FORESTS, PARKS & RECREATION
VERMONT
AGENCY OF NATURAL RESOURCES

LEGISLATIVE REPORT: EXPANSION OF WATER QUALITY ASSISTANCE PROGRAM

SUPPORTING LOGGING CONTRACTORS TO ENSURE IMPLEMENTATION OF PROACTIVE AND PREVENTIVE WATER QUALITY PROTECTION AND CLIMATE ADAPTATION PRACTICES ON HARVEST SITES.

Submitted to:
House Committee of Agriculture, Food Resiliency & Forestry
Senate Committee of Natural Resources & Energy

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VERMONT

EXECUTIVE SUMMARY

Purpose and Legislative Context

This report presents an assessment of the expansion of the Water Quality Assistance Program, established under 10 V.S.A. § 2622, through the implementation of the **Supporting Loggers to Comply with the Acceptable Management Practices (SLoCAMP)** pilot program. SLoCAMP provides financial assistance to logging contractors to support the implementation of proactive water quality protection and climate adaptation practices on harvest sites. The report includes preliminary results from the pilot program demonstrating that the program has been successful in supporting the implementation of water quality protection practices through offsetting associated costs. The logging community has responded enthusiastically to this opportunity to protect water quality, and it is likely that the funding made available for the pilot will be fully utilized by mid-2026, less than one year after the program was launched.

Program Design and Implementation

- Administered by the Department of Forests, Parks and Recreation (FPR) with professional contracted support provided by the Professional Logging Contractors of the Northeast (PLC).
- Focused on high-impact practices: skid trail improvements, truck road and landing hardening, and temporary and permanent stream crossings.
- Practice sheets were developed to standardize technical requirements, cost shares, and implementation guidance.
- Outreach included workshops, webinars, digital promotion, and email communications to ensure statewide awareness.

Preliminary Results

- 33 applications received; 29 deemed eligible; 16 approved to date; 6 closed out.
- $376,291 of $700,000+ allocated to date; projected full encumbrance by June 2026.
- Funding prioritized high-impact practices: 75% to truck roads/landings, 13% to skid trail improvements, 12% to stream crossings.
- Inspections and contractor feedback indicate elevated adherence to AMP standards and high satisfaction. Logging contractors report that SLoCAMP enabled enhanced, proactive implementation surpassing typical compliance levels.

Early Observations and Recommendations

- Practices implemented to date have improved drainage, stabilized roads, and protected streams, demonstrating measurable water-quality and climate-resilience benefits.
- Contractors recommend a longer planning horizon (two-year projects) for future phases to allow flexibility with weather and market variability.
- FPR recommends consideration of continued or annual funding for SLoCAMP to ensure implementation of proactive and preventive water quality protection and climate adaptation practices on harvest sites.

Table of Contents

INTRODUCTION

Vermont's forests cover 4.6 million acres, or 78 percent of the state. These forests are diverse and managed for multiple uses, including conservation, forest products, wildlife habitat, and community needs. The forest products industry contributes $2.1 billion to the state economy, including $770.8 million in value added, and supports 13,816 jobs (2020)[1]. Loggers play a critical role in forest management, sustainably harvesting wood products while implementing planned silvicultural treatments that maintain forest health and promote regeneration. Logging operations are governed by state regulations, including the Acceptable Management Practices for Maintaining Water Quality on Logging Jobs (AMPs), which safeguard waterways and reduce sedimentation risk.

Increasingly frequent and intense precipitation events, warmer winters, and flooding in 2023 and 2024 have significantly raised the cost of implementing AMPs. Coupled with volatile markets and mill closures across the Northeast, these pressures make logging economically challenging, even as effective AMP implementation becomes more critical for protecting Vermont's wetlands, rivers, and lakes.

As part of the 2025 "BIG BILL – FY2025 Appropriations Act," the Vermont General Assembly allocated $1 million to the Vermont Department of Forests, Parks and Recreation (FPR) for the expansion of the Water Quality Assistance Program established by 10 V.S.A. § 2622a. This expansion enabled FPR to provide financial assistance to logging contractors toward supporting implementation of proactive and preventive water quality protection and climate adaptation practices on harvest sites.

The Water Quality Assistance Program, administered by FPR, provides technical and financial assistance to loggers and others to support implementation of water quality practices in the State of Vermont. Under the Program, the Commissioner of FPR is authorized to facilitate implementation with water quality requirements by:

- Awarding grants to timber harvesters and others to purchase or construct skidder bridges and other equipment;
- Purchasing premade skidder bridges and other equipment to loan, lease, rent, or sell at cost to timber harvesters, cooperating processing plants, and others; and
- Constructing skidder bridges for delivery to cooperating processing plants for sale to timber harvesters and others at cost.

The expansion of the Water Quality Assistance Program directed FPR to provide financial assistance to logging contractors to support implementation of the following practices:

1. Implementation of acceptable management practices (AMPs) and other best practices defined by FPR on harvest sites to enhance water quality protection and climate adaptation measures before forest operations take place;

[1] Public Sector Consultants & Frederick, 2020

2. Purchase by logging contractors of materials or practices that can be used for forest access road construction, landing preparation, bridge construction or installation, culvert protection or installation, and sediment control in advance of harvest implementation to comply with AMPs and other potentially applicable water quality requirements;

3. Financial assistance or cost share for a logging contractor to be Master Logger Certified by third-party entities, such as the Northeast Master Logger Certification Program of the Trust to Conserve Northeast Forestlands.

FPR was directed to implement a $1 million pilot program, which FPR named **Supporting Loggers to Comply with the Acceptable Management Practices (SLoCAMP)**, to advance these objectives in accordance with established eligibility criteria. The General Assembly also required a report on pilot outcomes by July 15, 2025; due to implementation delays, FPR requested an extension to December 15, 2025.

Identification of Eligible Practices

During the summer of 2024, FPR began planning for implementation of the SLoCAMP Program. Pursuant to conversations with loggers and department observations, FPR chose to focus on establishing a program to provide financial assistance to support AMP implementation. Loggers reported that the costs associated with implementing certain AMPs represented a significant share of revenue from a logging job. Extreme precipitation events and flooding in 2023 and 2024 further increased costs by requiring loggers to revisit improvements to skid trails, stream crossings, and truck roads and landings. Funded projects are intended to be implemented prior to logging operations, but funding may also be used to maintain or remove projects, as appropriate, during and after operations.

To meet logger needs and remain consistent with statutory requirements, FPR structured SLoCAMP to provide funding for:

- **Labor** associated with installing, maintaining, and removing practices; and
- **Materials or practices** used for forest access roads, landings, stream crossings, culverts, and sediment control.

To expedite implementation during the pilot phase and maximize water quality and climate adaptation benefits, FPR limited the initial focus of SLoCAMP to the following practices:

1. **Skid Trail Improvement:** Water diversion structures redistribute flow onto vegetation on either side of the trail

2. **Temporary and Permanent Stream Crossings:** Stream crossings protect water quality by minimizing sediment, habitat damage, and flow disruption
3. **Hardening Truck Roads and Landings:** Hardening reduces turbidity and sedimentation and improves drainage

Development of Practice Sheets

An early challenge in implementing SLoCAMP was translating AMP requirements into practices that are easily understood by loggers and that have defined unit costs for the purpose of providing financial assistance. To address this, FPR developed a series of practice sheets that define the purpose, general policies, cost-share rates, and technical specifications for each practice supported under the SLoCAMP Program. These practice sheets were designed to serve both as a technical guide for loggers receiving assistance and as an administrative tool for FPR staff and the future service provider governing eligible activities and payments.

The four practice sheets, comprising more than 20 sub-components and including images, technical specifications, and references, were developed during the summer and early fall of 2024 and form the foundation of the SLoCAMP Program. FPR engaged loggers throughout development, including a formal scoping session on July 15, 2024, and finalized the practice sheets in late October 2024. The complete practice sheets are included in Appendix I.

Each practice sheet includes a practice description, purpose, unit cost and cost-share rate, applicable standards, technical specifications, and a determination of when field verification is required. FPR determined that most practices would require a logger cost share capped at 10 percent, consistent with statutory requirements under 10 V.S.A. § 2622(a). For practices involving permanent water crossings, FPR recommended a 50 percent cost share, reflecting the permanence of the infrastructure and the need for greater investment by the logger and/or landowner.

During development of the practice sheets, FPR also made the following determinations regarding program implementation:

- Payments to loggers will require a complete application and will be governed by a simple agreement.
- The future service provider will use the practice sheets to define eligible practices and allowable payments under SLoCAMP.
- With FPR approval, the service provider may amend practices and requirements prior to or during program administration to improve clarity, AMP implementation, or program usability.
- Applications must include an AMP Planning Map.
- More complex practices will require pre-award site visits by a licensed forester employed by the service provider.
- All funded sites will receive at least one post-implementation site visit by a licensed forester to verify use of funds.

Service Provider Selection

Consistent with legislative testimony regarding the SLoCAMP Program, FPR determined that the rapid startup and implementation of this pilot program exceeded existing staff capacity and that a qualified service provider was needed to lead program implementation under FPR oversight. To that end, FPR issued a Request for Proposals (RFP) to competitively select a service provider. The RFP was advertised on October 22, 2024, with bidder questions due November 11, 2024, and proposals due November 14, 2024.

FPR received one proposal, submitted by the Trust to Conserve Northeast Forestlands, doing business as the Professional Logging Contractors of the Northeast (PLC). In December 2024 and January 2025, FPR reviewed the proposal, determined it to be responsive to the RFP and program requirements, and entered into negotiations with PLC to establish the terms governing SLoCAMP implementation. Negotiations focused on cost elements, key deliverables, program timelines, and roles and responsibilities related to application review and practice implementation oversight.

The SLoCAMP agreement between FPR and PLC was executed on January 29, 2025.

INITIAL SLoCAMP PROGRAM DELIVERY

Service Provider Start Up

Following execution of the grant agreement, FPR and PLC shifted their focus to planning program outreach and implementation. The parties agreed to initiate program implementation by late spring 2025, with funding for projects to become available during the summer of 2025. FPR and PLC also established an 18-month implementation period to allow sufficient time for outreach, application review, practice implementation, and results reporting.

Identification of Key Staff

A key element of successful SLoCAMP implementation was ensuring that the Service Provider assembled a team with the skills and experience necessary to steward program funds and ensure they were used for their intended purpose of offsetting the costs associated with AMP implementation. PLC proposed a multidisciplinary team to lead and support SLoCAMP implementation, including:

- **Program management and oversight**, serving as the primary point of contact with FPR;
- **Program design and implementation**, including development of application materials and eligibility criteria;
- **Program administration**, including coordination on application review and processing;
- **Outreach and communications**, including marketing, graphics, and facilitation of focus groups;
- **Administrative support**, including meeting documentation, invoicing, and implementation tracking; and
- **Field-based technical support**, provided by contracted local foresters to assist with application development, eligibility determinations, and field verification during implementation.

Identification and Completion of Key Deliverables

FPR identified several key deliverables as essential to SLoCAMP program success. These were produced by PLC during the project start-up phase, reviewed and approved by FPR, and payment of PLC's invoices during this phase was contingent on their successful completion.

Application, Flow Chart, and Review Criteria

The SLoCAMP application was designed to be succinct yet clear, allowing PLC to determine general eligibility, approve funding awards, and establish field verification needs. The application includes:

- Practices/components to be implemented
- Timeframe for implementation (within 12 months of approval)

- Key personnel responsible for operations and project management
- Locational information, including AMP Planning Map, landowner, and proof of contract for logging services
- Description of compliance with AMPs by practice/component

Once an application is administratively complete, PLC determines the cost of approved practices at the logging site and submits a draft agreement to FPR for approval, including breakdowns by practice and sub-component of materials and labor costs, as well as how costs are shared between the logger and the SLoCAMP Program. In most cases, PLC foresters perform a pre-award site visit to assess needs and appropriateness of requested practices.

