected long-pro
  - Details to be collected in the longitudinal profile and cross sections listed in the Stream Crossing Design & Installation Standard

Channel Design

- ☐ **Using the longitudinal profile survey of existing site conditions, must provide a stream channel design extending upstream, through, and downstream of the replacement crossing that achieves the following:**
  - Provides long-term channel continuity and aquatic organism passage
  - Specifies essential channel features based upon survey of a reference reach condition
    - Bankfull width and cross-sectional shape with well-defined low flow channel (thalweg) and bank margins
    - Specified streambed material composition and placement thickness through the structure
    - Type, number, length, location and elevations of grade control features. A minimum rock size for grade controls must be specified

Structure Design

- ☐ **Structure must be of adequate width to accommodate the bankfull width of the stream at the final bankfull elevation with stable bank margins.**
  - Typical bankfull channel width is _____feet
- ☐ **Replacement structure must be properly aligned with the stream channel**
- ☐ **Must include types and placements of all associated structure appurtenances such as abutments, footings, wingwalls, etc.**
- ☐ **Headwalls and Endwalls are required on all stream crossing structures**
- ☐ **Sizing and installation of the structure and its appurtenances must provide long-term channel continuity and AOP and shall not reduce the minimum effective opening to less than 125% bankfull width at the structure inlet or outlet**
- ☐ **Structure must pass the Q100 flow at an elevation not to exceed 80% of the finished opening height at the structure inlet**

Roadway Design

- ☐ **Must provide design services as needed to address any change to roadway elevations and drainage patterns**
  - Stream Crossing Design & Installation Standard may require increasing the existing roadway elevation. See GP11 DEP Permit Memo for additional guidance
- ☐ **Must consider additional floodplain connectivity (high-water bypass, floodplain pipes, etc.) where necessary**

Permitting & Construction Documents

- ☐ **This project is located in HQ, EV, CWF, or WWF** _____
- ☐ **The drainage area for this project location is** _____
- ☐ **Design engineer must complete all required permit registrations and application materials needed to meet all State, Local and Federal requirements**
- ☐ **Design engineer must prepare a set of construction documents meeting the DGLVR Stream Crossing Design & Installation Standard.**
  - Detailed drawings
  - Technical specifications for project implementation
  - Existing and proposed conditions comparison
  - Erosion and sediment control plan including dewatering measures
  - All critical elevations, grades, slopes and other design criteria
- ☐ **Design engineer must provide all plans and specifications to the conservation district for consistency review with the DGLVR Policy and Stream Crossing Standard before submitting (or resubmitting) materials to regulatory agencies for permit registration / authorization.**
  - Submitted materials will be reviewed by the conservation district for consistency with the Stream Crossing Design and Installation Standard

Pre-Design Checklist

  - All comments must be addressed to the satisfaction of the conservation district prior to receiving a consistency letter and a cover letter for submission to the regulatory reviewing entity.

