Dirt Gravel and Low Volume Road Program

Stream Crossing Documents Overview

Policy: 5/25 9am

Standard: 5/26 9am

Tech Manual: 5/27 9am

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CDGRS

Steve Bloser

SCC

Roy Richardson

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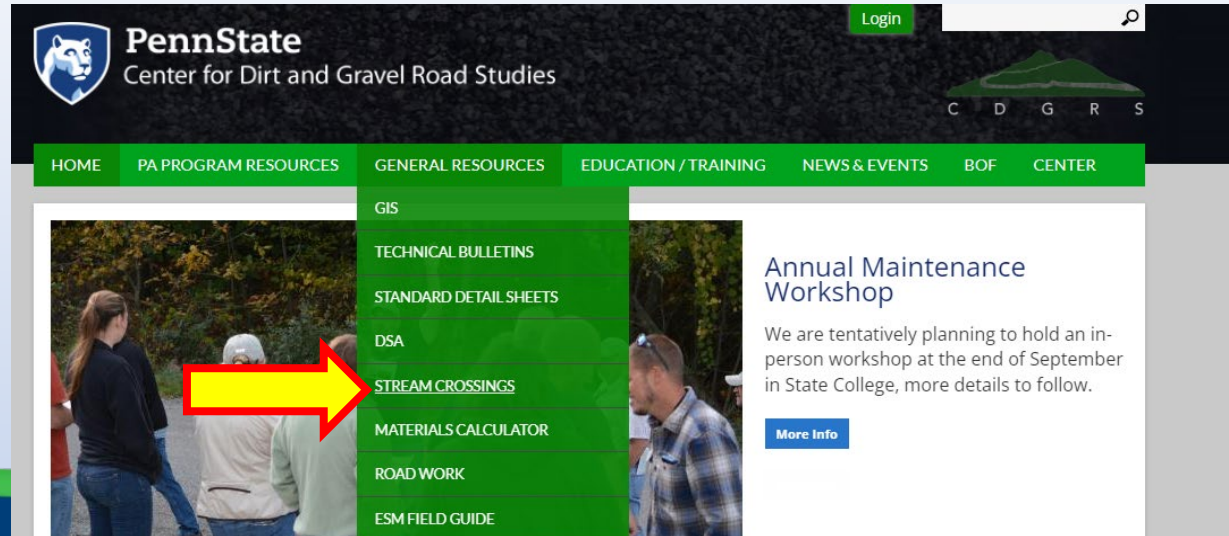
Pennsylvania SCC State Conservation Commission

PennState Center for Dirt and Gravel Road Studies

Stream Crossing Documents

Reminders:

- Contracts signed before 7/1/22 must follow existing policy, not required to follow standard.
- Documents available online (prelim format), will be printed and mailed to CDs
- 6 Regional trainings Scheduled June through December.
  - Each training consists of 4 virtual and 2 in-field sessions over two weeks.
  - Trainings taken this year WILL COUNT for certification requirement that goes into place 7/1/2023 (currently a 3-year certification).
  - Full Details online, registration is open, limited to 15 per session. ***as of 5/23:***
    - **Indiana:** 3 spots remaining
    - **Elk/Clarion:** **Full**
    - **Potter**: 7 spots remaining
    - **Monroe/Susq:** 8 spots remaining
    - **Cumberland:** 6 spots remaining
    - **Lehigh:** 10 spots remaining



TECHNICAL MANUAL

1. Introduction
2. Understanding the standard
3. Initial Site Assessment
4. Longitudinal Profile Survey
5. Grant Application (Material Selection & Cost Estimation)
6. QAB Ranking & Review
7. Writing a Contract
8. From Contract to Construction
9. Installation and Constructions Inspection (active project oversight)
10. Final Inspection & As-built Notes
11. Maintenance
12. Engineering Design, Permitting, and Bidding a Stream Crossing

Chapters 1 & 2 are background and spec detail

Chapters 3-11 in chronological order and directed at CDs

Chapter 12 directed at engineers

Technical Manual

- Intended as details on how to meet policy and standard
- Does not contain additional requirements not already specified in Policy or Standard.

Tech Manual: Ch 1, Introduction

Table of Contents

Tech Manual: Ch 1, Introduction

Ch 1 Highlights:

- The "why". Impacts of poor crossings and benefits of a different approach
- Built on lessons from USFS and other states.
- Focus on "Stream Continuity" over "Aquatic Organism Passage". (and continuity will get you AOP)
- Overview of roles and introduction of policy and standard, and bankfull.

State	Type	Entity	Year	Min Structure Width	Min Embedment (material in structure)
PA	Guidance	PA DCNR	2022	1.25 Bankfull Channel Width	20%
PA	Regulation	PA DEP	2013	x	6" or 1' depending on permit
CT	Guidance	CT DEP	2008	1.2x Bankfull	1', or 20% if over 10'
MA	Regulation	Riverways Prog.	2012	1.2x Bankfull, + dry passage	2', or 25% for round pipes
ME	Regulation	ME DEP	2008	25-year flow	
ME	Guidance	USFWS	2017	1.2x Bankfull	2' or 20% (salmon areas only)
NH	Regulation	NH DES	2009	1.2x Bankfull +2' (bridge over 16')	1' – 2', 25% for round pipes
NY	Guidance	NY DEC	?	1.25x Streambed Width	20%
VT	Guidance	VT FWD	2007	Bankfull + size of bank rocks	
GA	Guidance	GA DNR	2012	Average channel width	20%
NC	Standard	NC DOT	2003	x	1', or 20% if under 4'
SD	Guidance	SD DOT	2011	1.2 Bankfull	1'
CA	Regulation	CA F&G	2007	1.5x Active Channel Width	20%
OR	Standard	OR DOT	2014	1.25 Ordinary High Water Width	20%
WA	Regulation	?	?	1.2x Bankfull +2'	20%
AZ	Guidelines	AZ F&G	?	Span floodplain with dry passage	17% (1/6 structure height)
RI	Guidance	RI DOT	2019	1.2x Bankfull	2' or 20%
FHWA	Guidelines	US FHWA	2010	X	Structure dependent (2', 20%, 30%)