Eligibility criteria for SLoCAMP participation include:

- Logging contractors operating on Vermont harvest sites over 10 acres with long-term forest management focus
- Ownership of more than 50% of equipment used on-site
- Earning more than 50% of income from timber harvesting
- Good standing with relevant Vermont agencies (Act 154)
- Harvesting on land with the same ownership for 5+ years, enrolled in Current Use, or under an active conservation easement
- A contract with the landowner (unless logging own land)
- Project completion by June 30, 2026

PLC also developed a flow chart for project review from application to closeout, including field inspections if needed, payment procedures, and FAQs. Focus groups with loggers and FPR staff were held to refine these materials before finalization.

Funding Agreement and Application Review Framework

PLC and FPR, with legal counsel, developed a funding agreement template to govern awards and payments. The template defines eligible practices/components, approved cost shares, field visit schedules, agreement violations, and payment schedules. FPR reviewed the template for statutory and Bulletin 5 compliance. PLC also developed an application process and website, providing access to all program materials, practice sheets, sample maps, FAQs, and draft funding agreements. Applications can be submitted electronically, and all materials are viewable by PLC and FPR.

Marketing Plan

To ensure program awareness among logging contractors, PLC developed and implemented a marketing plan. The plan included:

- Publishing information on the PLC SLoCAMP website
- Outreach via mail, email, social media, and webinars to educate potential applicants
- Implementation of a trial with two logging contractors to test the application, field inspection, and agreement processes
- Key takeaways from the trial were incorporated into program documents and shared with prospective applicants through marketing efforts.

Logger Training and Program Launch

PLC and FPR held two in-person training events and one webinar to review AMP requirements and orient loggers to the SLoCAMP program, including approved practices and the application process. Trainings were held in Island Pond (June 24, 2025), Mendon (June 25, 2025), and via a virtual webinar (July 15, 2025). Information about the trainings was widely shared through the marketing plan, and 32 loggers attended the in-person sessions. Evaluations indicated that the trainings effectively achieved their objectives.

The SLoCAMP Program formally launched on July 21, 2025, with the “go-live” of the program website, and applications began arriving shortly thereafter.

PROGRAM IMPLEMENTATION SUMMARY TO DATE

Application and Funding Summary

Application and Project Activity:

- 33 applications were submitted between July 21 and December 1
- 1 rejected and 3 withdrawn
- 29 projects were deemed eligible by a review committee comprised of PLC and FPR staff for funding allocation. Of those 29 projects, 16 have been approved for funding, 7 are awaiting approval (1 PLC review, 5 pre-award inspections, 1 FPR review), and 6 closed out.

Funding Summary:

- Total Funds Applied For: $504,542
- Funding Encumbered by Approved/Eligible Applications: $376,291
- Funding Remaining for Application/Encumbrance $323,709
- Average Funding per Approved/Eligible Applications: $12,976

Estimated Timeline for Full Allocation

Based on encumbrance of $376,291 over the first 4½ months (approximately $83,620 per month), the remaining $323,707 is projected to be fully encumbered and closed out by June 30, 2026.

Funding Distribution by Practices and Practice Components

SLoCAMP funding to date reflects contractor priorities and alignment with water quality and AMP implementation. Of the funds encumbered for approved projects:

- **75%** were toward hardening truck roads and landings
- **13%** were toward skid trail improvements
- **8%** were toward temporary stream crossings
- **4%** were toward permanent stream crossings

Across all approved projects, a total of **113 individual practices** have been funded. This distribution demonstrates a focus on stabilizing access roads, the areas with the greatest potential to reduce erosion, while also investing in targeted trail and stream-crossing improvements.

Hardening Truck Roads and Landings (75% of funds, 56 components)

The greatest portion of funding was allocated to improving truck roads and landings, with contractors favoring high-impact practices that stabilize surfaces, improve drainage, and reduce erosion:

- **Gravel additions** prevent rutting and maintain safe truck access (18 uses, 61% of category funding)
- **Cross-drain culverts** divert surface water and prevent erosion (11 uses, 32% of funding)
- **Other components such as ditch construction and geotextile road fabric** address unstable soils or poor drainage (8 uses each)

Skid Trail Improvements (13% of funds, 29 components)

These practices prevent erosion along secondary routes for moving logs:

- **Pole bars** stabilize soft or saturated soils (4 uses, 34% of category funding)
- **Corduroy installation** distributes equipment weight to limit soil disturbance and rutting (6 uses, 18% of funding)
- **Trail relocation** (3 uses, 19%), **log-reinforced waterbars** (7 uses, 15%), and **standard waterbars** (7 uses, 12%) prevent erosion
- **Less commonly funded:** naturalizing old trails (2 uses, 2%)

Temporary Stream Crossings (8% of funds, 24 components)

Funding reflects practical, low-impact solutions for diverse site conditions:

- **Temporary wooden skidder bridges (**10 uses, 30% of category funding)
- **Temporary poled crossings** (5 uses, 22%)
- **Steel skidder bridges (**<25 ft**:** 2 uses, 13%; >25 ft: 2 uses, 10%)
- **Lower-cost options:** temporary culverts and truck-road ford crossings (2 uses each, combined 24%), brushed-in winter crossings (1 use)

Permanent Stream Crossings (4% of funds, 4 components)

These high-cost, long-term installations were used selectively:

- **Permanent culverts on intermittent streams** (3 uses, 47% of category funding)
- **Laminated wooden bridges** (1 use, 53% of category funding)

This distribution shows that contractors prioritize stabilizing access roads and landings while also addressing stream crossings and trail improvements where needed.

Participant Feedback

Early participant evaluations of SLoCAMP indicate strong satisfaction, with contractors rating the program highly across nearly all categories. Although the sample size is small (5 evaluations covering 6 closed projects), it reflects a mix of contractors, regions, and project types, providing a meaningful early snapshot. As defined in the SLoCAMP deliverables, a final report at the end of the pilot will summarize all financial and technical results; this report presents preliminary findings.

Ease of Application

Contractors generally found the online application straightforward, with ratings from 3 to 5 out of 5. Instructions were clear, required uploads manageable, and submission more efficient than expected. One participant noted: "*The online process was fast and simple, much easier than other cost-share programs."* Minor refinements could further support first-time applicants.

Clarity of Requirements and Materials

Program requirements were rated above average in clarity. Contractors valued the FAQs, practice sheets, and checklists, with one noting: "*Everything was well laid out, and the requirements were easy to follow."* Suggestions for improvement included more photos and examples to reduce ambiguity.

Responsiveness of PLC and Foresters

PLC staff and contracted foresters received high praise for responsiveness and guidance. Contractors described staff as "very responsive" and helpful, and on-site forester visits provided actionable direction. One noted: "*The onsite visit with the forester really helped me understand what was expected.*"

Inspections and Timeliness

Inspections were conducted promptly, with clear communication regarding timing. Minor scheduling challenges were typical of field-season constraints. Contractors appreciated the efficient process: *"Everything moved along quickly. I was kept up to date the whole time."*

Payment Timing

Most participants reported that the initial 75% payment was issued promptly. Final payments were pending for some, but expectations were positive based on prior timeliness.

Impact on Project Feasibility

All respondents agreed that SLoCAMP significantly improved project feasibility. Without the program, work either would not have occurred or would have been reduced. Comments included: *"Without*

SLoCAMP, I would not have done this work" and "*The funding allowed us to do it right—not just the minimum.*"

Overall Satisfaction and Future Participation

Every participant indicated they would engage in a similar program in the future. Feedback suggests early participants view SLoCAMP as high-value, well-managed, and impactful in supporting stronger water quality protection.

Outreach and Communications Summary

PLC conducted a comprehensive outreach campaign throughout 2025 to ensure logging contractors across Vermont were aware of SLoCAMP and had clear access to program information, training, and resources.

Workshops and Webinar

Two statewide SLoCAMP workshops were held on June 24–25, 2025, providing contractors with an overview of program eligibility, approved practice standards, mapping requirements, and the application process. Feedback from these workshops informed refinements to program materials. A recorded webinar was also released on July 15 and made available on the SLoCAMP landing page for on-demand viewing. The webinar served as an orientation to the application process and was a core component of the program's initial outreach strategy.

Social Media and Digital Promotion

Program marketing included a coordinated series of organic and paid social media posts. Promotion of the June workshops and July webinar generated nearly 70,000 views and 870 link clicks to the SLoCAMP landing page. Additional posts in the fall maintained program visibility, with early- and mid-October posts receiving over 9,500 and 6,400 views, respectively, and generating 44 additional clicks. These efforts significantly boosted contractor awareness during the program's launch period and sustained engagement during the early months of implementation.

Email Communications

PLC maintained regular email communications throughout the program, sending twice-monthly updates to a dedicated list of approximately 500 contractors. Emails included application reminders, tips, practice clarifications, and direct links to program resources.

Website Engagement

The SLoCAMP landing page, hosted on the PLC website, received approximately 400 visits during the early implementation period. The page serves as the central hub for program information, online applications, downloadable checklists, FAQs, and the recorded webinar.

Media and Partner Outreach

A formal press release was issued on July 21 to more than 20 Vermont and regional media outlets and was published in at least four publications. Collectively, these outreach efforts successfully established statewide awareness of SLoCAMP and supported contractor engagement as the program transitioned from development to full implementation.

IMPLEMENTATION NEXT STEPS

Utilization of Remaining Funding & Reporting

PLC anticipates that the remaining unallocated SLoCAMP funds will be awarded to logging contractors following successful application review by June 30, 2026. Throughout implementation, PLC has submitted quarterly reports documenting program progress, results to date, and performance relative to the established measures outlined below.

Performance Measures

1. **Project Tasks Delivered on Schedule and on Budget**
   - 1.1. Tasks 1–6 will be completed within the predicted monthly timeframes.
   - 1.2. Project resources for the Subrecipient will be expended within approved budget limits.
   - 1.3. Project resources for AMP implementation will be distributed to contractors in accordance with executed agreement schedules.
   - 1.4. A minimum of 25 cost-share projects will be approved for implementation.

2. **Quality of SLoCAMP-Funded Practices**
   - 2.1. AMP cost-share projects will be inspected in accordance with AMP practice guideline requirements, including random sampling of at least 25% of projects by PLC staff to ensure state standards are being met or exceeded.
   - 2.2. FPR staff will conduct field inspections based on staff availability and perceived need. Site visits may be selected randomly or targeted by FPR from among participating projects.
   - 2.3. Materials associated with funding applications will be provided to FPR upon request.
   - 2.4. Field inspections and review of PLC program materials are intended to ensure AMP implementation and that funded projects meet or exceed program expectations.

3. **Stakeholder Support and Engagement**
   - 3.1. Stakeholder (cost-share participant) evaluations will indicate good or very good experiences in more than 80% of survey responses.

Preliminary Findings and Final Report

Since program launch, FPR staff have inspected eight active SLoCAMP sites and observed a range of water quality protective practices in place including cross-drain culvert installation, road graveling, temporary bridge installation, and waterbar installation. Overall, implementation quality has been strong. Where adjustments were recommended, they reflected calibration in interpretation of practice

standards rather than deficiencies. Loggers have been highly responsive to feedback and demonstrate a clear commitment to meeting program requirements, as well as support for water quality protective practices. In all cases, FPR staff concurred with PLC forester determinations regarding practice need and placement.