Bid Documents and/or Shop Drawings

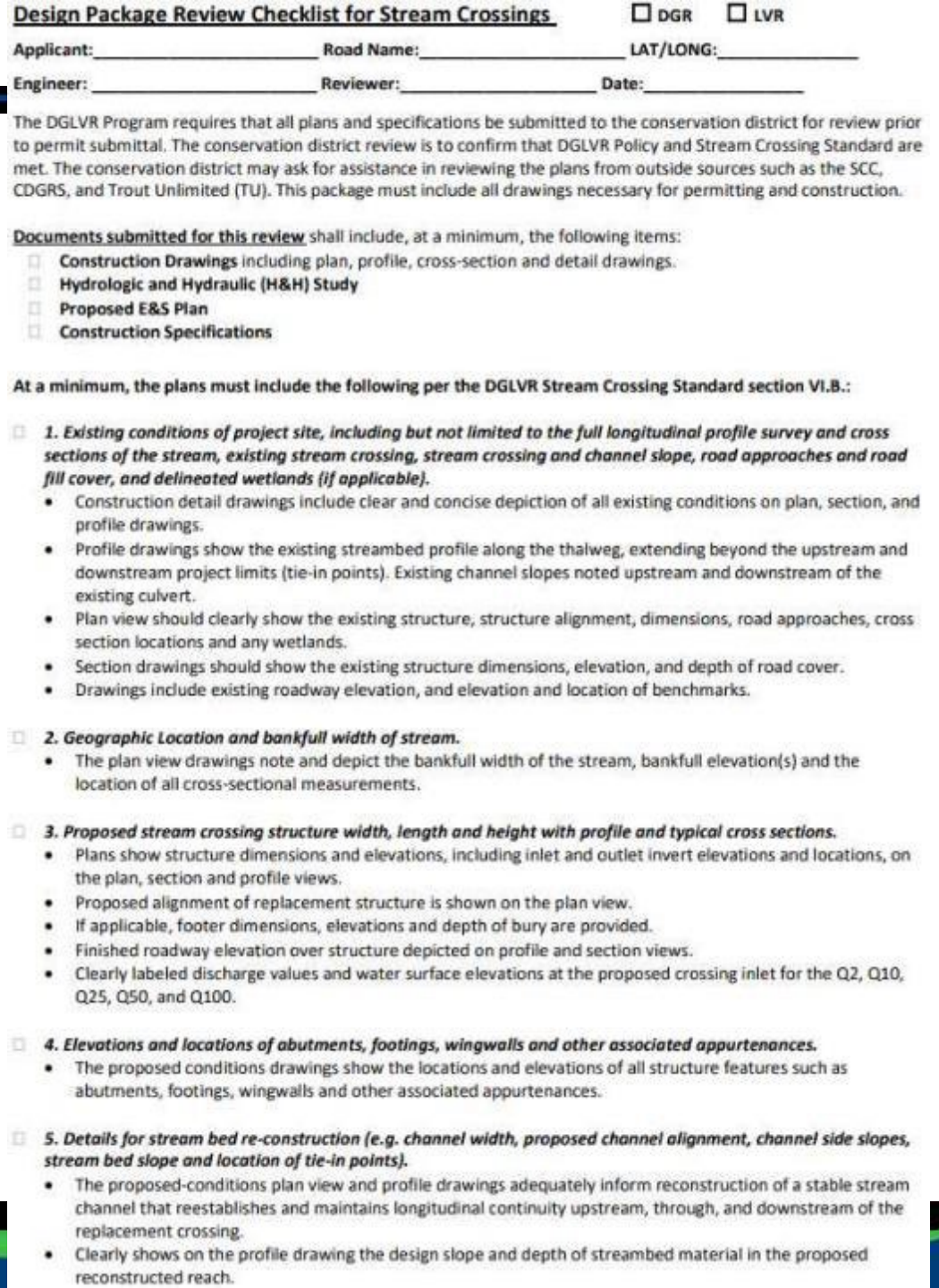
- ☐ **Conservation district must be provided any bid documents or shop drawings associated with the project before advertisement or acknowledgement for fabrication of materials**
  - Conservation district will review for consistency with permit and construction drawings and with the Stream Crossing Design and Installation Standard
  - If needed a list of deficiencies will be provided to the applicant and their design engineer to address
  - All comments must be addressed to the satisfaction of the conservation district prior to receiving a consistency letter. A consistency letter must be granted before advertisement of a bid or acknowledgement of shop drawings for material fabrication
- ☐ **Grantee or Design Engineer must coordinate with the conservation district to be present at the mandatory bid site showing meeting (if applicable).**

Construction Inspection and Certification

- ☐ **Design Engineer is required to provide onsite inspection of critical aspects of construction which include but are not limited to:**
  - Installation of structure subgrade and bedding materials and establishing inverts/elevations
  - Installation of footings, abutments or in-ground appurtenances
  - Installation of grade control features, bank margins, and streambed substrate.
  - Installation or placement of stream crossing structure
  - Compaction and backfill of stream crossing structure
- ☐ **Conservation districts must be on-site regularly during construction to ensure DGLVR Policy and Stream Crossing Standard are met. At a minimum, the conservation district must be onsite during the installation of "Critical Stages of Construction"**
- ☐ **Design engineer shall provide a signed and sealed certification form (attachment B)**

CD Responsibilities

- **Design Package (Plan) Review Checklist**
- **Confirm necessary elements are present**
- **Consistent with the Design Standard**
  - Required documents
  - Existing conditions
  - Location and bankfull width
  - Structure width, length, & height with profile and cross sections
  - Elevation and location of structure features
  - Details for streambed reconstruction
  - Details for low flow channel
  - Details for rock-sizing and structures
  - Material details for streambed restoration
  - Compaction specification
  - Scour hole restoration
  - Structure manufacturer's details/instructions



Design Package Review Checklist for Stream Crossings ☐ DGR ☐ LVR

Applicant:_____ **Road Name:**_____ **LAT/LONG:**_____

Engineer: _____ **Reviewer:**_____ **Date:**_____

The DGLVR Program requires that all plans and specifications be submitted to the conservation district for review prior to permit submittal. The conservation district review is to confirm that DGLVR Policy and Stream Crossing Standard are met. The conservation district may ask for assistance in reviewing the plans from outside sources such as the SCC, CDGRS, and Trout Unlimited (TU). This package must include all drawings necessary for permitting and construction.