Figure 1.3 Minimum Structure Size and Minimum embedment (depth of material) from various entities in other regions of the United States

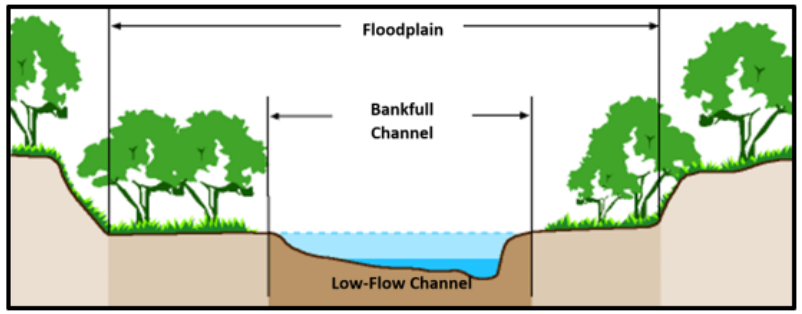
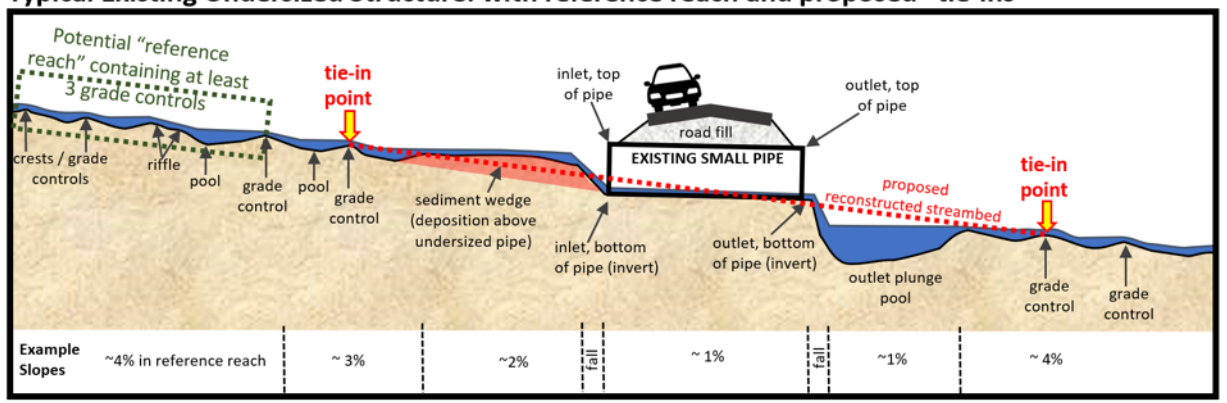


Figure 1.5 Bankfull Width

The bankfull width of a stream is typically equivalent to the width at the elevation where water begins to access its floodplain, and is usually

Typical Existing Undersized Structure: with reference reach and proposed "tie-ins"



A "reference reach" should contain at least three grade controls and be located outside of the influence of the culvert. Determent tie-in points that provide the best continuity of slope through the structure, upstream and downstream.

Tech Manual: Ch 2, DGLVR Stream Crossing Standard

Ch 2 Highlights:

- Provides line-by-line explanation to the Standard.
- This is what we used in yesterday's webinar on the Standard.

IV. I. *Consider floodplain connectivity when necessary (e.g., high water by-pass, overflow pipes, etc.). Floodplain- or overflow pipes must be placed a minimum of one bankfull-width distance outside of the bankfull channel*

In most cases, a wider-than-bankfull width structure will be sufficient to accommodate high flow events. There are situations, however, such as wetland complexes and braided channels, where additional floodplain connectivity should be implemented. This could be accomplished using additional pipes (floodplain pipes, not a multiple pipe crossing), a French mattress, a highwater bypass, or other conveyance. However, it is important that such structures are not placed close enough to the new stream crossing structure to function as a multiple-opening stream crossing structure, which is why the DGLVR Stream Crossing Standard specifies a minimum distance from the bankfull channel for installed floodplain- or overflow pipes.

IV. J. *Structures must be designed and constructed to accommodate the passage of aquatic organisms through the structure.*

In most cases, aquatic organism passage will be obtained by achieving channel continuity upstream, through, and downstream the structure by following the requirements of the DGLVR Stream Crossing Standard related to reestablishing slope, low-flow channels, bank margins, grade control, and **bedforms** reflective of the reference reach.

IV. K. *Round pipes over 36" in diameter may not be utilized for stream crossings.*

Round plastic pipes, by design, are intended to move water rapidly and flush the pipe clean. While this is

Tech Manual: Ch 3, Initial Assessment and Planning

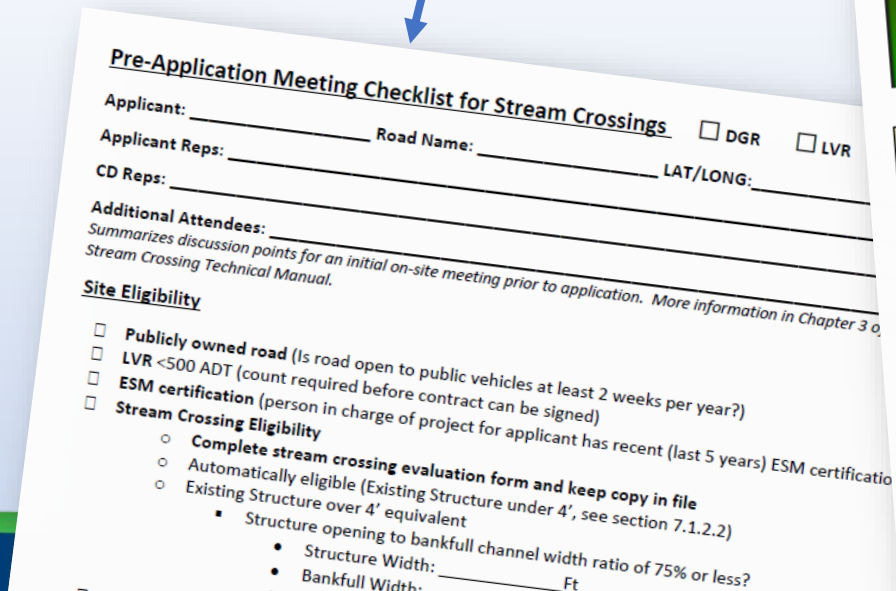
Tech Manual: Ch 3, Initial Assessment and Planning