Once all funding has been awarded and projects are closed out, PLC will submit a final report by July 31, 2026. This report will summarize funding use, practice implementation data, water-quality outcomes, successes, challenges, and logger feedback. It will also include results from post-closeout surveys administered to all participating loggers, addressing topics such as accessibility of information, application process, staff responsiveness, clarity of expectations, and project feasibility.

Early Recommendations for Program Improvement

The final report will include a dedicated section on recommended improvements to SLoCAMP, informed by ongoing feedback from logging contractors and foresters. One recurring theme is the value of a longer planning and implementation window. While a one-year timeframe was appropriate for piloting the program, participants have noted that a two-year completion period in any future phase would provide meaningful flexibility. A longer horizon would improve planning, accommodate weather variability, and better align with dynamic market and operational constraints faced by logging contractors.

UPDATE ON MASTER LOGGER CERTIFICATION COST SHARE

FPR did not prioritize implementation of Section E(704)(a)(3)—financial assistance for Master Logger Certification—under the FY25 SLoCAMP pilot.

In October 2024, after passage of the FY25 budget but prior to finalizing the SLoCAMP implementation framework, FPR received a $5 million Inflation Reduction Act grant from the U.S. Forest Service titled *"Growing Vermont's Forest Resilience: A Collaborative Strategy."* This grant includes funding to support logger education and professionalism, including subsidizing the cost of Master Logger Certification.

Given the availability of this federal funding source, and the more limited nature of state SLoCAMP funds with multiple competing demands, FPR elected to use federal funds to support Master Logger Certification and focus SLoCAMP resources on implementation of AMP practices and materials under Sections E(704)(a)(1) and (a)(2). This approach avoids duplication of funding and maximizes the impact of both state and federal investments.

CONCLUSION

SLoCAMP Pilot Success

The SLoCAMP pilot has been successfully implemented, directing cost-share assistance to practices that deliver measurable water quality and climate resilience benefits while maintaining site specific flexibility. Early inspections show improved drainage, stabilized truck roads and landings, and enhanced stream protection. Over half of available resources have already been allocated, demonstrating strong demand and efficient program implementation.

Contractor Impact

Contractor feedback confirms that SLoCAMP enables more proactive, high-impact AMP implementation. Participants report that, without program support, they would likely default to minimum compliance, increasing both financial strain and the risk of sediment discharge during extreme precipitation events. SLoCAMP funding materially influences behavior, allowing contractors to implement higher-cost, high-benefit practices that improve water quality and enhance long-term climate adaptation on harvest sites. It also familiarizes loggers with these practices and their impacts, making them more likely to use them in the future.

Program Sustainability

The library of SLoCAMP resources will remain available post-pilot, but sustained implementation of these comprehensive practices is unlikely without ongoing financial support. Maintaining funding supports both ecological and water quality benefits and a resilient logging workforce, and mitigates financial pressures that could otherwise reduce AMP implementation or result in workforce attrition.

Recommendation for Legislative Consideration

Given strong contractor demand, demonstrated program impact, and alignment with state water quality and climate objectives, FPR recommends that the General Assembly consider making SLoCAMP a permanent program with ongoing or annual funding. Continued support will ensure that Vermont's forests, water resources, and logging workforce remain resilient in the face of increasing climate and market pressures.

APPENDIX ONE: PRACTICE SHEETS

The SLoCAMP Program focuses on implementation of four practices that will support AMP compliance, promote climate adaptation, and meet loggers' needs to extend or maintain logging operations in a changing climate. These practices are as follows:

- Skid Trail Improvement
- Temporary Stream Crossings
- Permanent Stream Crossings
- Hardening Truck Roads and Landings

Detailed descriptions of each practice are on the following pages. The Service Provider will use these practice sheets as the basis to define what specific measures are eligible for payment to loggers at logging sites in Vermont under the SLoCAMP Program.

Practice sheets include purpose, general policies, cost-share rates, and technical specifications for each practice. These practice sheets should be considered as a technical guide for the service provider governing allowable activities for which payments can be made to loggers under this program.

PRACTICE 1: Hardening Truck Roads & Log Landings

PURPOSE

The purpose of this practice is to provide for the hardening and draining of existing infrastructure before a timber harvest begins. This practice shall be applied to existing truck roads and landings and to truck roads and landings approved for relocation.

The AMP standards will guide proper design and layout to improve drainage and to harden travel surfaces. This practice provides specifically for gravel, geotextile road fabric, and machine time which will be used to drain, harden, and shape the road or landing. This practice may include additional components such as installing cross-drain culverts, installing crane mats, or relocating the truck road or landing.

The changing climate is leading to more unpredictable harvesting conditions through increasing frequency and intensity of precipitation events and shorter periods of frozen ground conditions. Historically predictable periods of dry summer ground conditions or deep winter freezes are no longer occurring with regularity placing further need and emphasis on harvest planning to reduce unintended impacts from logging equipment.

GENERAL POLICIES

This practice is intended to be used on truck roads and log landings when they are part of an eligible forestry operation.

The installation, maintenance, and closeout of this practice must be consistent with Vermont's Acceptable Management Practices (AMPs).

Where wetlands occur, the Vermont Wetlands Rules (Section 6) apply and must be followed.

The applicant must submit an AMP Pilot Program Application and be approved before incurring any costs associated with this practice. Costs incurred before being approved are not eligible for reimbursement.

The Vermont Department of Forests, Parks and Recreation, or designee, will review the application for eligibility and assign a cost- share reimbursement value based on the submitted application and field review (if a field review is necessary).

Cost-share reimbursement for the AMP Pilot Program is available for all logging contractors in Vermont, regardless of affiliation, and is intended to be used on logging operations where the goal of the harvesting is for long-term forest management.

For this practice, an AMP Planning Map is required as part of the application. Refer to **Appendix B** for a sample AMP Planning Map. All AMP Pilot Program implementation practices identified on the AMP Planning Map must also be clearly identified on the ground with flagging or marked with paint.

Hardening Truck Roads and Log Landing practice components need pre-award field review only when components are in stream or wetland buffer, or other sensitive conditions. Pre-award visit may be exempted by the Service Provider when application review indicates that additional evaluation and guidance are not needed to support successful practice implementation.

AMP Planning Map Standards:

- Title block containing the landowner's name, logging contractor, town, parcel SPAN, and date
- Major roads with road names
- North Arrow
- Scale
- Legend identifying these landmarks at a minimum:
  - All landing areas and major skid trails
  - Streams, wetlands, and vernal pools
  - All implementation practices proposed for that harvest area

PRACTICE COMPONENTS, COSTS, AND DETAILS

Practice 1: Hardening Truck Roads & Log Landings Rates		
Practice Component	**Unit cost per practice**	**Practice Details**
1.1 Adding gravel to truck road and/or landing to harden travel surfaces.	$34/yd plus woven geotextile road fabric if needed	Properly constructed and maintained throughout the use of that road and/or landing. Includes cost of gravel and trucking to site plus machine time to spread and shape. Closeout to AMP standards when job is completed, road and/or landing is protected from erosion and left in a stable, well-drained condition.
1.2 Installation of geotextile road fabric to improve drainage and harden travel surfaces.	$1.25/linear ft	Properly installed polypropylene fabric. Use 'woven' fabric when adding gravel for separation of road sub-surfaces. Use 'non-woven' fabric for sub-surface drainage structures like a rock sandwich or a French drain.

1.3 Mobilization and installation of crane mats to harden travel surfaces.	$12/linear ft	Properly installed and maintained throughout the use of that road and/or landing. Includes cost of machine time to set the mats. Removal when job is completed.
1.4 Construct new ditch to improve drainage on truck roads.	$2.46/linear foot	Properly constructed and maintained throughout the use of that road. Includes cost to seed and mulch all exposed soil within the ditch.
1.5 Clean existing ditch to improve drainage on truck roads.	$1.26/linear foot	Properly cleaned and maintained throughout the use of that road. Includes cost to seed and mulch all exposed soil within the ditch.
1.6 Installation of cross-drain culverts to improve drainage on truck roads.	$2,365/cross-drain	Properly spaced, installed, and maintained throughout the use of that road. Includes cost for culvert, gravel, headwalls, and machine time.
1.7 Installation of a rock sandwich to improve sub-surface drainage. Also known as a French mattress.	$41/linear foot plus fabric (Practice 1.2)	Properly installed polypropylene fabric for sub-surface drainage. Use 'non-woven' for underdrainage structures like a rock sandwich. Includes cost for stone, gravel, and machine time.
1.8 Installation of a French drain to improve sub-surface drainage.	$32/linear foot plus fabric (Practice 1.2)	Properly installed polypropylene fabric for sub-surface drainage. Use 'non-woven' for sub surface drainage structures like a French drain. Includes cost for stone, gravel, perforated pipe, and machine time.
1.9 Installation and maintenance of waterbars to improve surface drainage.	$38/waterbar	Properly constructed and maintained throughout the use of that road. Includes cost for machine time.
1.10 Truck Road Relocation	$6.85/linear ft, plus other components as needed, for road relocation. In addition, $1.00/linear to stabilize the old road to the AMP standards.	Properly constructed and maintained throughout the use of that new road. Includes cost to cut, skid, stump, and shape relocated road. Also includes cost to stabilize the old road including removing stream crossings, installing water bars, and applying seed and mulch to the expose soil.

TECHNICAL SPECIFICATIONS

Definition Purpose: Mobilization and implementation for hardening and draining truck roads and log landings to protect water quality before harvesting activities.

Condition Where Components Applies: Truck roads and log landings where the goal of the harvest is long-term forest management and one or more of the following applies:

1. There is no road base to support trucks and equipment.
2. The travel surface has worn or eroded.
3. The travel surface is soft and wet.
4. Need to relocate the existing truck road because it is located within a buffer, the AMPs cannot be met, and a discharge is likely.

CONSIDERATION FOR EACH PRACTICE COMPONENT

Practice Component 1.1: Adding Gravel

- The intent of this component is to harden truck roads and log landings by adding up to 12" of gravel to approved areas.
- Travel surfaces are assumed to be 12-feet wide for the purposes of estimating costs and material needed.
- Prior to adding new gravel, the road and/or landing should be graded/shaped to an appropriate surface profile to remove any deformities and to establish an ideal shape (crowned, in-sloped, or out-sloped) for shedding water. Scarifying also helps to blend old material with new material and improves compaction.
- New gravel should be 1½" minus crushed gravel or crushed ledge. Other suitable alternatives include 3" dense grade and 6" logger mix.
- Gravel should be applied to a road by running a truck down the center of the roadway and dumping.
- Total unit cost is determined by the number of yards of gravel needed. The calculation is as follows: # of yards = (length (in feet) of road needing gravel * depth (in feet) of gravel being added * 12 ft) / 27 ft3.
- Length of truck road to be hardened and/or location of landing to be hardened shall be clearly marked and located on the ground and on the AMP Planning Map, with yardage indicated for each section to be graveled.

Practice Component 1.2: Geotextile Road Fabric (Woven or Non-Woven)

- The intent of this component is to use geotextile road fabric to harden and drain travel surfaces in approved locations.
- Use 'woven' polypropylene fabric only when adding gravel for the separation of road sub surfaces.
- Use 'non-woven' polypropylene fabric only for sub surface drainage structures such as rock sandwiches and French drains.
- Before fabric is laid down, the road base surface profile should be graded/shaped to remove any deformities and to establish an ideal shape (crowned, in-sloped, or out-sloped) for shedding water.
- When laying down and installing fabric, make sure to overlap joints by at least 12''.
- This practice may be selected for use when adding gravel (Practice 1.1), constructing a rock

sandwich (Practice 1.7), installing a French drain (Practice 1.8), or relocating a truck road (Practice 1.10).
- Total unit cost is determined by the length (in feet) of fabric needed.
- Areas where geotextile road fabric will be installed shall be clearly marked and located on the ground and on the AMP Planning Map, with lengths of fabric indicated for each use.

