

# Permit Types for Stream Continuity Culvert Replacements

Josh Shapiro, Governor

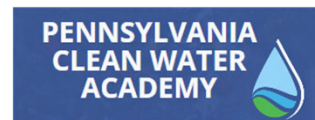
Jessica Shirley, Interim Acting Secretary

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## Additional 105 Updates

### New Clean Water Academy Courses:

- Into to PA Soils
- Oil Creek Restoration Case Study
- Restoration Guiding Principles



[Course: Guiding Principles of Aquatic Ecosystem Restoration \(remote-learner.net\)](https://remote-learner.net)

### [Online Bridge & Culvert Maint. Repair Tool](https://www.dep.pa.gov/Business/Water/Waterways/Encroachments/StormAndFloodingInformation/Pages/default.aspx)

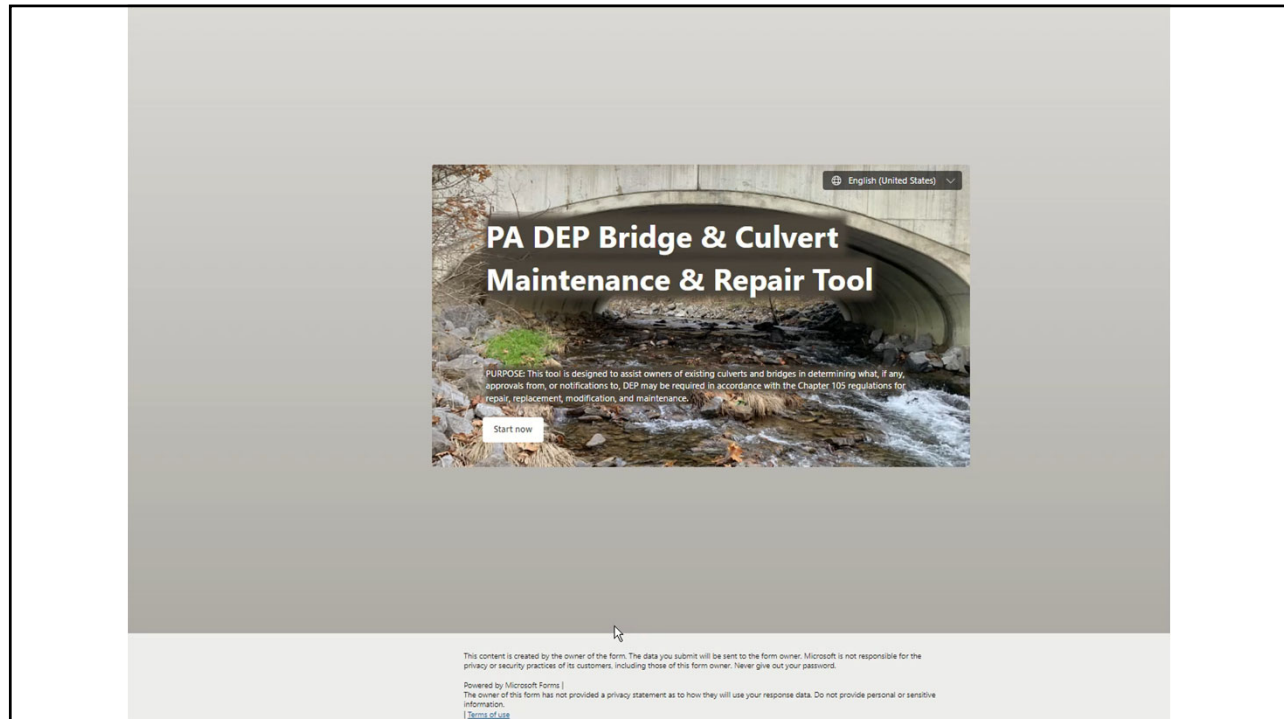
<https://www.dep.pa.gov/Business/Water/Waterways/Encroachments/StormAndFloodingInformation/Pages/default.aspx>

### Upcoming CWA Trainings (~ within a year)

- Additional Aquatic Resource Restoration (3-8 trainings)
- Wetland Restoration and Treatment in Ag




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## Topics

- DEP's Position On This Design Approach
- Permitting under GP-11
- Permitting outside of GP-11
- Scenarios for GP-11
- What to Submit with Permit Applications



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## DEP's Position on Design Approach

- We are strongly supporting it and encouraging it
- Working with other agencies on promoting
- 105 program is collaborating with SCC and PSU CDGRS on cooperative trainings
- Providing clarification and trainings to our staff



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## Permitting under GP-11



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## What is a General permit

Chapter 105 General Permits are (See Chapter 105 Subchapter K:

- Already issued Permits
- Categories of projects similar in nature
- Must be adequately regulated utilizing standardized specifications and conditions
- Registrations must still comply with Chapter 105 requirements



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## SCC GP-11 Memo in Tech Manual

Appendix E. Clarification on GP-11 regarding stream realignments, Changes of Approach Roadways, Scour and Deposition

- Coordinated with and reviewed by DEP
- Provides guidance on certain GP-11 conditions
- Provide understanding on when stream continuity replacements qualify for GP-11



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 Chapter 105 permit and can seek authorization under a GP-11. The Department of Environmental Protection is the agency with the authority to review and acknowledge these permits. After coordination with DEP Bureau of Waterways Engineering and Wetlands, it has been determined that DGLVR stream crossing replacement projects consistent with the DGLVR Stream Crossing Design and Installation Standard (Standard) are consistent with design techniques utilized under a GP-11 with specific consideration of design methodologies. The intent of this memo is to clear up some misunderstandings as to what design techniques may or may not be utilized under the GP-11. These clarifications are provided with specific consideration of the design methods utilized in the DGLVR Stream Crossing Standard.

Specifically, changes in the skew of bridges and culverts can be authorized under GP-11 in conjunction with associated stream realignments immediately upstream and downstream of the structure. The change in skew and associated incidental stream realignment associated with the change in skew, may be authorized in circumstances where:

1. The culvert or bridge skew changes maintain or re-establish stream flow patterns consistent with the natural regime upstream and downstream of the road or bridge/culvert.
2. The proposed structures maintain either the inlet or outlet at the same location as the existing structure, or the location of both the inlet and outlet change but the proposed structure rotates on a horizontal axis of the existing structure, or the proposed structure is immediately adjacent to the existing structure.
3. Stream realignments associated with the new structure are incidental and are generally limited to 50 feet upstream and downstream of the structure. DEP may consider realignments a limited distance beyond 50 feet in special circumstances, but any realignments must still be incidental and necessary to support the structure.