Ch 3 Highlights:

- Determining eligibility for replacement
- Details on exemptions.
- **Pre project considerations**
  - Realistic timelines
  - Off-ROW
  - Prevailing Wage
  - Potential project and engineering costs
  - Permitting
  - Likelihood of funding
  - SCC notification

Other Resources:

- **Checklist**: Pre-App meeting
- **Tech Bulletin:** Bankfull Width Determination


Pre-Application Meeting Checklist for Stream Crossings ☐ DGR ☐ LVR

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

Applicant Reps: _____

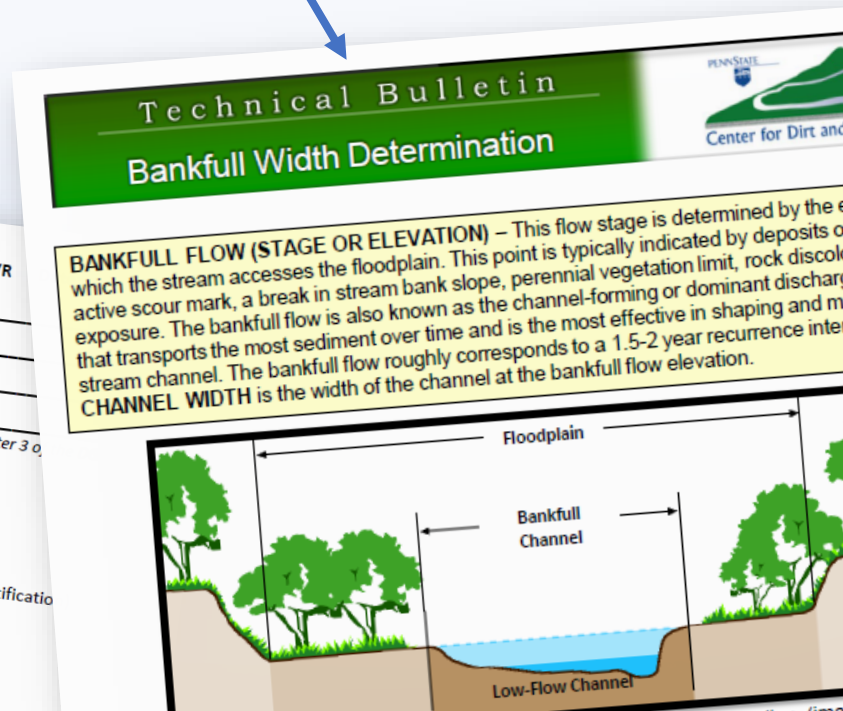
CD Reps: _____

Additional Attendees: _____

Summarizes discussion points for an initial on-site meeting prior to application. More information in Chapter 3 o
Stream Crossing Technical Manual.

Site Eligibility

- ☐ **Publicly owned road** (Is road open to public vehicles at least 2 weeks per year?)
- ☐ **LVR** <500 ADT (count required before contract can be signed)
- ☐ **ESM certification** (person in charge of project for applicant has recent (last 5 years) ESM certificatio
- ☐ **Stream Crossing Eligibility**
  - ○ **Complete stream crossing evaluation form and keep copy in file**
  - ○ Automatically eligible (Existing Structure under 4', see section 7.1.2.2)
  - ○ Existing Structure over 4' equivalent
    - ▪ Structure opening to bankfull channel width ratio of 75% or less?
      - Structure Width: _____ Ft
      - Bankfull Width: _____



Tech Manual: Ch 4, Site Assessment

Tech Manual: Ch 4, Site Assessment

Ch 4 Highlights:

- Longitudinal Profile
- Cross Sections
- Reference Reach
- Data analysis

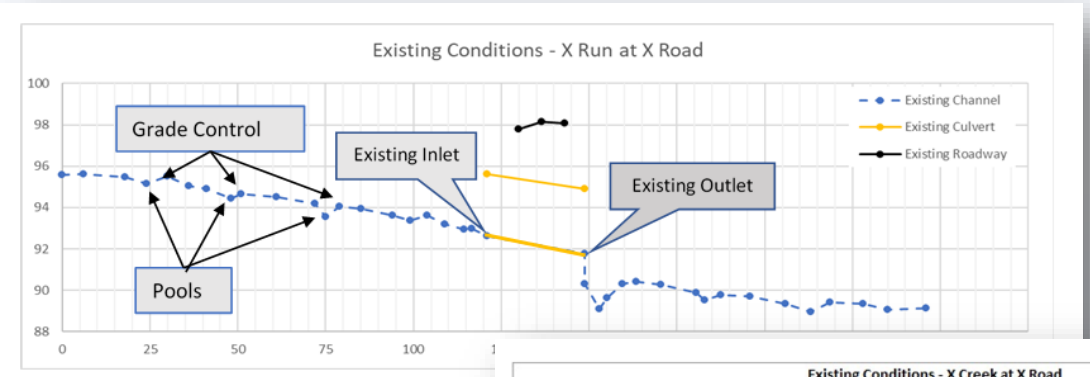


Figure 4.1 Longitudinal Profile Example G

An example of a long-pro survey plotted in Microsoft E average pool depths can be obtained from the data in

Existing Conditions - X Creek at X Road

XS #	1
LP STA	46
HI (ft)	103.7

STA	FS	NOTE	ELEV
0	5.13	Top of Left Pin	98.57
0	5.66	Base of Left Pin	98.04
5	5.86	Floodplain	97.84
8	5.9	Bankfull	97.8
13	6.62	Left Edge of Water	97.08
13.9	6.94	Bottom of Left Bank	96.76
20.3	7.34	Thalweg	96.36
23	7.08	Bottom of Right Bank	96.62
25	6.64	Right Edge of Water	97.06
30	5.62	Top of Right Bank	98.08
34	5.51	Floodplain	98.19