Practice Component 1.3: Mobilize & Install Crane Mats
- The intent of this component is to mobilize and install crane mats to harden travel surfaces in approved locations.
- Crane mats shall be properly installed before the job, maintained throughout the duration of the job, and removed at the end of the job.
- Prior to the crane mats being installed, the site should be graded/shaped to create an appropriate surface profile to remove any deformities so that the mats lie flat on the ground.
- Use of crane mats will be coordinated with Vermont's Crane Mat Program.
- Total unit cost is determined by the linear distance (in feet) for the section of trail, road, or landing needing to be hardened with mats and includes the cost of machine time to transport them from the truck to the site where needed, install them, and then remove them when the job is done.
- The location of crane mats shall be clearly marked and located on the ground and on the AMP Planning Map, with the distance (in feet) needing to be hardened and the number of mats needed for each area.

Practice Component 1.4: Construct Ditch
- The intent of this component is to establish new roadside ditches to improve drainage on truck roads in approved locations.
- Ditches shall be excavated and shaped by an excavator or backhoe with an articulated bucket.
- No berm shall be left along the road edge between the road surface and the ditch.
- Ditches shall be excavated deep enough to drain the road base and to a minimum depth of 1.5-2 feet below the road surface.
- Ditch bottom slope should be at a minimum of 2% grade to ensure that water does not stand.
- Ditch backslopes should be at a maximum 2:1 horizontal to vertical ratio.
- Ditches shall be at least 2 feet wide at the bottom forming a slightly rounded or U-shape to help slow and disperse water. Ditches with a V-shape will channelize the flowing water, increasing its velocity and power, and are not recommended.
- All exposed soil within the new ditch shall be seeded and mulched.
- Direct ditch outlets into vegetated areas whenever possible.
- On approaches to stream crossings, ditches shall be diverted into the forest buffer terminating at least 25 feet from the top of the streambank using a "disconnection practice" such as a cross-drain culvert, cross-drain waterbar, or turnout. When a 25-foot forest buffer is not possible, install a catch basin.
- Ditches shall never terminate into surface waters.
- Total unit cost is determined by the linear distance (in feet) of ditch needing to be constructed

and includes the cost to apply seed and mulch to the exposed soil.

- New ditches to be constructed shall be clearly marked and located on the ground and on the AMP Planning Map, with length indicated for each section to be constructed.

Practice Component 1.5: Clean Ditch

- The intent of this component is to clean existing roadside ditches to improve drainage on truck roads in approved locations.
- Ditches shall be cleaned by an excavator or backhoe with an articulated bucket to remove sediment and debris.
- After cleaning, re-shape the ditch as necessary as follows:
  - Minimum ditch depth 1.5-2 feet below road surface.
  - Ditch bottom slope at 2% grade to ensure no standing water.
  - Ditch backslope at a maximum 2:1 horizontal to vertical ratio.
  - Ditch at least 2 feet wide at the bottom and with a U-shape or slightly rounded.
- All exposed soil within the cleaned ditch shall be seeded and mulched.
- No berm shall not be left along the road edge between the road surface and the ditch.
- Total unit cost is determined by the linear distance (in feet) of ditch needing to be cleaned and includes the cost to apply seed and mulch to the exposed soil.
- Length of ditch to be cleaned shall be clearly marked and located on the ground and on the AMP Planning Map, with length indicated for each section cleaned.

Practice Component 1.6: Cross-Drain Culverts

- The intent of this component is to properly install cross-drain culverts with headwalls to improve drainage on truck roads in approved locations.
- Cross-drain culverts shall be installed at regular intervals as determined by % slope of the truck road as shown in Table 1 of the AMP Manual.
- Culverts shall be 18” in diameter unless otherwise approved.
- 15” diameter culverts may be acceptable upon approval in cases where ditch, slope, and road characteristics do not allow for a larger pipe. 24” diameter culverts may be acceptable upon approval in cases where there is an insufficient spacing of cross-drain culverts uphill in the ditch due to site constraints or when collecting additional surface water runoff.
- Install culverts at a 2% to 4% slope and at an approximately 30° angle to the road.
- The excavated trench for the culvert shall be dug such that the bottom width of the culvert trench is 2-3 times the width of the culvert to allow for suitable compaction.
- Culvert shall be laid starting at the outlet end and working upslope.
- Culverts shall have sufficient length to extend to the toe of the road. Lengths of culvert shall be joined in accordance with the manufacturer’s specifications.
- Culvert outlets shall not be perched or suspended above the ground.
- Compacted backfill shall surround the culvert for a minimum of 12” on either side.
- Gravel or native borrow material, compacted in 6” lifts, shall be used as backfill material as long as no stones greater than 3" in diameter are contacting the culvert.
- The top of culverts shall be covered with compacted material to the manufacturer’s

specifications or, lacking those, a depth of half the culvert diameter or 12" (whichever is greater).

- A ditch plug may be necessary to direct water into the culvert inlet. Ditch plugs shall be at least 6" lower than the road shoulder.
- Cross-drain culverts shall never terminate into surface waters.
- On approaches to stream crossings, cross-drain culverts shall terminate at least 25 feet from the top of the streambank in the forest buffer. When a 25-foot forest buffer is not possible, install a catch basin.
- Stone headwalls shall be installed at the inlet and outlet of all cross-drain culverts to mark the location of the culvert, prevent inlet and outlet erosion, and protect the culvert from damage.
- Construct stone headwalls as follows:
  - Large rocks, at least 18" in one dimension, shall be used. Rocks found on-site or blasted stone/ledge are suitable.
  - Headwalls should be flush with the ends of the culvert.
  - Headwall rocks shall be installed so that joints overlap and so that they are well fitted and tight.
  - Each side of the headwall should be at least 1.5 times the width of the culvert.
  - Headwalls should have one large stable rock over the center of the pipe.
- Total unit cost is for each cross-drain culvert installed and includes 3 hours of excavator time, 30 feet of 18" HDPE culvert, 2 truckloads of gravel in place, and 3 yards of 18" stone for headwall construction.
- New cross-drain culverts to be installed shall be clearly marked and located on the ground and on the AMP Planning Map.

Practice Component 1.7: Rock Sandwich (non-woven geotextile fabric)

- The intent of this component is to install a rock sandwich, also known as a French mattress, to improve sub-surface drainage on truck roads.
- This component should be used in the following situations:
  - Wet sections of road with a high water table.
  - Where soils are not sufficient for supporting a roadbed.
  - Where concentrated outflow from a pipe is undesirable.
  - Where installing a cross-drain culvert is not practical due to topography.
- This component should NOT be used for concentrated flows such as streams or ditches.
- A rock sandwich shall be as wide as the full width of the roadbed from toe of slope to toe of slope and shall be long enough to capture the wet area of the road.
- A rock sandwich shall be installed to match the slope of the land. In flat areas, a 1% to 2% slope should be used to aid drainage.
- Rock sandwiches can vary in length. They can be as short as 10 feet to as long as over 100 feet.
- Construct the rock sandwich in the following order:
  - Material shall be excavated from the road to the desired depth and width creating the bottom of the sandwich.
  - Non-woven geotextile fabric only shall be placed in the bottom of the sandwich, ensuring there is enough fabric to wrap around the sides.

- Clean stone 6” to 8” in diameter shall be placed on top of the fabric spread out in a uniform bed 12” to 18” deep.
- The clean stone shall then be covered with fabric, overlapping the joints by at least 12”.
- A minimum of 12” of gravel shall be compacted over the sandwich.

- Total unit cost is determined by the linear distance (in feet) of each rock sandwich constructed plus the length of non-woven geotextile fabric needed for each sandwich.
- Locations of rock sandwiches to be installed shall be clearly marked and located on the ground and on the AMP Planning Map, with lengths indicated for each sandwich.

Practice Component 1.8: French Drain (non-woven geotextile fabric)

- The intent of this component is to install French drains to improve sub-surface drainage on truck roads.
- Sometimes referred to as “underdrain,” a French drain is a drainage system installed under a road or road ditch to collect and transport sub-surface water. Underdrains can help dry out the road base and ditch. These buried conduits come in a variety of shapes and sizes and are usually wrapped in geotextile fabric which allows water to enter the conduit while keeping sediment out. A French drain also prevents sub-surface water from mixing with sediment-laden surface runoff during storm events.
- All French drains should be installed with at least a 1% slope.
- Construct the French drain in the following order:
  - Excavate material from the road to the desired depth and width to form a trench for the French drain. The depth should be low enough to catch the sub-surface flow of water, usually down to an impermeable layer. Be sure to keep a steady slope in the trench and “daylight” in a suitable location away from surface water.
  - Line trench bottom and sides with non-woven geotextile fabric leaving enough fabric to wrap the entire drain once constructed.
  - 4” diameter perforated pipe shall be placed on top of the fabric with the holes down.
  - Cover the perforated pipe with six inches of 1” to 2” washed or clean stone. Washed is preferred but clean stone is suitable. Stone shall not be compacted.
  - Fabric shall be wrapped around the washed or clean stone to fully encase the pipe and stone forming the drain.
  - A minimum of 12” of gravel shall be placed and compacted over the French drain.
- On approaches to stream crossings, the French drain outlet shall terminate at least 25 feet from the top of the streambank in the forest buffer. When a 25-foot forest buffer is not possible, install a catch basin.
- French drains shall never terminate into surface waters.
- Total unit cost is determined by the linear distance (in feet) of each French drain installed plus the length of non-woven geotextile fabric needed for each drain.
- Locations of French drains to be installed shall be clearly marked and located on the ground and on the AMP Planning Map, with lengths indicated for each drain.

Practice Component 1.9: Waterbars

- The intent of this component is to properly install and maintain earthen waterbars to improve

drainage on truck roads.

- Waterbars shall be properly installed and spaced at regular intervals as determined by % slope of the truck road as shown in Table 1 of the AMP Manual.
- Waterbars shall be installed with a 2% to 6% out-slope to ensure that water is properly shed into the ditch or roadside vegetation and does not pool in the bottom of the waterbar.
- Waterbar dimensions will vary depending on the slope of the road as follows:
    - Waterbars shall be installed at an angle to the road to ensure adequate drainage. The angle of installation will vary depending on the steepness of the road. On low grades, the angle may be as low as 15 degrees while on steeper slopes it may increase to as much as 30 degrees.
    - The depth of waterbars will vary depending on the slope of the road. On low grades, the total depth of the waterbar may be only 6" while on steeper slopes they may be up to 24" deep. Waterbar depth on roads should not impede vehicle passage.
- Waterbar outlets must extend one foot or more beyond the road to keep the diverted water from re-entering the road. The outlets must allow water to flow into a filter area.
- On approaches to stream crossings, waterbar outlets shall terminate at least 25 feet away from the top of the streambank in the forest buffer. When a 25-foot forest buffer is not possible, install a catch basin.
- Waterbars may be armored on the bottom and on the berm with 4" minus stone to make them more durable. Stone shall be compacted to ensure that it stays in place.
- Waterbars shall never terminate into surface waters.
- Total unit cost is for each waterbar installed and maintained.
- Locations of waterbars to be installed shall be clearly marked and located on the ground and on the AMP Planning Map.

