Proposed Billboards
1201 Research Parkway
Meriden, Connecticut

Wetland Impact Assessment

Submitted To:

BL Companies
355 Research Parkway
Meriden, CT 06450

Prepared By:

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APPENDICES

PROJECT PLANS ATTACHED SEPARATELY

1.0 INTRODUCTION

Davison Environmental, LLC has prepared this evaluation for BL Companies in conjunction with an Inland Wetlands and Watercourses Commission ("IWWC") application to the City of Meriden for two proposed billboards on an approximate 29.64-acre property ("project"). The property is located at 1201 Research Parkway, in Meriden ("property" or "site") with frontage on Research Parkway to the east and Interstate 91 to the west.

2.0 PROJECT DESCRIPTION

The project includes the construction of two proposed billboards, one static and one digital, and associated gravel access drives. Access will be via a proposed access drive originating from Research Parkway.

3.0 REGULATED ACTIVITIES

Due to the location of on-site wetlands and watercourses, regulated activities are required. Approximately 4,600 square feet (sqft) of wetlands would be subject to direct, permanent impacts (filling/piping) associated with two wetland/intermittent watercourse crossings and the northern billboard foundation. The first crossing requires approximately 2,300 sqft of wetland impacts and an intermittent watercourse crossing. This crossing will be accomplished using a three-side (open bottom – 20' span) culvert. The second crossing will require approximately 800 sqft of wetland impacts and an intermittent watercourse crossing that will be accomplished using a traditional round culvert. The northern billboard will require an additional 1,500 sqft of wetland filling. Representative photographs are provided in Appendix A.

In addition, approximately 16,000 sqft of temporary impacts are required for installation of the northern billboard. Additional temporary and secondary impacts are anticipated from tree clearing in wetlands at both billboard locations. Further, approximately 34,200 sqft of activities are proposed within the site's 100-foot upland review area ("URA") on on-site resource areas. Since the proposed access roads would be gravel, virtually all proposed URA activities would remain pervious post-construction.

4.0 EXISTING ENVIRONMENT

4.1 General Site Description

The site in its entirety encompasses approximately 29.64-acres of undeveloped land located east of Interstate 91, west of Research Parkway, and immediately north of the Meriden/Wallingford town line. The site is generally comprised of forested uplands and wetlands which include embedded intermittent watercourses. Site elevations are variable, but generally they fall from Research Parkway to the site wetlands, before rising again along Interstate 91.

4.2 Watershed

The Site is located within the Harbor Brook Subregional Drainage Basin (5206).

4.3 Wetland and Watercourse Delineation and Description

Site wetlands were delineated on October 9, 10, and 18, 2020 by Matthew Davison, Professional Soil Scientist. The delineated resource area includes seasonally to permanently saturated forested wetlands with embedded intermittent watercourses generally draining in a south-north direction through the central portion of the site. Several smaller intermittent tributaries contributing flows from the east and west. These contributing flows include discharges of stormwater (including point discharges) originating from Interstate 91, as well as tributaries originating from the east side of Research Parkway.

The width of, and flow velocities within the primary central intermittent watercourse increase to the north, as additional tributaries contribute flows. Incising and bank erosion was observed at several locations along embedded watercourses, but most notably along the primary intermittent watercourse near the first proposed wetland/watercourse crossing which is downgradient of the confluence of a contributing intermittent watercourse originating from the east side of Research Parkway.

Representative vegetation includes red maple *(Acer rubrum)*, black gum *(Nyssa sylvatica)*, green ash *(Fraxinus pennsylvanica)*, American beech *(Fagus grandifolia)*, tulip poplar *(Tulipifera liriodendron)*, spicebush *(Lindera benzoin)*, and skunk cabbage *(Symplocarpus foetidus)*. Note that within some wetland areas, trees such as hickory *(Carya spp.)*, black birch *(Betula lenta)*, and sugar maple *(Acer saccharum)* which are typically associated with uplands were found in wetland areas. Within these same areas, the shrub and herb layers were dominated by hydrophytic vegetation. This dynamic indicates a longer-term shift in site hydrology from drier to wetter, likely resulting from off-site inputs which have increased for some reason.

4.4 Soil Types

Digitally available updated soil survey information was obtained from the Natural Resources Conservation Service ("NRCS") and generally confirmed during the field investigations. Refer to the NRCS Soil Mapping in Appendix B. Soil classifications present on the property are as follows:

<u>Wetland Soils</u> – wetland soils consist of Wilbraham silt loam. The Wilbraham series consists of poorly drained loamy soils formed in subglacial till. The soils are very deep to bedrock and moderately deep to a densic contact. They are nearly level to gently sloping soils in drainageways and low-lying positions of till hills. Wilbraham soils have a water table at or near the surface much of the year. They have an aquic moisture regime.

<u>Non-Wetland Soils</u> - The non-wetland soils were not examined in detail, except as was necessary to determine the wetland boundary. Non-wetland soils consist of Manchester gravelly sandy loam, Ludlow silt loam, and Wethersfield loam. The Manchester series consists of very deep, excessively drained soils formed in sandy and gravelly outwash and stratified drift. They are nearly level to steep soils on outwash plains, terraces, kames, deltas and eskers. Slope ranges from 0 to 45 percent. Permeability is rapid in the surface layer, rapid or very rapid in the subsoil, and very rapid in the substratum.