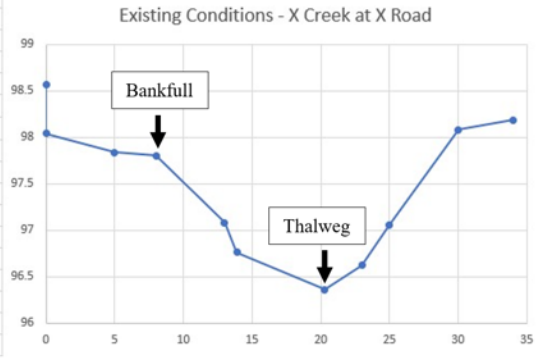
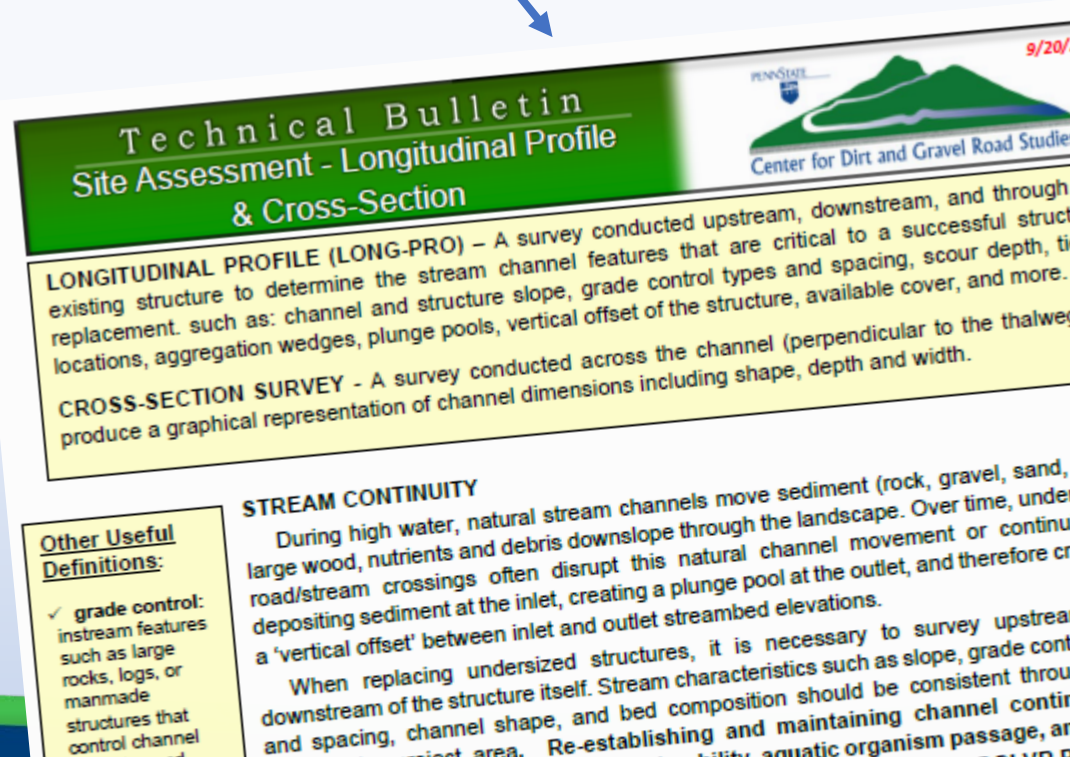


Figure 4.2 Cross Section Example Graph

Other Resources:

- Will be major focus of stream trainings
- **Tech Bulletin:** Site Assessment: Long Pro and Cross Sections



Technical Bulletin
Site Assessment - Longitudinal Profile & Cross-Section

Center for Dirt and Gravel Road Studies

LONGITUDINAL PROFILE (LONG-PRO) – A survey conducted upstream, downstream, and through existing structure to determine the stream channel features that are critical to a successful struct replacement. such as: channel and structure slope, grade control types and spacing, scour depth, ti locations, aggregation wedges, plunge pools, vertical offset of the structure, available cover, and more.

CROSS-SECTION SURVEY - A survey conducted across the channel (perpendicular to the thalweg produce a graphical representation of channel dimensions including shape, depth and width.

Other Useful Definitions:

✓ **grade control:** instream features such as large rocks, logs, or manmade structures that control channel

STREAM CONTINUITY

During high water, natural stream channels move sediment (rock, gravel, sand, large wood, nutrients and debris downslope through the landscape. Over time, under road/stream crossings often disrupt this natural channel movement or continu depositing sediment at the inlet, creating a plunge pool at the outlet, and therefore cr a 'vertical offset' between inlet and outlet streambed elevations.

When replacing undersized structures, it is necessary to survey upstrea downstream of the structure itself. Stream characteristics such as slope, grade cont and spacing, channel shape, and bed composition should be consistent throu

Re-establishing and maintaining channel contin

Tech Manual: Ch 5, Grant Application

Tech Manual: Ch 5, Grant Application

Ch 5 Highlights:

- **Estimating quantities and costs**
- Structure Selection: size, type
- Grade controls
- Streambed
- Other materials
- Labor (contracted vs muni)
- Engineering

Goal is to get a good estimate of costs for contracting. Final design determined by engineer.

Other Resources:

- **Tech Bulletin:** Structure Selection
- **Tech Bulletin:** Grade Control
- **Tech Bulletin:** Streambed Material

Technical Bulletin

Structure Selection for Stream Crossings

12/21

Center for Dirt and Gravel Road Studies

STRUCTURE SELECTION for ROAD STREAM CROSSINGS – Selecting an appropriate structure for crossing replacement will reduce maintenance, improve stream continuity, and increase longevity of the

Figures in this document are general guidelines and vary by material and design. Always consult manufacturer for actual specifications.

WHY DOES STRUCTURE SELECTION MATTER?