In accordance with the Standard and with DEP's design criteria, please note that the skew changes must maintain or re-establish stream flow patterns consistent with natural regime upstream and downstream of the bridge or culvert, and that the conditions of GP-11 must still be met.

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## GP-11 – What Can Be Done

GP-11 Authorizes:

“[T]he maintenance, testing, repair, **rehabilitation** or **replacement** of existing currently serviceable, **water obstructions or encroachments**, including bridges and culverts owned by railroad companies. **Minor deviations in the structure’s configuration or filled area** including those due to **changes in materials, construction techniques**, current construction codes or safety standards **which are necessary to repair, modify or replace** the water obstruction or encroachment are permitted, **provided the environmental impacts resulting from such repair, modification or replacement are minimal**, those minimal impacts fall within the terms and conditions of this General Permit, and there is no adverse impact on public health and safety.” Emphasis added.



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## GP-11 – What Can Be Done

Why does it matter that these are environmentally beneficial projects when interpreting permit conditions?

**Remember: This is an interdisciplinary design of both engineering and environmental professions**

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## Stream Realignments and GP-11

### No stream relocations allowed Under GP-11

"B. No new stream relocation, stream enclosure or stream channel is authorized by this General Permit"

### No stream realignments allowed except:

"C. No stream realignments are permitted except for those incidental activities **immediately adjacent to the upstream and downstream waterway opening of bridges and culverts that are necessary to support the structure.**"

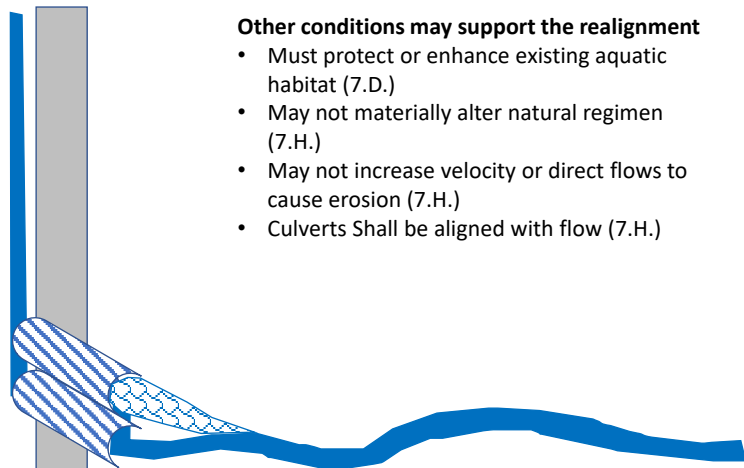


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## Stream Realignments and GP-11

### Realignments:

- Incidental
- Immediately Adjacent
- Better direct flow
- Limited to 50ft upstream and downstream
  - Ties to authorized "Minor" and how minor is defined in EA
  - GP-11 only authorizes "Minor"
- Beyond 50ft?? -Maybe-
  - Must still be incidental, and support geomorphic restoration



### Other conditions may support the realignment

- Must protect or enhance existing aquatic habitat (7.D.)
- May not materially alter natural regimen (7.H.)
- May not increase velocity or direct flows to cause erosion (7.H.)
- Culverts Shall be aligned with flow (7.H.)

**Consistent with Regulations:** 25 Pa. Code §§ 105.2(3), 105.2(4), 105.16(d), 105.161(a)(3), 105.161(a)(4), and 105.166(a)

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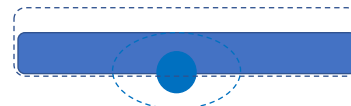
## ➤ Approach Grades and Overtopping Characteristics

**Special Condition 7.H.:**

- There will be no significant changes to grades of approach roadways or to overtopping characteristics.
- Bridge and culvert replacement projects may not increase water surface elevations for the 100-year flood event.

**Larger Structure = More fill**

**More Fill over road = Higher elevation where water goes**



**What is significant??**



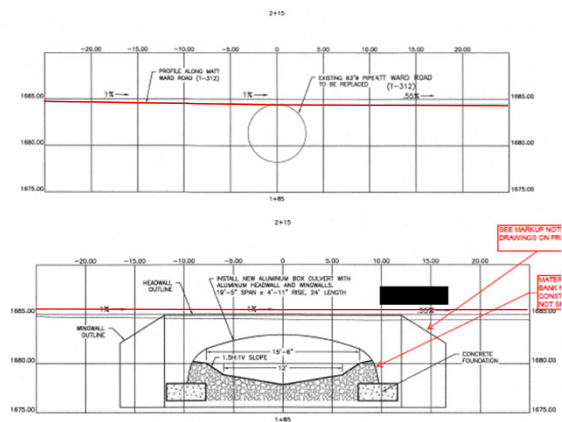
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## ➤ Approach Grades and Overtopping Characteristics

Significant is an engineering evaluation can be based on two things:

- Its obvious changes do not result in significant risk (i.e. substantial increase in hydraulic conveyance), and not in FEMA study area
- H&H report demonstrates no increase to risk of flooding

There is no clear rule of thumb, and you should be consulting with the reviewer.

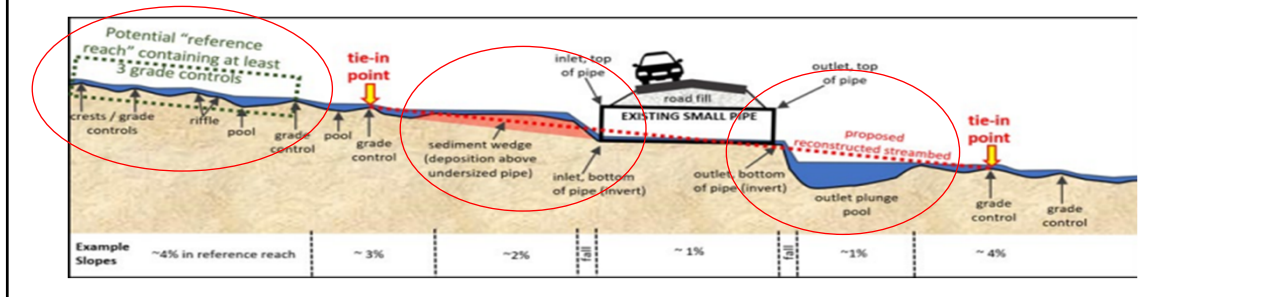


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## Sediment Deposition and Scour in Channel

- Undersized culverts accumulate sediment above culverts
- Scour areas in streams can be present below culverts
- Stream continuity looks to restore natural profile through the reach

Restoring aquatic habitat is part of the conditions of GP-11

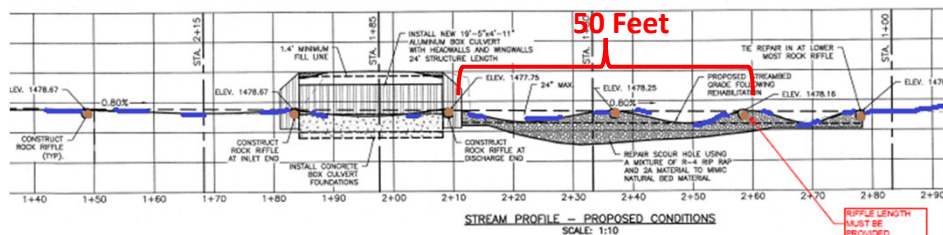


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## Sediment Deposition and Scour in Channel

What are the GP-11 Limits?