Practice Component 1.10: Relocation of Truck Road

- The intent of this component is to relocate an existing truck road to a suitable location when the existing road location is within a buffer, the AMPs cannot be met, and a discharge is likely. This component also includes the stabilization of the old road and bringing it into a stable condition that is compliant with the AMPs.
- Road relocations must be reviewed and approved prior to commencing the work.
- Road relocations shall adhere to AMP standards and shall be strategically laid out, considering topography, streams, wetlands, soils, and access needs.
- Avoid seeps, wet areas, and steep slopes over 10% while minimizing the number of stream crossings.
- This component may be combined with other components as needed including gravel (Practice 1.1), geotextile road fabric (Practice 1.2), ditching (Practice 1.4), cross-drain culverts (Practice 1.6), and waterbars (Practice 1.9).
- As a condition of relocating the truck road, the old road shall be stabilized according to the AMP standards.
- All exposed soil along the entire length of the old road shall be seeded and mulched.
- Total unit cost to relocate the new truck road is determined by the linear distance (in feet) of

the new road and includes machine and truck time only. Total unit cost to stabilize the old road is determined by the linear distance (in feet) and includes machine time to install water bars, remove stream crossings, and to scarify the road surface and the cost to seed and mulch the exposed soil.

- Length of new truck road to be relocated shall be clearly marked and located on the ground and on the AMP Planning Map, with the length clearly indicated. Additional components shall be clearly marked and located on the ground and the AMP Planning Map.
- Length of old truck road to be stabilized, including locations of stream crossings to be removed and waterbars to be installed, shall be clearly marked and located on the ground and on the AMP Planning Map, with the length clearly indicated.

REFERENCES

Vermont Acceptable Management Practices, Manual for Logging Professionals 2nd edition, 2022.

VT AMP App for smartphones. Available at the App store or Google play. https://apps.apple.com/ph/app/vermont-amp/id1567399850

PRACTICE 2: Skid Trail Improvement

PURPOSE

The purpose of this practice is to provide for the improvement, stabilization, or relocation of skid trails, as well as the implementation of soil protection measures in sensitive conditions, before a timber harvest begins. Objectives include preventing rutting or erosion, enhancing operability, protecting water quality, and ensuring long-term trail resiliency. This practice shall be applied to existing skid trails and to skid trails approved for relocation. The AMP standards will guide proper design and layout for all components falling under this practice. Practice 2 provides specifically for trail relocation, the installation of surface diversion structures such as traditional waterbars, log-reinforced waterbars, or pole bars (log-reinforced waterbars filled with poles for operability), and the use of corduroy or crane mats for soil protection during harvesting operations.

The changing climate is leading to more unpredictable harvesting conditions due to increasing intensity of precipitation and shorter periods of frozen ground conditions. Consequently, skid trails are more vulnerable to heavy rains, free-thaw events, and saturated soils. Such conditions can result in water quality impacts due to erosion and stream sedimentation, or loss of established access due to trail washout, requiring costly repair for landowners and contractors. Proper implementation of the AMPs on skid trails will improve accessibility while protecting soils and water quality, minimizing unintended impacts from logging equipment.

GENERAL POLICIES

This practice is intended to be used on skid trails as part of an eligible forestry operation.

The installation, maintenance and closeout of skid trail improvement practices must be consistent with Vermont's Acceptable Management Practices.

The applicant must submit an AMP Pilot program application and be approved before incurring any costs associated with this practice. Costs incurred before application approval are not eligible for reimbursement.

The Department of Forests, Parks and Recreation, or designee, will review the application for eligibility and assign a cost-share reimbursement value based on the submitted application and field review (if field review is necessary).

Cost-share reimbursement for the AMP Pilot Program is available for all logging contractors in Vermont regardless of affiliation and is intended to be used on logging operations where the goal of the harvesting is for long-term forest management.

Where wetlands occur, the Vermont Wetland Rules (Section 6) apply and must be followed.

Skid Trail practice components need pre-award field review only when components are in stream or wetland buffer, or other sensitive conditions. Pre-award visit may be exempted by the Service Provider when application review indicates that additional evaluation and guidance are not needed to support successful practice implementation.

For all components falling under the skid trail improvement practice, an AMP Planning Map is required as part of the application. Refer to **Appendix B** for a sample AMP Planning Map. All AMP Pilot Program implementation practices identified on the AMP Planning Map must also be clearly identified on the ground with flagging or marked with paint.

AMP Planning Map Standards:

- Title block containing the landowner's name, logging contractor, town, parcel SPAN, and date
- Major roads with road names
- North Arrow
- Scale
- Legend identifying these landmarks at a minimum:
  - All landing areas and major skid trails
  - Streams, wetlands, and vernal pools
  - All implementation practices proposed for that harvest area.

- For Practice 2, the AMP Planning Map must specifically include (if applicable):
  - Which type of erosion control structures are being proposed (waterbar, log-reinforced waterbar, pole bar)
  - Location of erosion control structures
  - Chart listing total number of each type of erosion control structure

PRACTICE COMPONENTS, COSTS, AND DETAILS

Practice 2: Skid Trail Improvement		
Practice Component	**Unit cost per practice**	**Practice Details**
2.1 Trail relocation	$4/linear ft, plus other components as needed, for skid trail relocation $0.75/linear ft to decommission and stabilize old skid trails to AMP standards.	Skid trail relocated to approved location due to sensitive conditions or water quality concerns. Old trail section decommissioned and stabilized to AMP standards.
2.2 Installation of waterbars	$38/waterbar	Waterbars properly installed, spaced, and maintained throughout harvest.
2.3 Installation of log-reinforced waterbars	$75/log-reinforced waterbar	Log-reinforced waterbars properly installed, spaced, and maintained throughout harvest.
2.4 Installation of pole bars	$150/pole bar	Pole bars properly installed, spaced, and maintained throughout harvest.
2.5 Installation and mobilization of crane mats to harden travel surfaces	$12/linear ft	Proper installation and maintenance of mats for harvest operability and protection of wet or sensitive soils throughout approved section of trail. Removal when job is completed.
2.6 Installation of corduroy	$6.50/linear ft	Proper installation and stabilization of corduroy for harvest operability and protection of wet or sensitive soils on approved sections of trail.

TECHNICAL SPECIFICATIONS

Definition and Purpose:
Implementation of skid trail improvement practices for the protection of water quality and soils before harvesting activities begin.

Condition Where Practice Applies: Skid trails on logging operations where the objective of harvesting is long-term forest management, and one or more of the following applies:

1. The skid trail encroaches on the forested buffer of a stream, wetland, or other waterbody.
2. Diversion structures (waterbars, log-reinforced waterbars, pole bars) are lacking, based on AMP spacing requirements, before harvesting begins.
3. Wet soils restrict harvesting operations and/or pose a risk to water quality, and soil stabilization measures can be used to meet both harvesting objectives and AMP standards.

Applicants must include an AMP Pilot Program Work Plan and an AMP Planning Map along with the AMP Pilot Program Application. Refer to **Appendix B** for a sample Work Plan and AMP Planning Map.

CONSIDERATIONS FOR EACH TRAIL IMPROVEMENT COMPONENT

Practice Component 2.1: Trail Relocation

- The intent of this component is to relocate trails which are not suitable for harvesting purposes due to inoperability, gradient, soil conditions, forest buffer encroachment, or other approved conditions, and where a suitable location exists to reroute the trail.
- Trails will not be approved for relocation solely for reasons relating to harvest efficiency or access to standing timber.
- New skid trail routes must be strategically laid out according to AMP standards, considering topography, streams, wetlands, soils, and access needs.
- Ensure that new trail routes are as short as possible, and minimize the number of stream crossings and steep sections exceeding 20% grade.
- Utilize NRCS soil maps or USDA Web Soil Survey, along with knowledge of local soil conditions, to locate the new trail route, avoiding wet areas where possible.
- Determine whether trail relocation is necessary for harvesting purposes. In certain instances, soil stabilization measures (e.g. crane mats, corduroy) may provide operability and the establishment of a new trail section is not justified.
- The old trail section to be relocated must be properly decommissioned and left in a state that will allow the trail to naturalize over time, with minimal risk of concentrated flow, erosion, or other potentially destabilizing conditions.
    - Erosion control structures must be installed on decommissioned trail sections at spacing based on Table 1 of the AMPs.
    - Where possible, installation of additional or larger erosion control structures is recommended, to ensure trail naturalization.
    - All stream crossings on trails to be relocated and decommissioned must be removed and

brought to AMP standards.
    - Rutting on old trail sections must be smoothed upon trail decommissioning.
    - Exposed soil within the forested buffer must be properly seeded and mulched upon trail decommissioning.
    - Old trail sections that have been decommissioned and relocated may not be reopened or used again for any purpose.
- Total unit cost to relocate trail is determined by the linear distance (in feet) of the new trail section, and includes machine time to clear and establish the new trail only.
- Additional components on the newly established trail section (e.g. waterbars, temporary stream crossing components, etc.) may be combined with trail relocation, but are not included in the unit cost to establish new trail sections.
- Total unit cost to decommission and stabilize an old trail section is determined by the linear distance (in feet) of the old trail, and includes machine time to install water bars, remove stream crossings, and smooth ruts, as well as the cost to seed and mulch exposed soil within the forested buffer.
- Length of new skid trail section, as well as any additional components, must be clearly marked and located on the ground and on the AMP Planning Map.
- Length of old trail to be decommissioned and stabilized, including locations of stream crossings to be removed and waterbars to be installed, shall be clearly marked and located on the ground and on the AMP Planning Map.

Practice Component 2.2: Waterbars

- The purpose of this component is to provide for the installation and maintenance of waterbars on approved skid trails prior to and during harvesting.
- Water diversion structures must be installed strategically and frequently enough to prevent water from accumulating, based on Table 1 of the AMPs.
- Traditional (earthen) waterbars should be at least 12 inches deep and 12 inches high.
- Waterbars should be installed at a 30-degree angle to the trail and with a 2% to 6% out-slope. This will prevent water pooling and sediment filling the structure.
- Extend the waterbar inlet and outlet 1 foot or more beyond the trail to keep the diverted water from re-entering the trail.
- Ensure waterbars do not outlet directly into a stream, wetland, or other water body.
- Surface water runoff from waterbar outlets should filter out and dissipate on the forest floor before reaching forested buffers.
- Inspect and maintain waterbars periodically to ensure integrity of the structure and prevent failure during a severe weather event.
- On sunken or entrenched trail sections where water cannot be diverted to a filter area, strategically place waterbars above and below the sunken trail segment.
- Total unit cost is for each waterbar installed and maintained.
- Waterbar spacing and length of trail where component will be installed must be clearly laid out and located on the ground and on AMP Planning Map.

Practice Component 2.3: Log-reinforced Waterbars

- The purpose of this component is to provide for the installation and maintenance of log-

reinforced waterbars on approved skid trails prior to and during harvesting.

- All water diversion structures must be installed strategically and frequently enough to prevent water from accumulating, based on Table 1 of the AMPs.
- Logs used in construction of log-reinforced waterbars should be a minimum 12" DBH, and 4' longer than trail width to allow for outflow.
- Log-reinforced waterbars should be placed at a 30-degree angle to the trail and with a 2% to 6% out-slope. This will prevent water from pooling and sediment filling the structure.
- Ensure that log-reinforced waterbars do not outlet directly into a stream, wetland, or other water body.
- Surface water runoff from log-reinforced waterbar outlets should filter out and dissipate on the forest floor before reaching forested buffers.
- Inspect and maintain log-reinforced waterbars periodically throughout the harvest to ensure structural integrity and prevent failure during a severe weather event.
- On sunken or entrenched trail sections where water cannot be diverted to a filter area, strategically place log-reinforced waterbars above and below the sunken trail segment.
- Total unit cost is for each log-reinforced waterbar installed and maintained.
- Log-reinforced waterbar spacing and length of trail where component will be installed must be clearly laid out and located on the ground and on AMP Planning Map.