Documents submitted for this review shall include, at a minimum, the following items:

- ☐ **Construction Drawings** including plan, profile, cross-section and detail drawings.
- ☐ **Hydrologic and Hydraulic (H&H) Study**
- ☐ **Proposed E&S Plan**
- ☐ **Construction Specifications**

At a minimum, the plans must include the following per the DGLVR Stream Crossing Standard section VI.B.:

☐ ***1. Existing conditions of project site, including but not limited to the full longitudinal profile survey and cross sections of the stream, existing stream crossing, stream crossing and channel slope, road approaches and road fill cover, and delineated wetlands (if applicable).***

- Construction detail drawings include clear and concise depiction of all existing conditions on plan, section, and profile drawings.
- Profile drawings show the existing streambed profile along the thalweg, extending beyond the upstream and downstream project limits (tie-in points). Existing channel slopes noted upstream and downstream of the existing culvert.
- Plan view should clearly show the existing structure, structure alignment, dimensions, road approaches, cross section locations and any wetlands.
- Section drawings should show the existing structure dimensions, elevation, and depth of road cover.
- Drawings include existing roadway elevation, and elevation and location of benchmarks.

☐ ***2. Geographic Location and bankfull width of stream.***

- The plan view drawings note and depict the bankfull width of the stream, bankfull elevation(s) and the location of all cross-sectional measurements.

☐ ***3. Proposed stream crossing structure width, length and height with profile and typical cross sections.***

- Plans show structure dimensions and elevations, including inlet and outlet invert elevations and locations, on the plan, section and profile views.
- Proposed alignment of replacement structure is shown on the plan view.
- If applicable, footer dimensions, elevations and depth of bury are provided.
- Finished roadway elevation over structure depicted on profile and section views.
- Clearly labeled discharge values and water surface elevations at the proposed crossing inlet for the Q2, Q10, Q25, Q50, and Q100.

☐ ***4. Elevations and locations of abutments, footings, wingwalls and other associated appurtenances.***

- The proposed conditions drawings show the locations and elevations of all structure features such as abutments, footings, wingwalls and other associated appurtenances.

☐ ***5. Details for stream bed re-construction (e.g. channel width, proposed channel alignment, channel side slopes, stream bed slope and location of tie-in points).***

- The proposed-conditions plan view and profile drawings adequately inform reconstruction of a stable stream channel that reestablishes and maintains longitudinal continuity upstream, through, and downstream of the replacement crossing.
- Clearly shows on the profile drawing the design slope and depth of streambed material in the proposed reconstructed reach.

- Shows design of streambed and bank margin including rock sizing and elevations at structure inlet and outlet and extending upstream and downstream of the crossing as needed to tie into existing streambed and banks.
- Notes locations and elevations of tie-in points at upstream- and downstream limits of the reconstructed reach (these should occur at existing grade control features).
- The proposed bankfull width of the reconstructed reach shown to scale, with design bankfull width noted.
- Identifies method for stabilizing transition areas at upper and lower project limits.

6. Location and details for low flow channel width, depth, and material size and types.
- Low flow channel dimensions from the cross-sectional surveys are shown on the section view.
- Details should include the width and depth of the channel and information on the stream bed materials used in constructing the low flow channel.

7. Locations and construction details, including rock sizing, of in-stream structures, grade controls, and/or bank stabilization structures (if applicable).
- Plan, section and profile drawings clearly show all grade controls and instream structures, including locations and elevations of grade control features (at crest / thalweg) through the reconstructed reach.
- Plans should note whether grade control features at the tie-in points will be maintained as existing (stable) or will be constructed. For constructed riffles, the design riffle length should be specified.
- Detail drawings for grade control structures should clearly indicate material type, size, installation slopes and overall structure length.

8. Depth, gradation, and composition of material for streambed restoration. Refer to the DGLVR Stream Crossing Replacement Technical Manual for more guidance on determining substrate gradation and composition.
- On the proposed section and profile view the streambed material thickness, inlet and outlet bed elevations should be shown.
- Material gradation and composition should be specified. Note if native material onsite will be reused or if material will need to be imported.
- Gradation, composition and construction details included for the low flow channel, bankfull channel and the bank margins.

9. Specification for compaction of placed streambed material.
- Details provided on compaction (mechanical or hydraulic) of materials used to construct the streambed through the reconstructed reach to prevent subsurface flow down through the substrate.
- Note that substrate is thoroughly compacted when water stays on top of the newly constructed stream bed and does not go subsurface.