- Stream Length: Generally 50-feet upstream and downstream can be authorized
  - Why?: Minor and incidental
    - (ties to GP-11 description, minor definition in EA, and incidental in conditions)
- To ensure stability, this work usually goes beyond the sediment wedge and scour hole.
- Applicant should justify beyond 50ft and consult with DEP prior to submission
- If the wedge and scour hole go beyond the 50ft, staff are encouraged to use their professional judgement in allowing.



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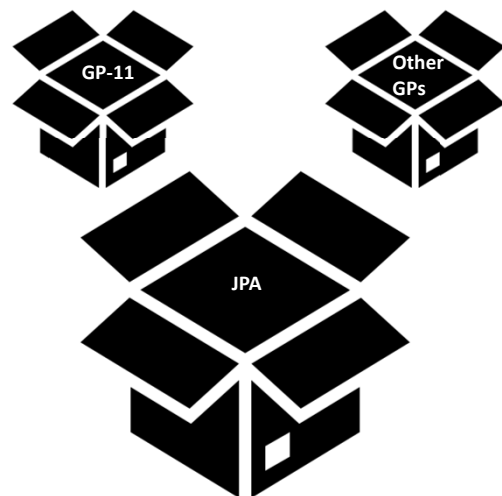
## Permitting Outside of GP-11



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## When GP-11 Does Not Apply

- So what are the options??
- GP-11 + Other General Permits
- GP-11 + EA Approval
- Joint Permit Application



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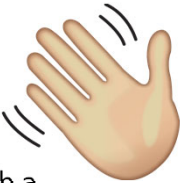
## Ideal Goal


  
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## JPAs

- Pre-Application Meetings Encouraged
- This design process identifies degradations and has solutions designed to address and mimic natural stream, so use that background info to write the EA
- Ask DEP in pre-app if there are things they can waive. Go through a form and mark it up and ask them to confirm.



- Much of work should already be done to complete the EA as part of the process.
- Remembering that and much of the additional Environmental Assessment Documentation should be easy to write, without significant additional work.


  
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## Scenarios



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## Scenarios

**The scenarios are only examples, meant to simplify into specific attributes of a hypothetical project. Just because a portion of a project may fit a scenario presented here does not guarantee eligibility for GP-11. The whole project, scope, and design must be considered in determining GP-11 Eligibility.**

**Therefore, early coordination with DEP reviewers on channel realignments, etc. is strongly recommended.**



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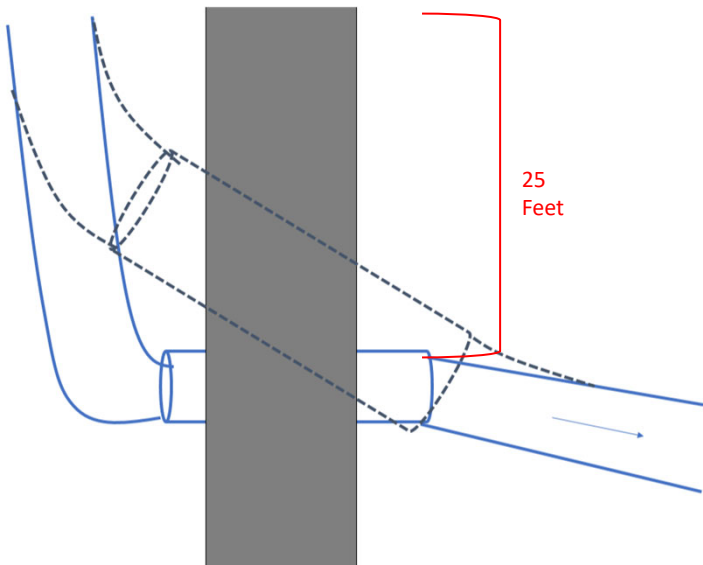
## Scenario #1

Culvert  
Perpendicular  
to flow at  
entrance from  
historic  
installation

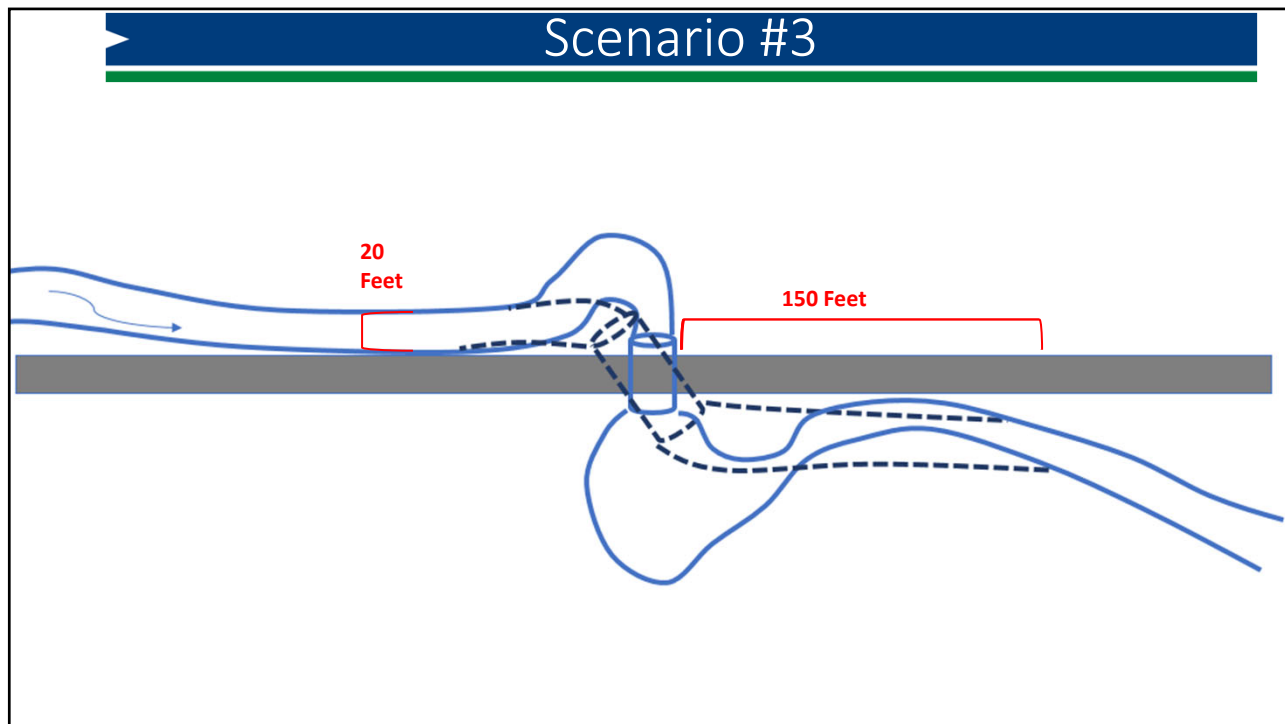
An aerial photograph showing a culvert structure. The culvert is a dark, rectangular feature oriented vertically. Several light-colored, linear features, likely flow paths or channels, cross the culvert area. The surrounding terrain is a mix of light and dark patches, possibly representing different ground types or vegetation.