Example of log reinforced water bar on active harvest. Photo credit: Vermont AMP Manual

Practice Component 2.4: Pole Bars

- The purpose of this component is to provide for the installation and maintenance of pole bars (log-reinforced waterbars with small-diameter stems used to fill the structure's trench or depression) on approved skid trails prior to and during harvesting.
- Pole bars are more operable and more durable than earthen or log-reinforced waterbars. When installed correctly, pole bars can improve harvest efficiency and minimize required maintenance of diversion structures throughout the harvest and at closeout.
- Stems used to fill pole bar trenches should be a minimum 8" DBH and 4' longer than trail width. Stems used in the construction of the water diversion berm (the "bump" in a waterbar) should follow the specifications for log-reinforced waterbars.
- Water diversion structures must be installed strategically and frequently enough to prevent water from picking up speed and concentrating, at spacing based on Table 1 of the AMPs.

- Inspect and maintain pole bars periodically throughout the harvest to ensure structural integrity and prevent failure during a severe weather event.
- Ensure that pole bars do not outlet directly into a stream, wetland, or other water body.
- Surface water runoff from pole bar outlets should filter out and dissipate on the forest floor before reaching forested buffers.
- Stems should be removed from pole bars at harvest closeout to prevent the structure from prematurely filling with sediment.
- Total unit cost is for each pole bar installed and maintained.
- Pole bar spacing and length of trail where component will be installed must be clearly laid out and located on the ground and on AMP Planning Map.

Practice Component 2.5: Crane Mats

- The intent of this component is to mobilize and install crane mats to harden trail surfaces in approved locations.
- Crane mats shall be properly installed before the job, maintained throughout the duration of the job, and removed at the end of the job.
- Prior to the crane mats being installed, the site should be graded/shaped to create an appropriate surface profile to remove any deformities so that the mats lie flat on the ground.
- Use of crane mats will be coordinated with Vermont's Crane Mat Program.
- Use the ANR Atlas wetland layer to determine if wetlands are present along length of trail planned for crane mats.
- Where wetlands occur, the Vermont Wetland Rules (section 6) apply and must be followed. Familiarity with the Vermont Wetland Rules and 'Silviculture Allowed Uses' is critical if operating in or around wetlands.
- Total unit cost is determined by the linear distance (in feet) for the section of trail needing to be hardened with mats, and includes the cost of machine time required for mat transportation from the truck to site where mats are needed, installation, and removal at time of job completion.
- The location of crane mats shall be clearly marked and located on the ground and on the AMP Planning Map, with the number of mats indicated for each area.

Practice Component 2.6: Corduroy

- The intent of this component is to use corduroy to harden trail surfaces in approved locations.
- Corduroy is the laying of small logs or poles, sometimes mixed with brush or slash, perpendicular to the direction of travel along a skid trail. Corduroy can help stabilize soft soils and allow for equipment access in otherwise inoperable areas.
- Poles used for corduroy should be a minimum of 8" DBH, and a minimum of 16' in width.
- In winter logging conditions, track in corduroy and allow several days of below-freezing temperatures for trails to stabilize.
- Laying corduroy is not a suitable practice in all wet areas; generally, a solid base (rock, hardpan, or clay) is necessary to prevent rutting or dredging. Soils with deep layers of organic matter, such as muck or peat, may not be suited for corduroy, or harvesting in general.
- Use the ANR Atlas wetland layer to determine if wetlands are present along length of trail

planned to receive corduroy.

- Where wetlands occur, the Vermont Wetland Rules (Section 6) apply and must be followed. Familiarity with the Vermont Wetland Rules and 'Silviculture Allowed Uses' is critical if operating in and around wetlands.
- Total unit cost is determined by the linear distance (in feet) of section of trail where corduroy will be laid.
- The length of trail where corduroy is to be used will be clearly marked and located on the ground and on the AMP Planning Map.

Corduroy on approach to stream crossing. Photo credit: Vermont AMP Manual

REFERENCES

Vermont Acceptable Management Practices, Manual for Logging Professionals
2nd edition, 2022.

VT AMP App for smartphones. Available at the App store or Google play.
https://apps.apple.com/ph/app/vermont-amp/id1567399850

Practice 3: Temporary Stream Crossings

PURPOSE

Stream crossings are one of the most important aspects of maintaining water quality on forest operations. They are key in protecting the streams connectivity, as well as preventing sediment and slash from getting into the stream during forest operations. When designing stream crossings, it is important to size them appropriately so that they are flood resilient and durable during high flow events.

The changes in our climate, characterized by more intense rain events, have created a need for larger and more complex crossing structures. In addition, new tools and techniques are available to create better and more efficient stream crossings. This practice is intended to expose loggers to those methods and support their use.

This practice is intended to assist loggers in implementing temporary stream crossings that are appropriate to the site and designed to support the equipment and type of harvesting that is to be done. If a stream crossing is not sufficiently laid out and constructed, that crossing will most likely be unreliable to operate without risking a discharge of sediment and slash to the stream.

GENERAL POLICIES

The installation, maintenance, and close out of temporary stream crossing practices must be consistent with the Vermont's Acceptable Management Practices (AMPs).

Where wetlands occur, the Vermont Wetland Rules Apply (Section 6) and must be followed.

This practice is intended to be utilized on both skid trails and truck roads.

The applicant must submit an AMP Pilot Program Application and be approved before incurring any costs associated with this practice. Costs incurred before being approved are not eligible for reimbursement.

The Department of Forests, Parks and Recreation, or designee, will review the application for eligibility and assign a cost-share reimbursement value based on the submitted application and field review (if a field review is necessary).

Temporary Stream Crossing components need pre-award field review only when components support crossing of streams with watersheds greater than 40 acres. Pre-award visit may be exempted by the Service Provider when application review indicates that additional evaluation and guidance are not needed to support successful practice implementation.

Cost-share reimbursement for the AMP Pilot Program is available for all logging contractors in Vermont regardless of affiliation and is intended to be used on logging operations where the goal of the harvesting is for long-term forest management.

For the temporary stream crossing practice, an AMP Planning Map is required as part of the application. Refer to **Appendix B** for a sample AMP Planning Map. All AMP Pilot Program implementation practices identified on the AMP Planning Map must also be clearly identified on the ground with flagging or marked with paint.

AMP Planning Map Standards:

- Title block containing the landowner's name, logging contractor, town, parcel SPAN, and date
- Major roads with road names
- North Arrow
- Scale
- Legend identifying these landmarks at a minimum:
    - All landing areas and major skid trails
    - Streams, wetlands, and vernal pools
    - All implementation practices proposed for that harvest area.

PRACTICE COMPONENTS, COSTS, AND DETAILS

Practice 3: Temporary Stream Crossing Rates		
Practice Component	**Unit cost per practice**	**Practice Details**
3.1 Mobilization, installation, and close out of temporary poled crossing (with or without steel culverts).	$350/ crossing	Properly constructed and maintained throughout the use of that trail or road. Removal when job is completed, stream channel re-shaped and seeded and mulched within 50' of stream.
3.2 Mobilization, installation, and close out of temporary brushed in winter crossing (with or without steel culverts).	$350/ crossing	Properly constructed and maintained throughout the use of that trail or road. Removal when job is completed, stream channel re-shaped and seeded and mulched within 50' of stream.
3.3 Mobilization, installation, and close out of temporary wooden skidder bridge.	$450/ crossing	Properly constructed and maintained throughout the use of that trail or road. Removal when job is completed, stream channel re-shaped and seeded and mulched within 50' of stream.

3.4 Mobilization, installation, and close out of temporary steel skidder bridge.	$750/ crossing	Properly constructed and maintained throughout the use of that trail or road. Removal when job is completed, stream channel re-shaped and seeded and mulched within 50' of stream.
3.5 Mobilization, installation, and close out of temporary culvert.	$400/ crossing	Properly constructed & maintained throughout the use of that trail or road. Removal when job is completed, stream channel re-shaped and seeded and mulched within 50' of stream.

TECHNICAL SPECIFICATIONS

Definition and Purpose: Mobilization and excavation for all temporary stream crossing types includes the transfer of the temporary crossing material (culvert, bridge, poles etc.) from the landing to the crossing site. It also includes the excavation and machine work necessary to install the crossing, as well as the removal of the crossing, the excavation necessary to re-shape the crossing to its original profile and seeding and mulching exposed soil within 50 feet of the waterway.

Condition Where Component Applies: Access roads and skid trails on logging operations where the goal of the harvesting is for long-term forest management. Temporary stream crossing practices apply on both intermittent and perennial streams.

Applicants must include an AMP Pilot Program Work Plan and an AMP Planning Map along with the AMP Pilot Program Application. Refer to **Appendix B** for a sample Work Plan and AMP Planning Map.

Stream crossings shall be located and installed in compliance with the VT AMP Manual. Temporary crossings cannot be installed for longer than 18 months. The number of stream crossings should be minimized.

CONSIDERATIONS FOR EACH TEMPORARY CROSSING TYPE

Practice Component 3.1: Temporary Poled Crossing

- Poled crossings are suitable for intermittent stream crossings where the channel is narrow and there is a suitable hard stream bed to support the poles.
- The crossing should be located where approaches are stable and have less than 10% slope.
- Poles should be at least 10" in diameter and long enough to extend beyond the edges of the skid trail.
- Installing a heavy-walled steel culvert in the bottom of the channel is recommended to allow

for additional stream flow. The culvert is not back filled with dirt and is not considered a temporary culvert. These crossings are sometimes called a “vented ford”.

- The number of poles in the crossing should be enough to fill the channel and protect the stream channel and stream banks from being impacted by the machinery and/or the hitches of wood.
- The approaches to the crossing shall be protected using logging slash and corduroy if necessary and maintained throughout the job.
- Temporary poled fords must be removed as soon as skidding on that trail has been completed, or within 12 months of installation, whichever is sooner.
- Temporary and final closeout of the crossing shall follow the ‘*Closeout Procedures*’ found at the end of this section.

Practice Component 3.2: Temporary Brushed-In Winter Crossing

- This crossing type is suitable for wintertime use only on intermittent stream crossings where the channel is narrow and there is a suitable hard stream bed to support the brush. It is not suitable for summertime use because the brush can block summer rainstorms and wash out the crossing structure.
- The crossing should be located where the approaches are stable and have less than 10% slope.
- Poles should be at least 10” in diameter and long enough to extend beyond the edges of the skid trail.
- Installing a heavy-walled steel culvert in the bottom of the channel is recommended to allow for additional stream flow. The culvert is not back filled with dirt and is not considered a temporary culvert. These crossings are sometimes called a “vented ford”.
- The number of poles in the crossing should be enough to fill the channel and protect the stream channel from being impacted by the machinery and/or the hitches of wood.
- Brush made up of tops and branches is then placed on top of the poles to create a smoother crossing and to further reduce the impacts on the stream banks.
- The approaches to the crossing shall be protected using logging slash and corduroy if necessary and maintained throughout the job.
- Temporary brushed-in fords must be removed as soon as skidding on that trail has been completed, or within 12 months of installation, whichever is sooner.
- Temporary and final closeout of the crossing shall follow the ‘*Closeout Procedures*’ found at the end of this section.