Every site presents unique challenges and structure selection is a critical component to the success of any stream crossing project. Selecting the proper structure is important in providing continuity of the stream through the road crossing and providing a long-term, low-maintenance solution to the road owner. A properly selected and designed crossing will meet the following objectives:

- ✓ 1.25 bankfull width minimum opening at bankfull elevation
- ✓ Stable grade controls and stream bed in the structure
- ✓ Stream continuity and passage of aquatic organisms
- ✓ Capacity to pass 100-year discharge (Q100) at 80% of the finished opening height

Bank margins established to create a low-flow channel and protect the structure from scour.

STRUCTURE SELECTION CONSIDERATIONS

Longitudinal Profile: A longitudinal profile conducted upstream and downstream of the structure is a required design practice that ... selection (See Longitudinal Profile ... provide valuable information ... scour

Tech Manual: Ch 6 & 7, Ranking and Contracting

Ch 6&7 Highlights:

- Fairly “normal” DGLVR procedures
- Ranking and evaluation considerations
- Contracting and amendments

Tech Manual: Ch 8, From Contracting to Construction

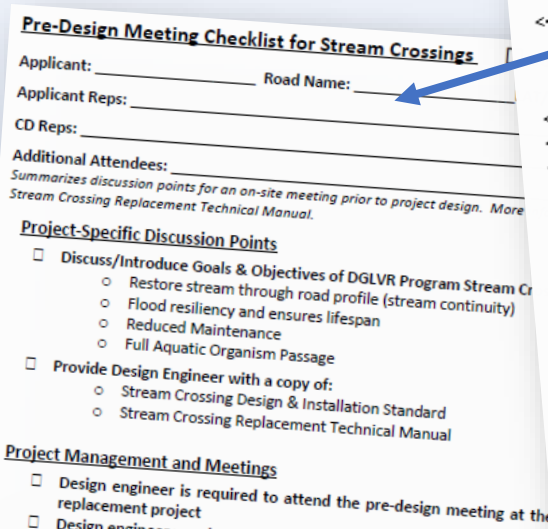
Tech Manual: Ch 8, From Contracting to Construction

Ch 8 Highlights:

- Engineering and RFP(optional)
- Engineering survey
- CD review of plans
- Bidding
- CD review of bid
- Site showing (required to attend if held)
- Pre-design and pre-construction meetings (required)

Other Resources:

- **Templates:**
  - RFP for engineering
  - CD permit review letter
  - CD bid package review letter
- **Checklists:**
  - Pre-design Meeting
  - Permit review
  - Bid-package review
  - Pre-construction Meeting



Pre-Design Meeting Checklist for Stream Crossings

Applicant: _____ Road Name: _____

Applicant Reps: _____

CD Reps: _____

Additional Attendees: _____

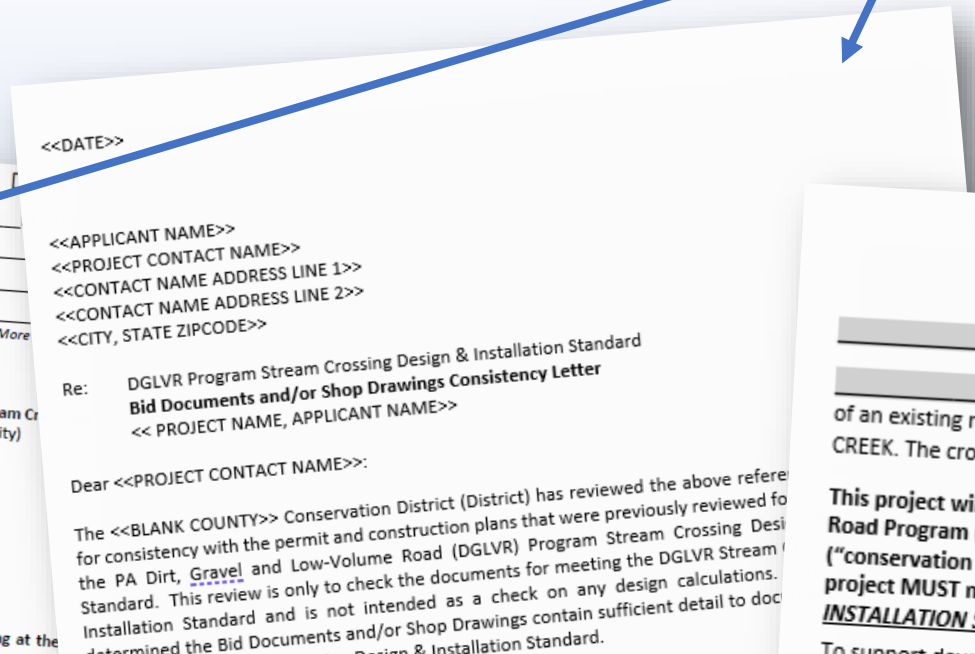
Summarizes discussion points for an on-site meeting prior to project design. More
Stream Crossing Replacement Technical Manual.

Project-Specific Discussion Points

- ☐ Discuss/Introduce Goals & Objectives of DGLVR Program Stream Cr
  - ○ 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 replacement project
- ☐ Design engineer