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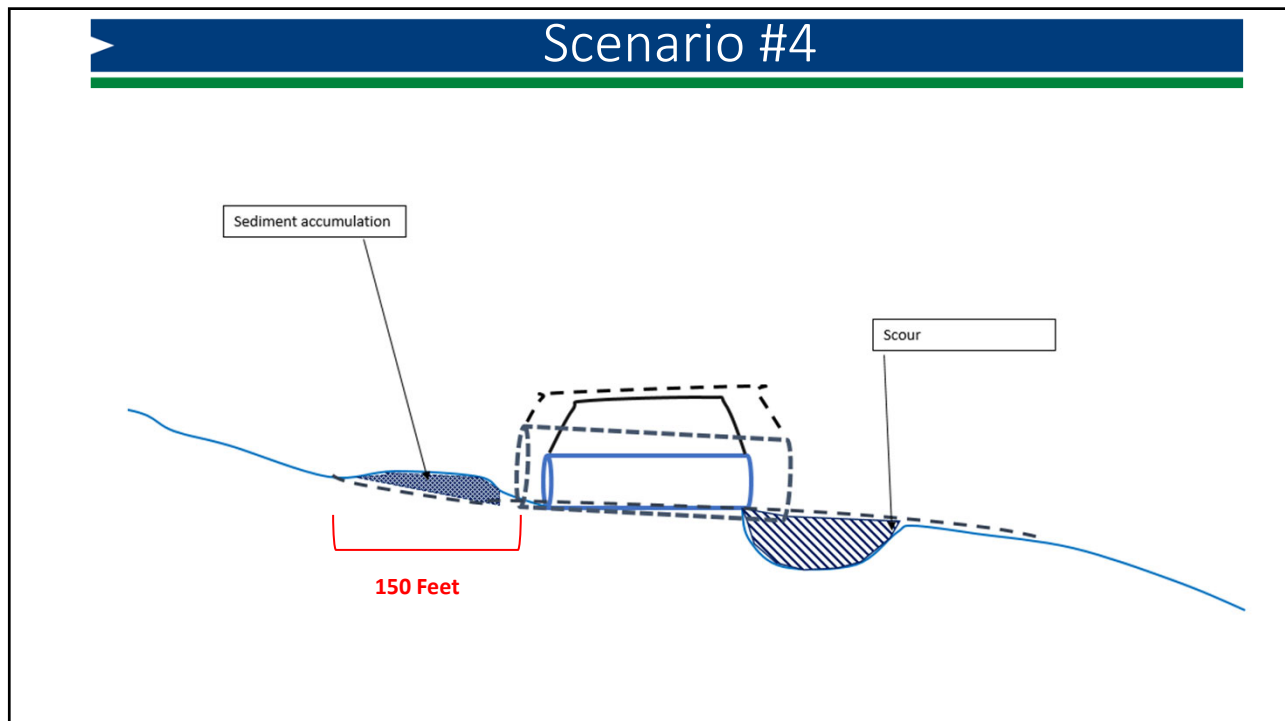
## Scenario #2

A schematic diagram illustrating flow paths around a culvert. A central vertical grey bar represents the culvert. Solid blue lines show the flow paths, which curve around the culvert. Dashed blue lines represent alternative or potential flow paths. A red bracket on the right side indicates a distance of 25 feet from the culvert to a specific point on the flow path. A small blue arrow at the bottom right indicates the direction of flow.