10. Details for scour hole restoration details and reestablishing channel cross section.
- If applicable, details are provided to indicate material type, size, and depth to reconstruct the scour hole.
- Reconstruction of the channel cross section through the scour hole should be shown to tie into the existing or reconstructed stream bed.

11. Structure manufacturer's specifications, details, and installation instructions.
- Submittal includes all structure specification drawings, including applicable structural details of all components, including but not limited to reinforcing steel, type of materials, thickness, anchorage requirements, backfill lift thickness, etc.

12. Thickness, compressive strength, reinforcement, testing, and other special requirements for concrete according to the manufacturer specifications, if applicable.
- If applicable, concrete specifications and manufacturer's requirements are provided.
- Includes details for concrete sampling and testing as required.

13. Load limits for bridges and/or culverts including signage per local codes.
- All details related to structure load limits and related signage per Township and PA code are provided.

Design Package (Plan) Review Checklist

☐ ***14. Location of all utilities and notification requirements (PA One Call).***
- Drawings show locations of all utilities and specifies contractor notification requirements for PA One Call.

☐ ***15. Location and elevation of survey benchmarks.***
- Elevations and locations of benchmarks are clearly shown on design plans.

☐ ***16. Method of surface water diversion and dewatering during construction.***
- Submittal includes detail drawings for diversion of the stream flow and dewatering of the construction site.
- Provides details for control of sediment during diversion and dewatering.

☐ ***17. Erosion and Sedimentation Control Plan, if applicable.***
- Construction documents will include an approved E&S Plan with detail drawings for all BMPs to be used during construction, if applicable.

☐ ***18. Vegetative requirements that include seed and plant materials to be used, establishment rates, and season of planting.***
- Plans include details on reseeding and establishment rate. Should note if any specialized bank stabilization or soil amendments will be needed to ensure establishment.

☐ **19. Cross section view of the proposed structure that clearly notes proposed streambed thalweg elevation (at the crest of a constructed grade control feature), Q100 water surface elevation, and top of structure opening elevation.**

☐ ***20. Additional site-specific requirements.***
- Stream crossing replacements through the DGLVR Program include many aspects that differ from more basic culvert replacement projects, therefore project specifications should be included with the bid package.
- If not provided as notations to the detail drawings, separate site-specific specification documents should be provided for unique construction elements. This allows prospective contractors a clear sense of the project goals and needs, establishing a clear understanding of construction requirements.

CD Responsibilities

Other Documents

- Pre-Application Meeting Checklist
- Stream Crossing Exemption Forms (required *if applicable*)
- Engineer Request for Proposal Template
- Consistency/Deficiency Letters (required, but don't have to use template)
- GP-11 Memo (use it)
- GP-7/GP-11 Cover Letter (use it)
- Bid Package Review Checklist
- Bid Site Showing Checklist
- Pre-Construction Meeting Checklist
- Construction Inspections Checklist
- Completion/Final Inspection Checklist
- Inspection and Documentation of Critical Stages of Construction Form (required for engineer)

https://dirtandgravel.psu.edu/stream-crossing-replacements/

Stream Crossing Update

- Implementation Update
- Emerging Issues
- CD Responsibilities
- ***Other Considerations***