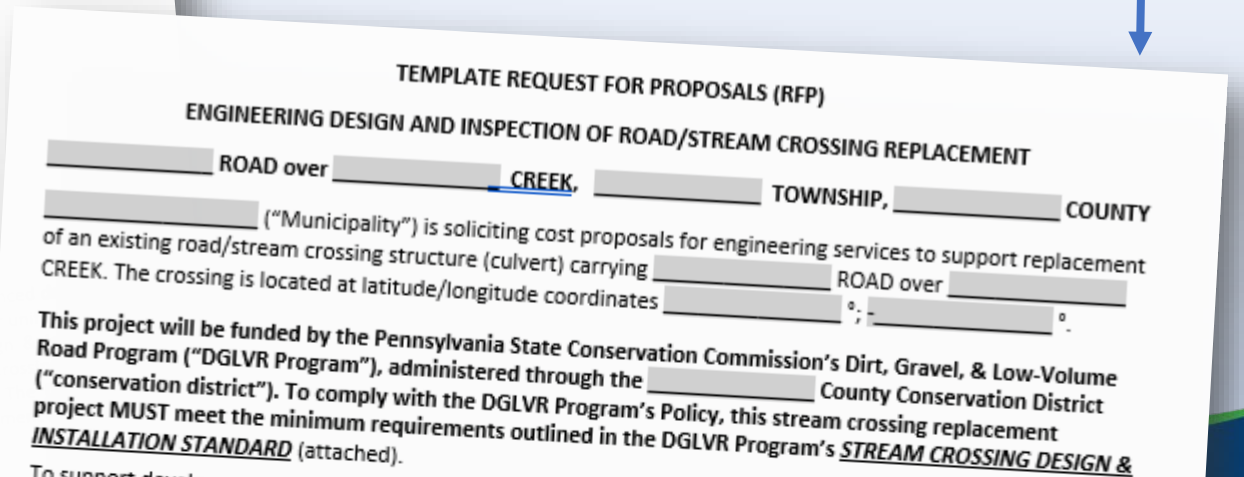
<<DATE>>

<<APPLICANT NAME>>
<<PROJECT CONTACT NAME>>
<<CONTACT NAME ADDRESS LINE 1>>
<<CONTACT NAME ADDRESS LINE 2>>
<<CITY, STATE ZIPCODE>>

Re: DGLVR Program Stream Crossing Design & Installation Standard
Bid Documents and/or Shop Drawings Consistency Letter
<< PROJECT NAME, APPLICANT NAME>>

Dear <<PROJECT CONTACT NAME>>:

The <<BLANK COUNTY>> Conservation District (District) has reviewed the above refere
for consistency with the permit and construction plans that were previously reviewed fo
the PA Dirt, Gravel and Low-Volume Road (DGLVR) Program Stream Crossing Desi
Standard. This review is only to check the documents for meeting the DGLVR Stream
Installation Standard and is not intended as a check on any design calculations.
determined the Bid Documents and/or Shop Drawings contain sufficient detail to doc
Design & Installation Standard.



TEMPLATE REQUEST FOR PROPOSALS (RFP)

ENGINEERING DESIGN AND INSPECTION OF ROAD/STREAM CROSSING REPLACEMENT

_____ **ROAD over** _____ **CREEK,** _____ **TOWNSHIP,** _____ **COUNTY**

_____ ("Municipality") is soliciting cost proposals for engineering services to support replacement of an existing road/stream crossing structure (culvert) carrying _____ ROAD over _____ CREEK. The crossing is located at latitude/longitude coordinates _____ °; -_____ °.

This project will be funded by the Pennsylvania State Conservation Commission's Dirt, Gravel, & Low-Volume Road Program ("DGLVR Program"), administered through the _____ **County Conservation District ("conservation district"). To comply with the DGLVR Program's Policy, this stream crossing replacement project MUST meet the minimum requirements outlined in the DGLVR Program's *STREAM CROSSING DESIGN & INSTALLATION STANDARD*** (attached).

To support develo

Tech Manual: Ch 9, Construction and Inspection

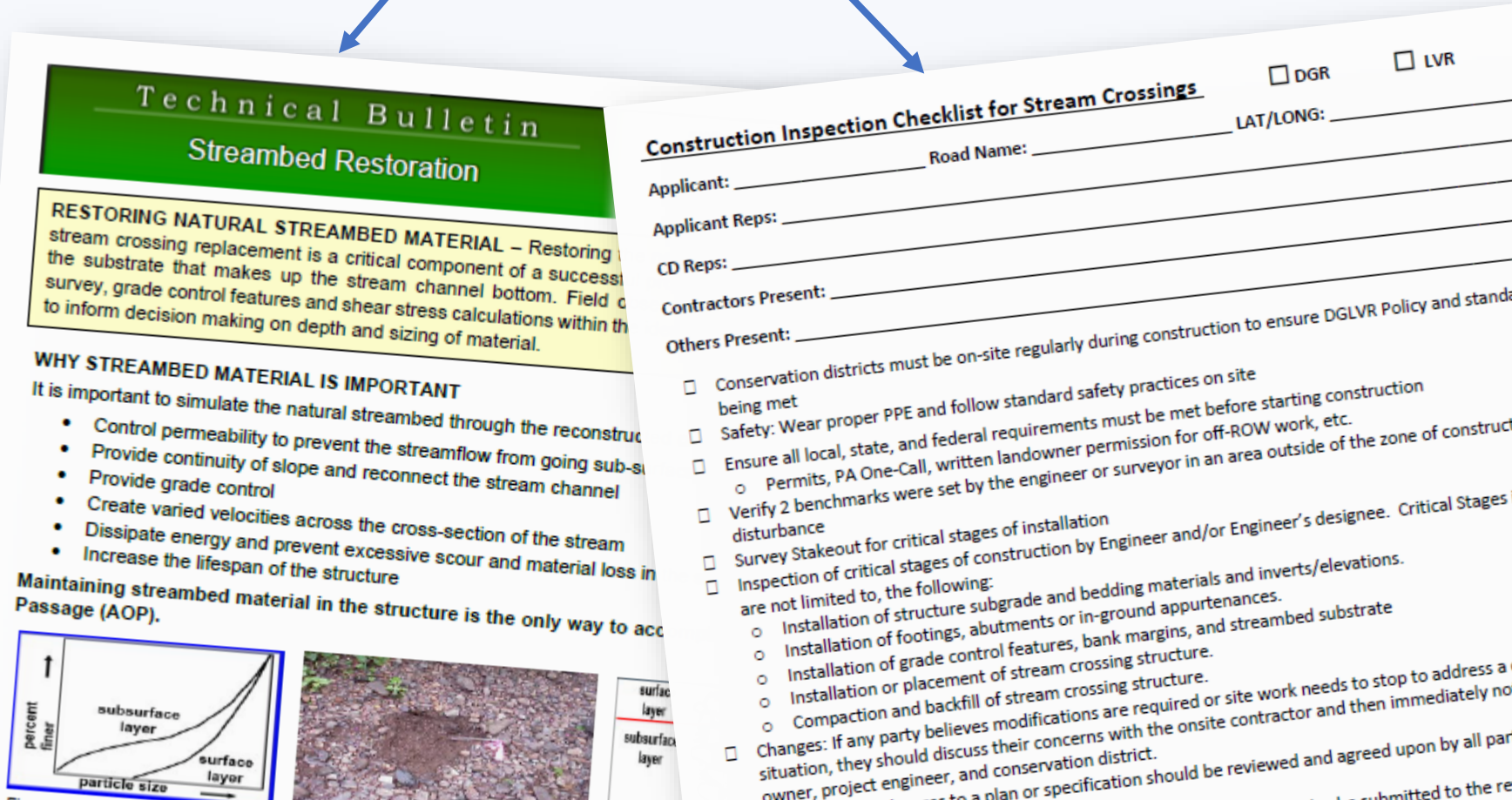
Tech Manual: Ch 9, Construction and Inspection