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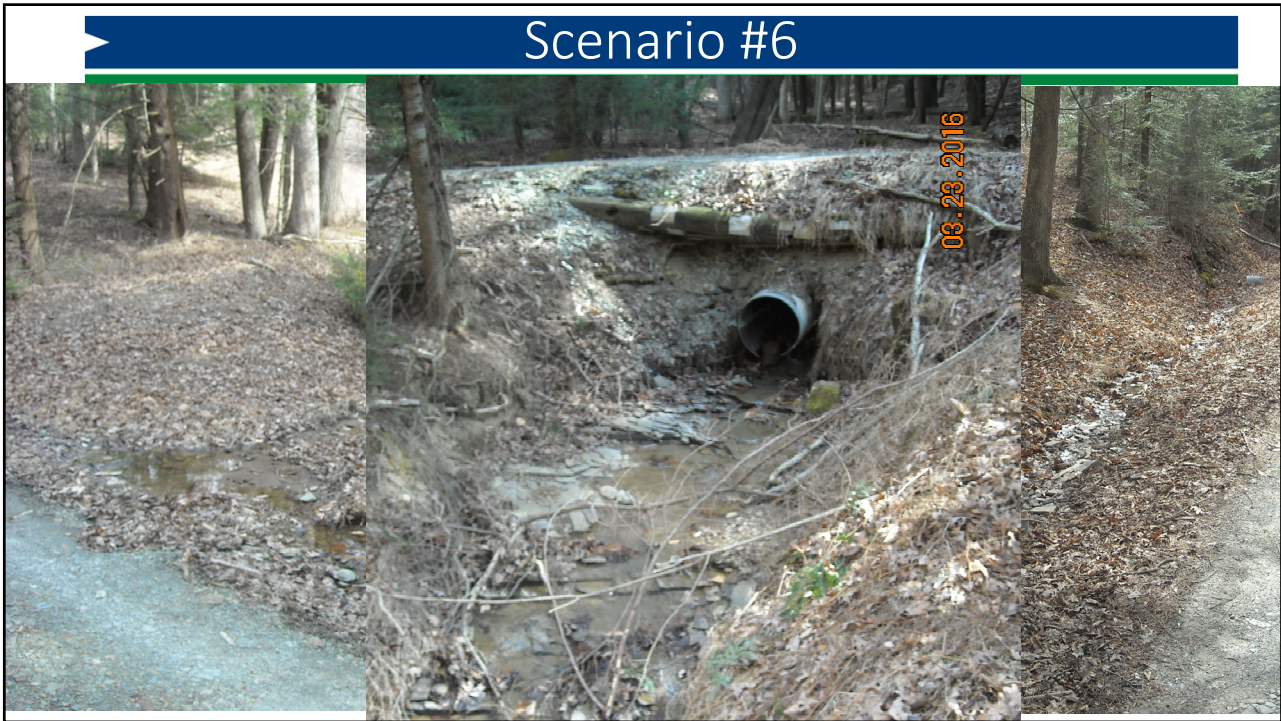
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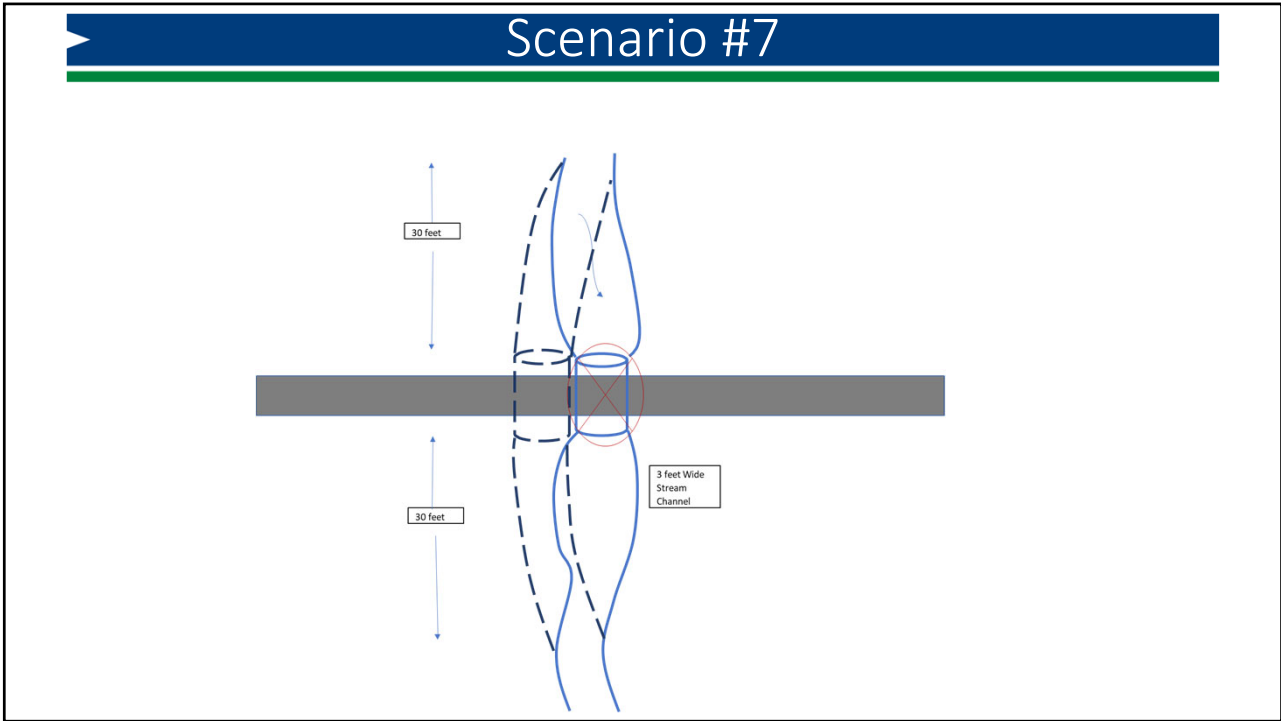
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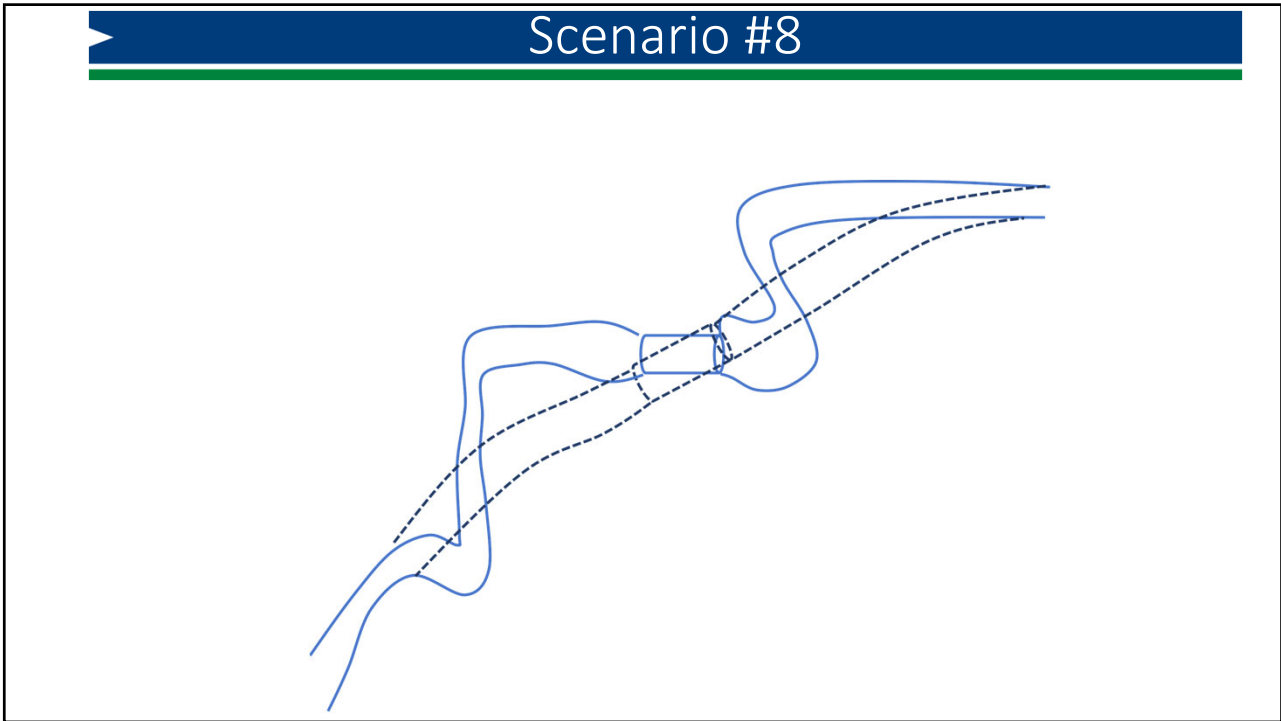
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# Real World Problems #1