Practice Component 3.3: Temporary Wooden Skidder Bridge

- Temporary wooden skidder bridges are suitable for intermittent and perennial stream crossings.
- The crossing should be located where the approaches are stable and have less than 10% slope.
- All types of temporary wooden bridges can be used in this practice regardless of length or construction, provided they are long enough to span the stream channel.
- Temporary bridges shall be wide enough and constructed in a manner so that logging slash and soil cannot fall through the bridge.
- Bumper logs shall be installed on either side of the bridge to keep machinery and hitches on the bridge and out of the stream channel.
- The approaches to the crossing shall be protected using logging slash and corduroy if necessary and maintained throughout the job.
- Temporary wooden bridges must be removed as soon as skidding on that trail has been completed, or within 18 months of installation, whichever is sooner.
- Temporary and final closeout of the crossing shall follow the '*Closeout Procedures*' found at the end of this section.

Practice Component 3.4: Temporary Steel Skidder Bridge

- Temporary steel skidder bridges are suitable for intermittent and perennial stream crossings.
- The crossing should be located where the approaches are stable and have less than 10% slope.
- All types of temporary Steel bridges can be used in this practice regardless of length or construction, provided they are long enough to span the stream channel.
- Temporary bridges shall be wide enough and constructed in a manner so that logging slash and soil cannot fall through the bridge.
- Bumper logs shall be installed on either side of the bridge to keep machinery and hitches on

the bridge and out of the stream channel.

- The approaches to the crossing shall be protected using logging slash and corduroy if necessary and maintained throughout the job.
- Temporary steel bridges must be removed as soon as skidding on that trail has been completed, or within 18 months of installation, whichever is sooner.
- Temporary and final closeout of the crossing shall follow the '*Closeout Procedures*' found at the end of this section.

Practice Component 3.5: Temporary Culvert

- Temporary culverts are suitable for intermittent and small perennial stream crossings.
- Temporary culverts are suitable on crossings where the channel is narrow and relatively deep and does not require moving a lot of cover material.
- The crossing should be located where the approaches are stable and have less than 10% slope.
- All types of pipes can be used, provided they are strong enough to support the backfill material and the equipment, and that they are solid and will not leak water out of the pipe.
- Ensure that the culvert is long enough to prevent dirt and logging debris from falling into the stream channel and plugging the inlet or outlet of the pipe. Bumper logs can be used like headwalls to prevent soil movement over the end of the culvert.
- The diameter of the temporary culvert shall meet the requirements of Table 2A in the VT AMP Manual.
- Installation of temporary culverts should be done in as dry a condition as possible.
- Proper installation is important, starting with placing the culvert in the stream channel, then backfilling with as clean a material as can be found, and compacting with an excavator bucket in 12" lifts. Backfill should match the height of the skid trail approaches and be no less than 12" over the pipe.
- For temporary culverts on truck roads, it is recommended to use crushed gravel as backfill material. This will provide more strength to the pipe itself, as well as preventing rutting and settling around the pipe.
- A properly installed temporary culvert will pass all of the stream flow through the pipe and will not allow water to go sub-surface under the pipe.
- The approaches to the crossing shall be protected using logging slash and corduroy if necessary and maintained throughout the job.
- Temporary culverts must be removed as soon as skidding on that trail has been completed, or within 18 months of installation, whichever is sooner.
- Temporary and final closeout of the crossing shall follow the '*Closeout Procedures*' found at the end of this section.

CLOSEOUT PROCEDURES

These closeout activities are important in stabilizing stream crossings and are required to be done on each crossing site and for each practice.

For crossings that are used during winter conditions, frozen ground may not allow for all activities to be completed as soon as the crossing is no longer needed. In these situations, temporary measures should be done to protect the site during snow melt and spring conditions such as removing the structure if possible and installing temporary waterbars. Then, as soon as the ground conditions are suitable, the final closeout procedure below shall be completed.

- Remove temporary structures, slash, and/or other materials from below the normal high-water mark. Do not remove debris that has fallen into the stream naturally.
- For temporary culverts, the channel shall be re-shaped to match the profile of the stream as evident by the channel upstream and downstream.
- Remove logs used for abutments on temporary bridges unless doing so may cause more disturbance.
- Leave brush and corduroy in place on the approaches and banks (above the normal high-water mark). This provides for stabilization and may limit the area of exposed soil and reduce the need for seeding and mulching.
- Re-shape the stream channel to its original profile.
- Stabilize the approaches in the forest buffer by applying seed and mulch to all exposed soil within 50 feet of the waterway.
- Install waterbars on the approaches to the crossing as close to 25 feet from the top of bank as ground conditions allow.

REFERENCES

Vermont Acceptable Management Practices, Manual for Logging Professionals
2nd edition, 2022.

VT AMP App for smartphones. Available at the App store or Google play.
https://apps.apple.com/ph/app/vermont-amp/id1567399850

Practice 4: Permanent Stream Crossings

PURPOSE

Stream crossings are one of the most important aspects of maintaining water quality on forest operations. They are key in protecting the streams connectivity, as well as preventing sediment and slash from getting into the stream during forest operations. When designing stream crossings, it is important to size them appropriately so that they are flood resilient and durable during high flow events.

The changes in our climate, characterized by more intense rain events, have created a need for larger and more complex crossing structures. In addition, new tools and techniques are available to create better and more efficient stream crossings. This practice is intended to expose loggers to those methods and support their use.

This practice is intended to assist loggers in replacing undersized crossings on intermittent streams where they cross permanent roads or trails. This practice is not intended for large stream crossings on perennial streams that fall under the jurisdiction of the River Management Engineers.

GENERAL POLICIES

Any permanent stream crossings installed through this practice must be consistent with the Vermont's Acceptable Management Practices (AMPs).

Where wetlands occur, the Vermont Wetland Rules (Section 6) apply and must be followed.

This practice is intended to be utilized on permanent roads that are used for long-term forest management and access a log landing.

The applicant must submit an AMP Pilot Program Application and be approved before incurring any costs associated with this practice. Costs incurred before being approved are not eligible for reimbursement.

The Department of Forests, Parks and Recreation, or designee, will review the application for eligibility and assign a cost-share reimbursement value based on the submitted application and field review (if a field review is necessary).

Prior to award and after practice implementation, all applications for this practice will be required to be field reviewed by FPR, or the Service Provider for the purposes of verifying the stream type, proposed crossing size, location and suitability, and satisfactory implementation.

Cost-share reimbursement for the AMP Pilot Program is available for all logging contractors in

Vermont regardless of affiliation and is intended to be used on logging operations where the goal of the harvesting is for long-term forest management.

For the permanent stream crossing practice, an AMP Planning Map is required as part of the application. Refer to Appendix B for a sample AMP Planning Map. All AMP Pilot Program implementation practices identified on the AMP Planning Map must also be clearly identified on the ground with flagging or marked with paint.

AMP Planning Map Standards:

- Title block containing the landowner's name, logging contractor, town, parcel SPAN, and date
- Major roads with road names
- North Arrow
- Scale
- Legend identifying these landmarks at a minimum:
  - All landing areas and major skid trails
  - Streams, wetlands, and vernal pools
  - All implementation practices proposed for that harvest area
- For permanent stream crossings, the location of the crossing and the drainage area for that crossing must be identified and labeled on the map, including the number of acres draining to that crossing site

PRACTICE COMPONENTS, COSTS, AND DETAILS

Practice 4: Permanent stream crossing rates		
Practice Component	**Unit cost per practice**	**Practice Details**
4.1 Installation of permanent culvert on intermittent stream	$3.49 / in-ft; In-ft is determined by multiplying the diameter in inches of the culvert by the length of the culvert in feet	Properly sized and installed culvert.
4.2 Installation of laminated wooden bridge on intermittent stream	$53.30 / sq ft	Properly sized and constructed wooden laminated bridge on intermittent stream.

TECHNICAL SPECIFICATIONS

Definition and Purpose: The permanent stream crossing practice is intended to support the replacement of undersized stream crossings on intermittent streams only. This practice does not

include stream crossings on perennial streams that are under the jurisdiction of the River Management Program within VT DEC. This practice is for the replacement of undersized crossings that have been or are at risk of being damaged by flood events.

Condition Where Component Applies: Truck roads and skid trails where the goal of the harvesting is for long-term forest management. Permanent stream crossing practices apply to intermittent streams only.

For permanent stream crossings, the location of the crossing and the drainage area for that crossing must be identified and labeled on the AMP Planning Map with the acres draining to that crossing site. Prior to award all sites will be visited by FPR, or the Service Provider, and the stream type will be verified as well as the proposed structure size. Following installation, satisfactory implementation of practice will be verified.

CONSIDERATIONS FOR EACH CROSSING TYPE

Practice Component 4.1: Installation of Permanent Culvert on Intermittent Stream - 24" to 66" Diameter Culvert

- The crossing should be located where the approaches are stable and have less than 10% slope.
- Work involving stream crossings has an elevated risk of discharging sediment into the stream. Sediment control measures shall be used to prevent a discharge from occurring and includes a variety of temporary barriers such as silt fence, haybale check dams, fiber blankets, filter socks, and straw rolls/wattles.
- Culverts shall be properly sized. The minimum size for permanent culverts on intermittent streams shall be determined by watershed area as outlined in Table 2A of the AMP Manual or shall be sized to accommodate the active channel as observed at the crossing site. Active channel shall be determined by the extent of streambed scour as measured perpendicular to the stream. Active channel width is narrower than bankfull width (approximately 75%) and is defined by the break in slope and typically extends to the edge of permanent vegetation.
- The inlet and outlet shall be at grade with the stream bed. No plunge pool shall be present at the outlet. If a plunge pool does exist, it shall be filled with stone matching the size of the largest stone observed within the stream channel.
- Culverts installed on streams with active channel widths equal to or greater than 4' shall be embedded 30% below streambed elevation. Infill material is not required and will occur from natural stream action.
- The trench for the culvert shall be excavated such that the bottom width of the trench is at least 3 feet wider than the culvert to allow for suitable compaction. Remove the old culvert if doing a replacement.
- Culverts shall be installed on undisturbed or well-compacted base material.
- The longitudinal profile should be set at the same slope as the natural stream gradient if possible, but shall be no less than 0.5%, and no more than 4%.
- Pipe shall be laid starting at the outlet end and working up slope.
- Culverts shall have sufficient length to extend to the toe of the road and shall be flush with the

inlet/outlet headwalls. Lengths of culvert shall be joined in accordance with the manufacturer's specifications.

- Culvert outlets shall not be perched or suspended above the ground.
- Culverts shall be back filled with 1 ½" crushed gravel in 6" compacted lifts, with compaction done by a plate compactor.
- Compacted backfill should surround the culvert for a minimum of 12" on either side.
- The top of culverts shall be covered with compacted material to the manufacturer's specifications or, lacking those, a depth of half the culvert diameter or 12" (whichever is greater).
- Stone headwalls shall be installed at the inlet and outlet of all stream crossing culverts to mark the location of the culvert, prevent inlet and outlet erosion, and protect the culvert from damage.
- Construct stone headwalls as follows:
  - Large rocks, at least 18" in one dimension, shall be used. Rocks found on-site or blasted stone/ledge are suitable.
  - Headwalls should be flush with the ends of the culvert.
  - Headwall rocks shall be installed so that joints overlap and so that they are well fitted and tight.
  - Each side of the headwall should be at least 1.5 times the width of the culvert.
  - Headwalls should have one large stable rock over the center of the pipe.