Ch 9 Highlights:

- Inspection Requirements (engineer and CD)
- Logistics: safety, E&S, dewatering etc
- Structure placement
- Re-establishing stream
  - Grade Control
  - Bank Margins
  - Streambed substrate
- Backfill and cleanup

Other Resources:

- **Tech Bulletin:** Grade Control
- **Tech Bulletin:** Streambed Material
- **Checklist:** Construction Inspection



Technical Bulletin

Streambed Restoration

RESTORING NATURAL STREAMBED MATERIAL – Restoring
stream crossing replacement is a critical component of a successf
the substrate that makes up the stream channel bottom. Field c
survey, grade control features and shear stress calculations within th
to inform decision making on depth and sizing of material.

WHY STREAMBED MATERIAL IS IMPORTANT

It is important to simulate the natural streambed through the reconstruc

- Control permeability to prevent the streamflow from going sub-s
- Provide continuity of slope and reconnect the stream channel
- Provide grade control
- Create varied velocities across the cross-section of the stream
- Dissipate energy and prevent excessive scour and material loss in
- Increase the lifespan of the structure

Maintaining streambed material in the structure is the only way to acc
Passage (AOP).

Construction Inspection Checklist for Stream Crossings ☐ DGR ☐ LVR

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

Applicant Reps: _____

CD Reps: _____

Contractors Present: _____

Others Present: _____

- ☐ Conservation districts must be on-site regularly during construction to ensure DGLVR Policy and standa being met
- ☐ Safety: Wear proper PPE and follow standard safety practices on site
- ☐ Ensure all local, state, and federal requirements must be met before starting construction
  - ○ Permits, PA One-Call, written landowner permission for off-ROW work, etc.
- ☐ Verify 2 benchmarks were set by the engineer or surveyor in an area outside of the zone of construct disturbance
- ☐ Survey Stakeout for critical stages of installation
- ☐ Inspection of critical stages of construction by Engineer and/or Engineer's designee. Critical Stages are not limited to, the following:
  - ○ Installation of structure subgrade and bedding materials and 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.
- ☐ Changes: If any party believes modifications are required or site work needs to stop to address a situation, they should discuss their concerns with the onsite contractor and then immediately no owner, project engineer, and conservation district.

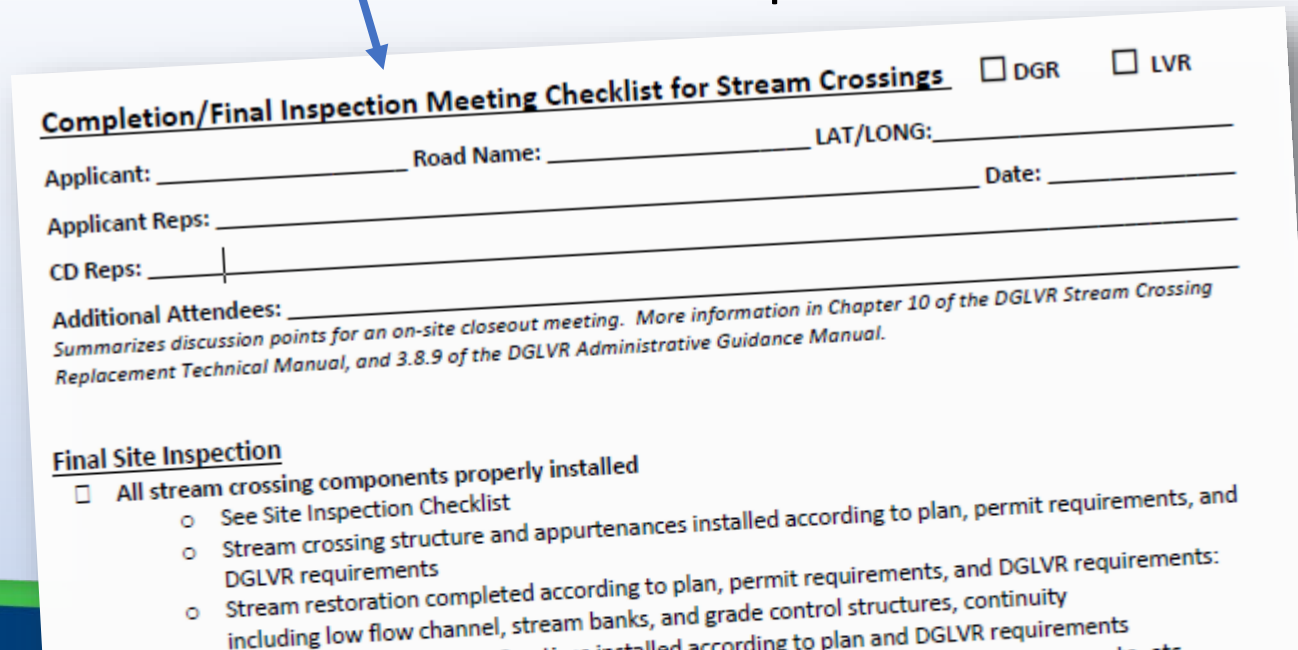
Tech Manual: Ch 10, Final Inspection and "As Built" Notes

Ch 10 Highlights:

- Final inspection and completion report
- Documentation and payment

Other Resources:

- **Checklist:** Final Inspection



Completion/Final Inspection Meeting Checklist for Stream Crossings ☐ DGR ☐ LVR

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

Applicant Reps: _____ Date: _____

CD Reps: _____

Additional Attendees: _____

Summarizes discussion points for an on-site closeout meeting. More information in Chapter 10 of the DGLVR Stream Crossing Replacement Technical Manual, and 3.8.9 of the DGLVR Administrative Guidance Manual.