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# Real World Problems #2



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## Real World Problems #2



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## Real World Problems #3



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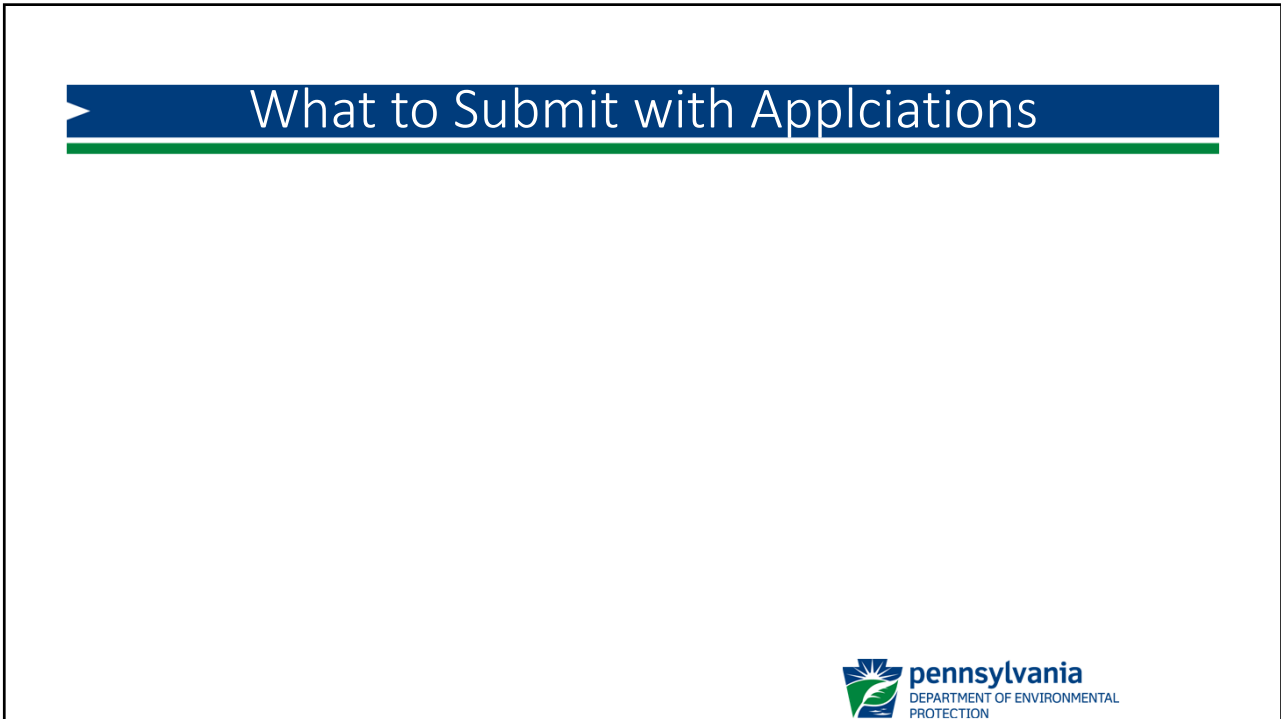
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## ▶ What to Provide With Permit Applications

- What does the Design Manual Require?
- What should be submitted with GP-11
- Comparison GP-11 VS Manual
- Plan Examples



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## ▶ What Does the Design manual Require?

Design standard has very specific requirements (12.2.1)

- Profile of existing stream along Thalweg
  - Long Pro 150' up/down stream
  - Include existing slopes above/below structure
- Plan view of existing structure showing structure dimensions, elevation, etc.
- Existing Roadway elevations

*Effective 7/1/2022*

1. A longitudinal profile survey is required for each site prior to project design and/or permitting. The surveyed stream segments must extend far enough to capture existing channel slopes upstream and downstream of the crossing and must include an appropriate reference reach to support project design. To determine applicability, the reference reach slope must be +/- 25% of the proposed continuity slope of the reconstructed streambed, unless otherwise approved by the SCC. If an appropriate reference reach is not located near the crossing, a separate survey may be conducted on an appropriate reference reach further upstream or downstream of the crossing. The reference reach must begin and end at existing grade control features and must, at minimum, include two consecutive sequences of repeating bed features (eg., riffle/pool/riffle/pool/riffle). A longer reference reach, including additional bedform sequences, is encouraged in order to provide more reliable design criteria.
  - i. The longitudinal profile survey must extend both upstream and downstream of the crossing and include data points associated with the existing structure and roadway surface.
  - ii. A sufficient number and locations of data points must be collected to determine the stream channel features that are critical to a successful structure replacement. These include:
    1. channel and structure slope,
    2. grade control types, lengths, and spacing,
    3. pool scour depth,
    4. potential tie-in points,
    5. aggradation wedges,
    6. plunge pools,
    7. vertical offset of the streambed adjacent to the structure, and
    8. available roadway cover.
  - iii. The longitudinal profile survey must extend a minimum of 150' upstream and 150' downstream of the existing crossing. Additional length of survey may be necessary to capture a suitable reference reach to support the project design. Actual length of the longitudinal profile survey is dependent upon the site conditions, availability of a suitable reference reach, channel size, and distance necessary to accurately capture existing channel slopes both upstream and downstream of the crossing. The longitudinal profile survey must extend from an existing grade control upstream of the crossing feature to an existing grade control feature downstream of the crossing.

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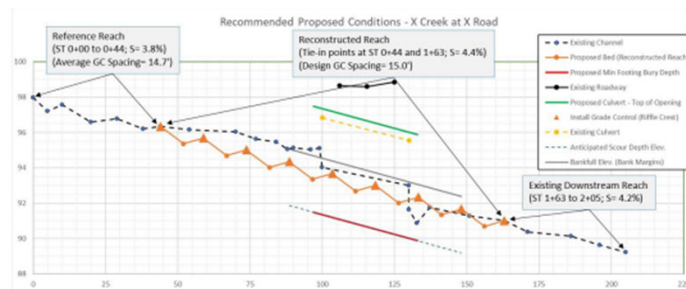
## What Does the Design manual Require?

- Planview should show bankfull width of the stream, bankfull elevations, and location of cross sections
- Reference Reach Profile and cross sections
- Proposed structure plan, cross section, and profile views.
  - Include dimensions, elevations, inlet and outlet elevations
- Proposed alignment of new structure on plan view
- Proposed footing dimensions, elevations, and depth of bury
- Finished Roadway Elevation over structure on Profile and Plan Views
- Provide all locations and elevations of structure features such as abutments, footings, wingwalls

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## What Does the Design manual Require?