Practice Component 4.2: Installation of Laminated Wooden Bridge on Intermittent Stream

- This practice is suitable for larger intermittent streams where the drainage area is less than 160 acres. These permanent crossings do not require a Stream Alteration Permit and can be installed using the basic design included in the practice sheet.
- Work involving stream crossings has an elevated risk of discharging sediment into the stream. Sediment control measures shall be used to prevent a discharge from occurring and includes a variety of temporary barriers such as silt fence, haybale check dams, fiber blankets, filter socks, and straw rolls/wattles.
- Bridges shall be properly sized according to Table 2B in the AMP Manual.
- The low chord of the bridge shall be at least 2.75 feet above average stream bed elevation.
- If the stream bed requires re-construction, as in cases where culverts are replaced with a bridge, the appropriate sized Type E Stone Fill should be used that most closely matches the natural bed material above and below the crossing.
- Proposals to install an intermittent stream bridge crossing shall include watershed area determination, active channel width determination, distance between abutments, length of deck, alignment, stringer/deck design, abutment design, sediment control measures, water diversion plan, streambank armoring, and any other relevant aspects.
- The state has provided a bridge design, the *FPR Laminated Bridge Design*, for use on streams with bank full widths of 10 feet or less. When all other conditions can be met, these designs shall be used on these crossings. Alternatives to this bridge design shall require approval by the State.

Additional Considerations for Laminated Bridge Design

- This bridge design uses pressure treated lumber that is nail-laminated, and spans from abutment to abutment. With this design, the supporting structure and deck are one and the same, with runners put down on top to protect the deck from tire wear. The capacity of the bridge is based on the Nail Laminated Deck Design Table from the USFS document entitled '*Standard Plans for Timber Bridge Superstructures*.' https://www.fpl.fs.usda.gov/documnts/fplgtr/fplgtr125.pdf
- The abutment design used by FPR is very simple and typically made with concrete waste blocks. These bridges are generally short spans, less than 14 feet from face to face of the abutments, and can be designed to be as wide as necessary simply by nail laminating more decking material. The abutments are locked into the streambed by moving the abutments back away from the active channel or bank full width and protecting them with riprap that is keyed in below streambed elevation.
- Nail laminated bridges are good alternatives for large culverts over 48" in diameter where high flows frequently overwhelm the crossing. Extra width can often be attained without significant additional cost.
- Excavation for abutments is often less than for larger culverts that are embedded in the stream channel.

Laminated Bridge Design Details

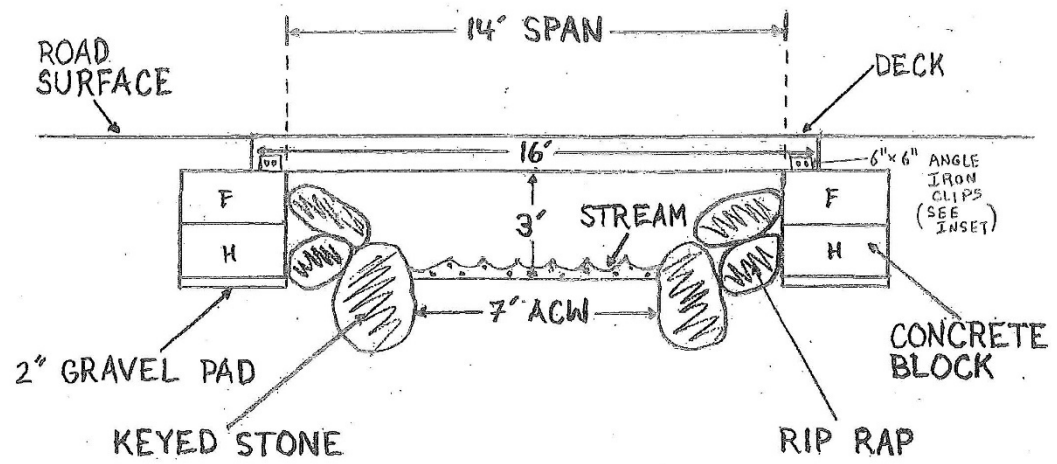
- Set abutments back from the active channel a distance that is equal to, or more than, the height of the low chord of the bridge. This will allow for a 1:1 slope of riprap from the active channel to the abutment.
- Use only single-pour concrete waste blocks without cold seams.
- The base of the first row of blocks shall be set no higher than average streambed elevation.
- Set blocks on a 2" bed of crushed stone to allow for leveling.
- Blocks shall be level and tight with joints staggered.
- Key in riprap at least 3' below stream bed elevation. Use large 3' plus stone in bottom row. The stone should be set on undisturbed or compacted soil.
- Use pressure treated lumber only for decking, curbs, and runners.
- Use galvanized nails or deck screws for lamination that are long enough to laminate three boards together at a time.
- The bridge deck shall have at least 12" sitting on each abutment.
- On the side of each corner of the deck, there shall be a 6x6 piece of angle iron 10" long attaching the deck to the abutment. See *FPR Laminated Bridge Design* on the following page.
- Curbing and runners shall be constructed as shown in the *FPR Laminated Bridge Design.*

REFERENCES

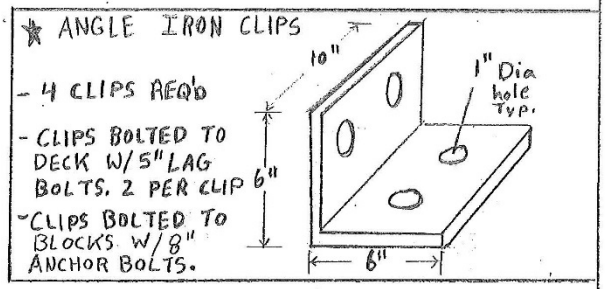
Vermont Acceptable Management Practices, Manual for Logging Professionals
2nd edition, 2022.

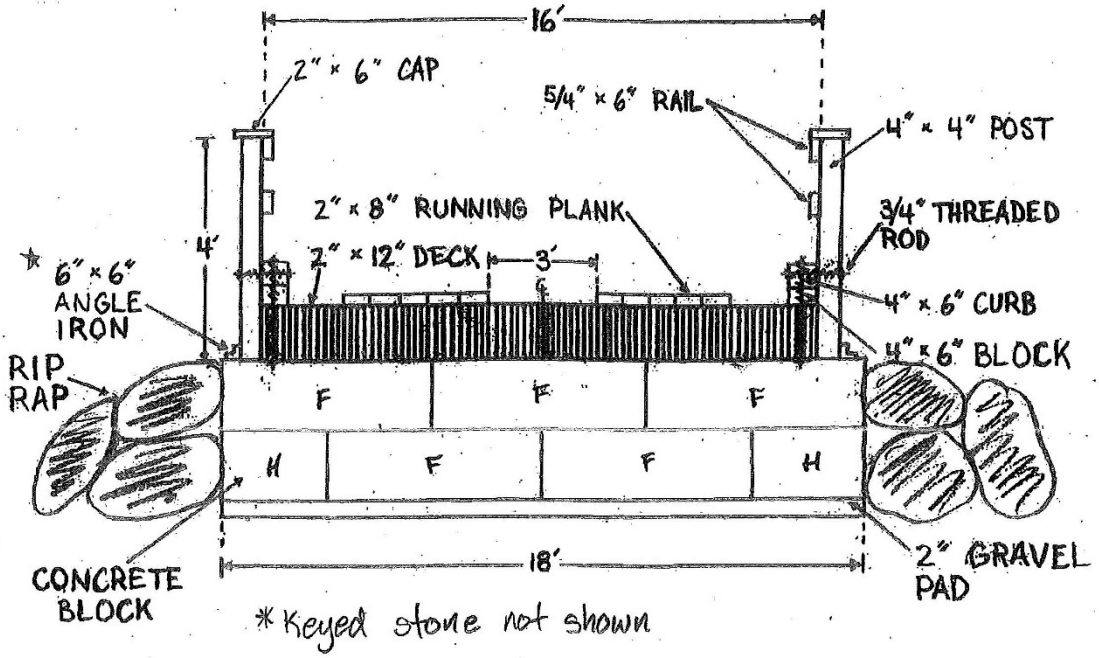
VT AMP App for smartphones. Available at the App store or Google play.
https://apps.apple.com/ph/app/vermont-amp/id1567399850

FPR LAMINATED BRIDGE DESIGN



ACW = Active Channel Width
F = Full Block - 6' x 3' x 18"
H = Half Block - 3' x 3' x 18"





*Keyed stone not shown

NOT TO SCALE

RD/DW April 2024

ATTACHMENT I: Pre-Award Verification Site Visit Requirements by Practice

Practice 1: Hardening Truck Roads & Log Landings

Practice Component	Pre-Award Visit Needed?
1.1 Adding gravel to truck road and/or landing to harden travel surfaces.	Yes, but only when gravel is being added in stream, wetland buffer, or other sensitive conditions (hydric soils, RTE habitat.)
1.2 Installation of geotextile road fabric to improve drainage and harden travel surfaces.	Yes
1.3 Mobilization and installation of crane mats to harden travel surfaces.	Yes, but only when crane mats are used in stream or wetland buffer.
1.4 Construct new ditch to improve drainage on truck roads.	Yes, but only when ditch construction is in stream, wetland buffer, or other sensitive conditions (hydric soils, RTE habitat.)
1.5 Clean existing ditch to improve drainage on truck roads.	No
1.6 Installation of cross-drain culverts to improve drainage on truck roads.	No
1.7 Installation of a rock sandwich to improve sub-surface drainage. Also known as a French mattress.	Yes, but only when rock sandwich is in stream, wetland buffer, or other sensitive conditions (hydric soils, RTE habitat.)
1.8 Installation of a French drain to improve sub-surface drainage.	Yes, but only when drain construction is in stream, wetland buffer, or other sensitive conditions (hydric soils, RTE habitat.)
1.9 Installation and maintenance of waterbars to improve surface drainage.	No
1.10 Truck Road Relocation	Yes, but only when site of relocated road is in stream, wetland buffer, or other sensitive conditions (hydric soils, RTE habitat.)

Practice 2: Skid Trail Improvement

Practice Component	Pre-Award Visit Needed?
2.1 Trail relocation	Yes, but only when relocated trail is in stream, wetland buffer, or other sensitive conditions (hydric soils, RTE habitat.)
2.2 Waterbars	No
2.3 Log-reinforced waterbars	No
2.4 Pole bars	No
2.5 Installation and mobilization of crane mats to harden travel surfaces	Yes, but only when crane mats are used in stream or wetland buffer or other sensitive conditions (hydric soils, RTE habitat.)
2.6 Corduroy	Yes, but only when corduroy is used in stream or wetland buffer or other sensitive conditions (hydric soils, RTE habitat.)

Practice 3: Temporary Stream Crossing Rates

Practice Component	Pre-Award Visit Needed
2.1 Mobilization, installation, and close out of temporary poled crossing (with or without steel culverts).	Only for large crossings on streams draining at least a 40-acre watershed.
2.2 Mobilization, installation, and close out of temporary brushed in winter crossing (with or without steel culverts).	Only for large crossings on streams draining at least a 40-acre watershed.
2.3 Mobilization, installation, and close out of temporary wooden skidder bridge.	Only for large crossings on streams draining at least a 40-acre watershed.
2.4 Mobilization, installation, and close out of temporary steel skidder bridge.	Only for large crossings on streams draining at least a 40-acre watershed.
2.5 Mobilization, installation, and close out of temporary culvert.	Only for large crossings on streams draining at least a 40-acre watershed.

Practice 4: Permanent stream crossing rates

Practice Component	Pre-Award Visit Needed
4.1 Installation of permanent culvert on intermittent stream	Yes
4.2 Installation of laminated wooden bridge on intermittent stream	Yes

ATTACHMENT II: Sample AMP Planning Map