Center for Dirt and Gravel Road Studies

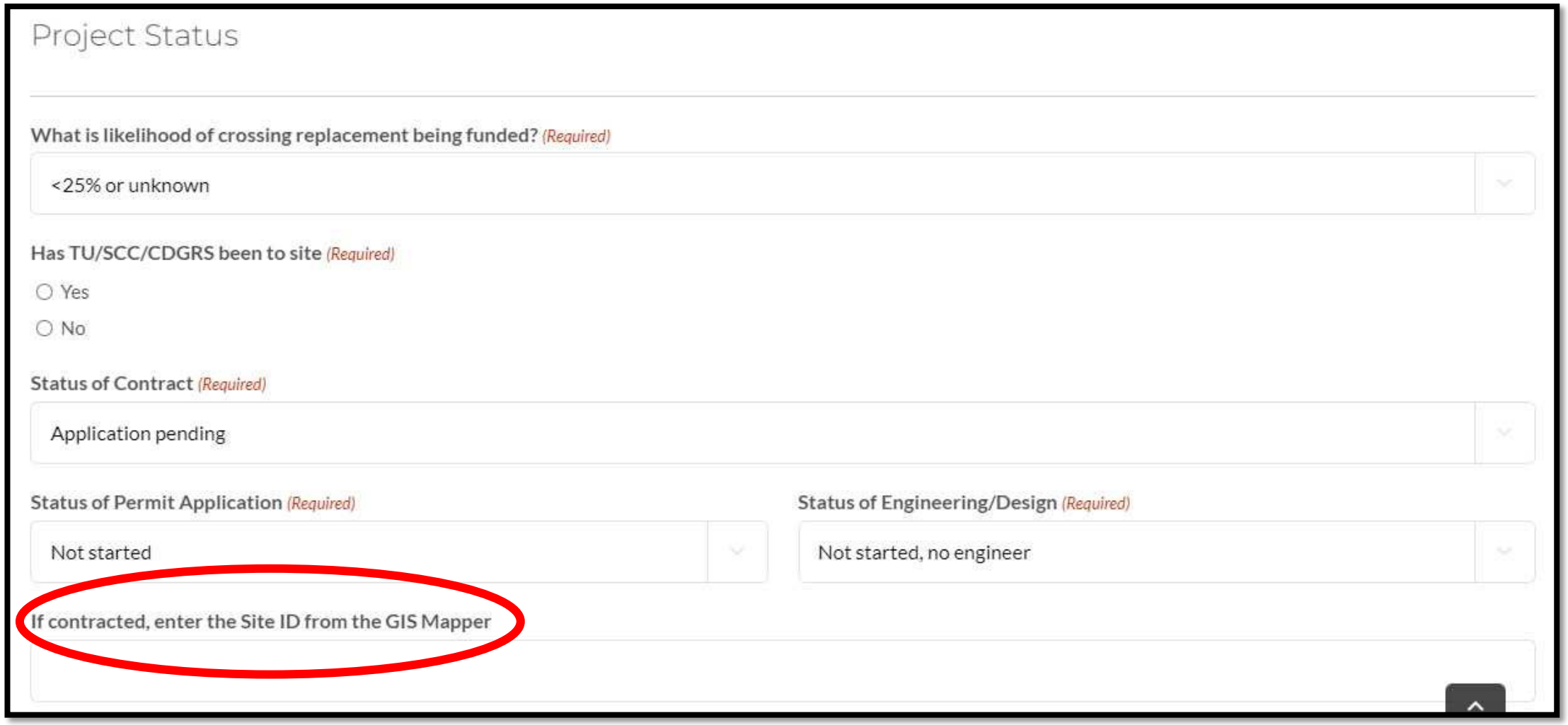
Stream Crossings: Other Considerations

The Program would like to get ahead of any other potential issue out there.

- SCC/CDGRS working to catalog crossings going in under standard
  - E-mail survey to come
- SCC/CDGRS will reach out to see if assistance is needed
- We also want to monitor how the first ones go using the Standard…what works, what doesn't, for future Standard changes.

Stream Crossings: Other Considerations

Stream Notification System update: Add site ID once the project is contracted



Stream Crossings: Other Considerations

Stream Crossing Replacements:

- **are more complex.**
- **are more time-consuming.**
- **take longer to implement.**

(compared to "normal DGLVR projects")

Stream Crossings: Other Considerations

Stream Crossing Replacements:
- **are more complex.**
- **are more time-consuming.**
- **take longer to implement.**

(compared to "normal DGLVR projects")

Does your CD have available staff time to implement stream crossings?

- More meetings, more planning, more plan review, more on-site time.
- A CD with one 25% DGLVR tech might not have to capacity to do even one!
- A few CDs have several (3-4) in the pipeline at once (in addition to drainage projects). That may overwhelm even a full time DGLVR tech.

Stream Crossings: Other Considerations

Stream Crossing Replacements:
- **are more complex.**
- **are more time-consuming.**
- **take longer to implement.**

(compared to "normal DGLVR projects")

Does your CD have knowledge and capacity to implement stream crossings?

- The Center's stream training is a great start, but if you implement one every few years, it is a lot to remember
- Do you have a laser and know how to use it?
- CD is the "keystone" in the process. Can you effectively communicate and discuss with engineer and applicant, and know when to ask for help.

Stream Crossings: Other Considerations

Stream Crossing Replacements:
- **are more complex.**
- **are more time-consuming.**
- **take longer to implement.**

(compared to "normal DGLVR projects")

What happens when the DGVLR technician leaves?

- The average stream crossing, start to finish, might be about as long as the average new technician lasts!
- Manager needs to have some knowledge and needs to ensure someone at the CD can pick up the project.
- How do you move forward with new technician?

- Stream crossing projects require more CD involvement/time
- First 100% “to Standard” projects going in this Spring.
- The Standard only works if the CD ensures it is being met!
- Don’t be shy if you have questions!