- Streambed reconstruction details
  - Show slope and depth of streambed material on profile
  - Provide Design of Bank margin, including rock sizing and elevations
  - Show locations of tie in points
  - Proposed bankfull width with design bankfull noted
  - Type, location, lengths, and elevations of grade control features



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## What Does the Design manual Require?

- Scour Hole Restoration details and specifications
- Details on streambed material compaction
- Streambed material gradation thickness, etc.

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## What Does the Design manual Require?

### STREAMBED N

*Methods for Specifying a Suitable Substrate*  
 In most situations, the suitable substrate gradation is specified by a design streambed material

1. **U.S. Forest Service Method:** The USFS provides a methodology (modified critical shear stress method) for determining streambed mobility and stability based upon particle distribution (pebble counts) from the reference reach. The substrate size distribution from the reference reach is used as a starting point and evaluated for stability. If needed, the reference gradation is adjusted until calculated stability is achieved.

Appendix E of the USFS Stream Simulation document outlines the process for specifying a suitable substrate gradation using this method. More information is available at <https://www.fs.fed.us/eng/pubs/pdf/StreamSimulation/>

2. **Washington Department of Fish & Wildlife Methods:** WDFW provides three methods for determining a streambed substrate gradation. These include the reference reach method (similar to the USFS method above), the unit-discharge method, and the paleohydraulic analysis method. All three methods are described in the *2013 WDFW Water Crossing Design Guidelines*. This document also provides guidance for developing a bed material gradation from a single known particle size/gradation class ( $D_{100}$ ,  $D_{50}$ , etc.).

Chapter 3 of this WDFW document contains guidance regarding determination of a suitable substrate gradation. More information available at <https://wdfw.wa.gov/sites/default/files/publications/01501/wdfw01501.pdf>

Overall, both documents listed above serve as good general resources for understanding many of the concepts described in this Technical Manual and the criteria required in the DGLVR Stream Crossing Standard. It is strongly recommended that practitioners review both documents to better understand the application of these concepts to stream crossing replacement projects funded through the DGLVR Program.

### Streambed Reconstruction

Should consider the natural structure over time. functionality of a natural streambed and resistance of larger pieces

material composition. To determine a suitable streambed that supports the natural streambed does not identify any



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## SCC GP-11 Memo in Tech Manual

### Appendix E. Clarification on GP-11 regarding stream realignments, Changes of Approach Roadways, Scour and Deposition

- Coordinated with and reviewed by DEP
- Provides guidelines on what to submit to meet certain GP-11 conditions
- While this was done before the new policy, the list sufficiently captures the requirements
- Provide understanding on when stream continuity replacements qualify for GP-11



COMMONWEALTH OF PENNSYLVANIA  
STATE CONSERVATION COMMISSION

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2. The proposed structures maintain either the inlet or outlet at the same location as the existing structure, or the location of both the inlet and outlet change but the proposed structure rotates on a horizontal axis of the existing structure, or the proposed structure is immediately adjacent to the existing structure.
3. Stream realignments associated with the new structure are incidental and are generally limited to 50 feet upstream and downstream of the structure. DEP may consider realignments a limited distance beyond 50 feet in special circumstances, but any realignments must still be incidental and necessary to support the structure.

In accordance with the Standard and with DEP's design criteria, please note that the skew changes must maintain or re-establish stream flow patterns consistent with natural regime upstream and downstream of the bridge or culvert, and that the conditions of GP-11 must still be met.

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## What Should Be Included?

1. A description of the proposed work, existing structure, and purpose of proposed structure changes and any minor channel realignments.
2. A scaled plan showing the existing and proposed structures, including any proposed channel realignments.
3. Scaled cross section(s) of the existing and proposed culvert structures depicting dimensions of the existing and proposed waterway opening, and the existing and proposed depth of fill and roadway elevations in the approaches and over the existing and proposed structures.
4. Scaled cross sections of streams in any areas of proposed minor stream realignments.



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## What Should Be Included?

5. Photographs of proposed stream realignments depicting areas of proposed work, channel and geomorphic conditions, eroded banks, deposition, etc.
6. Scaled drawings for any proposed grade control structures in and/or upstream and downstream of the proposed structure, if applicable.
7. Scaled cross sections of any reference reach data (upstream or downstream of proposed work) collected to determine bankfull characteristics or reference reach information, if applicable.



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## What Should Be Included?

8. Scaled profiles of the existing and proposed culvert structures and a stream channel section extending sufficiently up and down stream to show proposed minor channel realignments, if applicable. When possible, it is recommended the length of the realigned channel be comparable to the length of the existing channel. However, where the project is correcting a ninety-degree bend in the stream, the realigned channel will likely have a shorter length than the existing channel and is therefore still permissible.
9. Details on the proposed stream bed material.



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## What Should Be Included?

10. If applicable, a hydraulic analysis demonstrating that the changes in the approach grades or overtopping characteristics will not increase the risk of flooding.
11. A P.E. Seal and Certification must be provided on the hydrologic and hydraulic report and on plans and specifications for proposed structures on public roads.



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## GP-11 VS. DGLVR Manual

### GP-11 Memo

- Description of Proposed Work, Structure/Purpose
- Scaled plans of existing and Proposed structures and changes
- Cross sections of existing and proposed structures and channels

### DGLVR Manual Design Requirement

- ▲ Sort of (GP-11 Summary of design work & Purpose)
- ✓ Yes. Manual goes into a lot of detail
- ✓ Yes. Manual has very specific details on what to include



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## GP-11 VS. DGLVR Manual

### GP-11 Memo

- Cross Sections at stream realignments
- Photographs
- Scaled Drawings for grade control structures
- Cross sections of reference reach

### DGLVR Manual Design Requirement

- ▲ Implied, but not specifically stated
- × No, but has always been a GP-11 requirement
- ✓ Yes. Drawings and scaled plans showing locations required
- ✓ Yes



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## GP-11 VS. DGLVR Manual

### GP-11 Memo

- Profiles of existing and proposed structures and streams
- Stream bed materials detail
- H&H Analysis
- P.E. Seal