Final Site Inspection

☐ **All stream crossing components properly installed**

- See Site Inspection Checklist
- Stream crossing structure and appurtenances installed according to plan, permit requirements, and DGLVR requirements
- Stream restoration completed according to plan, permit requirements, and DGLVR requirements: including low flow channel, stream banks, and grade control structures, continuity
- [illegible] installed according to plan and DGLVR requirements

Tech Manual: Ch 11, Monitoring and Maintenance

Ch 11 Highlights:

- Site monitoring encouraged but NOT required
- Regular Maintenance: up to road owner
- Larger “repairs”: May be funded at discretion of individual CDs

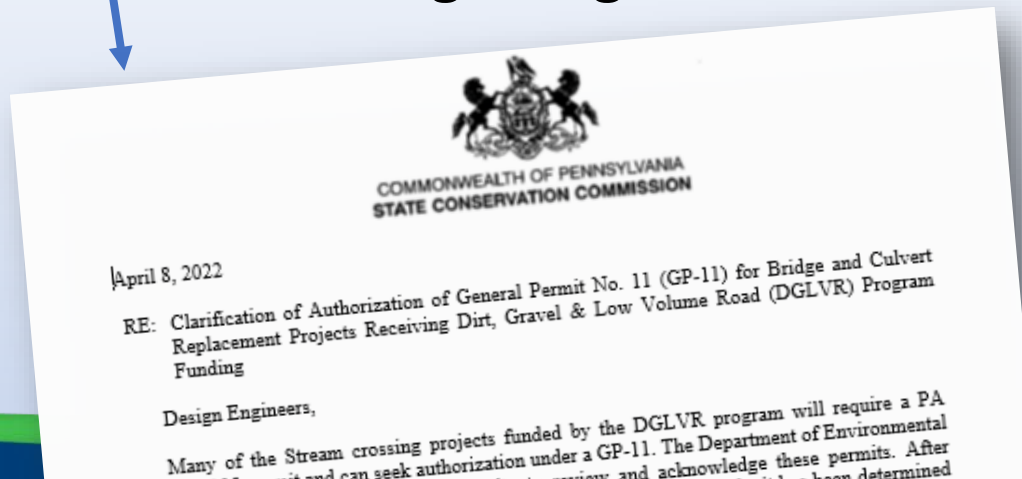
Tech Manual: Ch 12, Engineering Design Considerations

Ch 12 Highlights:

- This chapter is intentionally repetitious of previous Chapters.
- Written with an engineer audience in mind
- More technical and design oriented
- Can give to design engineer
- This is where a lot of the “nitty gritty” lives

Other Resources:

- GP-11 Permit Memo
  - Raising the Road
  - Crossing realignment



COMMONWEALTH OF PENNSYLVANIA
STATE CONSERVATION COMMISSION

April 8, 2022

RE: Clarification of Authorization of General Permit No. 11 (GP-11) for Bridge and Culvert Replacement Projects Receiving Dirt, Gravel & Low Volume Road (DGLVR) Program Funding

Design Engineers,

Many of the Stream crossing projects funded by the DGLVR program will require a PA

Tech Manual: Ch 12, Engineering Design Considerations

APPENDICES

Appendix A. DGLVR Stream Crossing Design and Installation Standard
Appendix B. Definitions and Acronyms
Appendix C. Stream Crossing Evaluation Form
Appendix D. Stream Continuity Sketches
Appendix E. SCC GP-11 Permit Memo
Appendix F. Editable Forms and Templates
Appendix G. Checklists
Appendix H. Technical Bulletins

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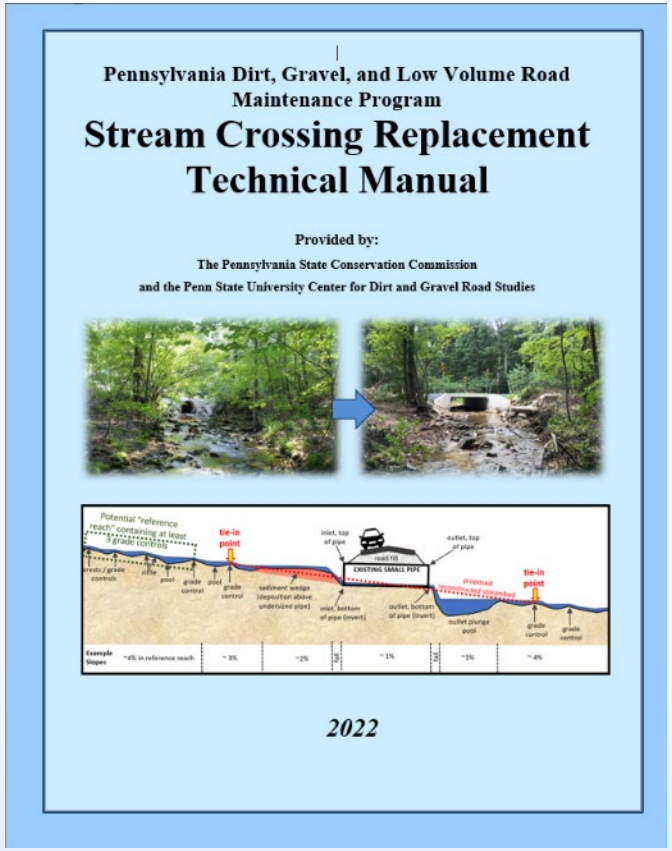
Additional Questions?



Technical Manual does not contain additional requirements not already specified in Policy or Standard.