### DGLVR Manual Design Requirement

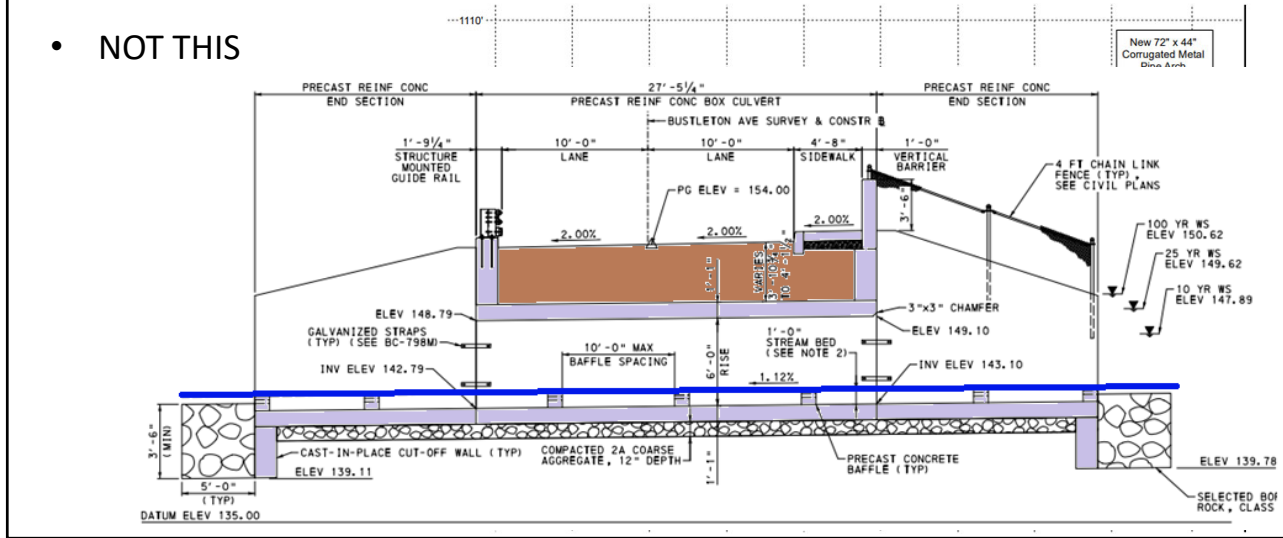
- ✓ Yes, manual has many details
- ✓ Yes, many details in manual
- ✓ Yes
- × No, but is a longstanding GP-11 and regulatory requirement



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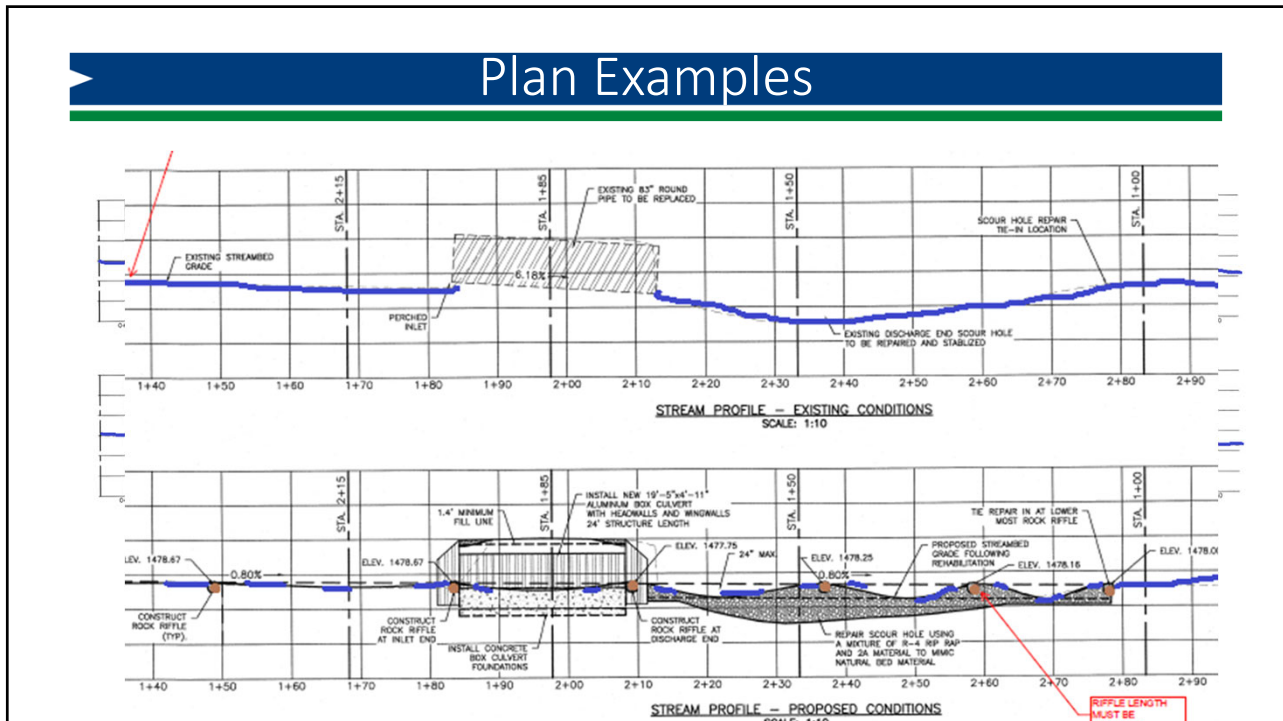
# Plan Examples

- NOT THIS



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# Plan Examples



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## ▶ What Should Be Included – Small Project?

### Small Project JPA

- PNDI
- Plans, Cross Sections, Profiles, etc.
- Location Map
- Project Description
- Color Photographs
- Environmental Assessment

### GP-11 Required?

✓ Yes

✓ Yes

✓ Yes

✓ Yes

✓ Yes

✗ No



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## ▶ What Should Be Included – Small Project?

### Small Project JPA – Possible Additional Requirements by DEP

- E&S Plan and Approval Letter
- H&H Analysis
- Risk Assessment
- PE Seal and Certification

### GP-11 Required for Stream Continuity?

✓ Yes

✓ Yes

✗ No

✓ Yes



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## ▶ What Should Be Included – Small Project?

### Small Project JPA – Environmental Assessment

- Overall Project Description, and information on project purpose and need, water dependency, and summarize impacts (S1)
- Provide aquatic resource ID, delineation, etc. (S2)
- Identify if location in parks, game lands, scenic rivers, etc. (S2)
- Identify discuss PNDI impacts, etc. (S2)

### GP-11 Required for Stream Continuity?

▲ Sort of, more specific Proj. Desc. Only need 1, write detailed and point to.

✓ Yes

× No

▲ Partial, yes PNDI, discuss impacts not spelled out in GP-11



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## ▶ What Should Be Included – Small Project?

### Small Project JPA – Environmental Assessment

- Table of impacts, impact types, and sub facility codes
- Discuss any impacts to parks, scenic rivers, T&E, etc.

### GP-11 Required for Stream Continuity?

× No

× No



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## Questions?

**Andrew McDonald** | Water Program Specialist  
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Division of Wetland Encroachments and Training  
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