The Ludlow series consists of moderately well drained soils formed in loamy subglacial till. They are very deep to bedrock and moderately deep to a densic contact or hardpan. They are nearly level to strongly sloping soils on till plains, hills, and drumlins.Ludlow soils have a seasonal high water table at a depth of about 20"-42" from November through May.

The Wethersfield series consists of very deep, well drained loamy soils formed in dense glacial till on uplands. The soils are moderately deep to dense basal till. They are nearly level to steep soils on till plains, low ridges, and drumlins. Permeability is moderately rapid or moderate in the solum and slow or very slow in the dense substratum. Slope ranges from 0 to 35 percent.

4.5 Rare Species Habitat

Based on a review of the most recently updated (June 2020) Connecticut Department of Energy and Environmental Protection Natural Diversity Database mapping, no State-listed species or critical habitats are located on, or in close proximity to the site.

5.0 WETLAND FUNCTIONS AND VALUES

5.1 Wetland Functions and Values

The functions and values of the wetlands which will be subject to impacts (filling/piping) are summarized in Table 1 and discussed in Sections 5.2 and 5.3. The *Highway Methodology* recognizes 13 separate wetland functions and values which are listed in Table 1.

The degree to which a wetland provides each of these functions is determined by one or more of the following factors: landscape position, substrate, hydrology, vegetation, history of disturbance, and size. Each wetland may provide one or more of the listed functions at significant levels. The determining factors that affect the level of function provided by a wetland can often be broken into two categories. The effectiveness of a wetland to provide a specified function is generally dependent on factors within the wetland whereas the opportunity to provide a function is often influenced by the wetland's position in the landscape as well as adjacent land uses. For example, a depressed wetland with a restricted outlet may be considered highly effective in trapping sediment due to the long residence time of runoff water passing through the system. If this wetland is located in gently sloping woodland, however, there is no significant source of sediment in the runoff therefore the wetland is considered to have a small opportunity of providing this function.

Table 1: Summary of Wetland (Watercourse) Functions and Values

Wetland Functions and Values	Groundwater Recharge/Discharge	Sediment/Shoreline Stabilization	Floodflow Alteration	Fish & Shellfish Habitat	Sediment/Toxicant/ Pathogen Retention	Nutrient Removal/Attenuation	Production Export	Wildlife Habitat	Recreation	Educational/Scientific Value	Uniqueness/Heritage	Visual Quality/Aesthetics	Listed Species Habitat
On-Site Wetlands	S	P	S	S	S	S	S	S	U	U	U	U	U
Suitability P = principal function S = secondary function U = function unlikely to be provided at a significant level N/A = not applicable													

5.2 Functions and Values of Impacted On-Site Wetland

This on-site wetlands would be subject to approximately 4,400 sqft of filling/piping to accommodate a proposed access driveway. The principal function of this resource area is described below.

Sediment/Shoreline Stabilization functions are provided at a principal level due to the presence of several embedded, flashy watercourses with incised and eroded banks (opportunity). Bordering wetlands, particularly where shrub and tree growth are present along the streambanks (effectiveness) provide this function at a principal level.

6.0 POTENTIAL EFFECTS ON WATER RESOURCES, FLORA, AND FAUNA

The following describes potential short-term (construction phase) and long-term wetland impacts, along with comments and recommendations. Note that recommendations are in *italics*. With adherence of these recommendations, along with incorporation of the proposed mitigation (refer to Section 7), DE anticipates that the proposed project will not adversely affect water resources both on and off-site.

6.1 Potential Short-term Impacts

Potential short-term impacts are primarily associated with sediment discharge to site water resources during construction. This is especially pertinent to the construction of the two watercourse crossings.

Comments & Recommendations:

1. *In order to minimize the potential for impacts, erosion and sedimentation control measures should be designed and installed in accordance with CTDEEP's 2002 Connecticut Guidelines for Soil Erosion and Sediment Control. A detailed plan should be developed for each of the two watercourse crossings that includes information such as footing installation details including dewatering measures.*
2. *The watercourse crossings should be constructed during low-flow periods between June 1 and September 30.*

6.2 Potential Long-term Impacts

Potential long-term impacts to water resources are primarily related to the loss of functions and values and/or water quality degradation resulting from wetland/watercourse filling, alterations to wetland hydrology, and stormwater discharges. The following are comments and recommendations related to the minimization of potential long-term impacts to water resources.

Comments & Recommendations:

1. Water quality degradation in streams is often associated with a high percentage of impervious cover within its watershed. A target of 12% impervious cover represents the level of impervious cover in the contributing watershed, below which a stream is likely to support a macroinvertebrate community that meets aquatic life use goals in Connecticut

Water Quality Standards.[1] The project would contribute only a negligible area of impervious cover (billboard foundations) over 29 acres, since no paved roads, parking areas, or buildings are proposed.

2. Due to the limited area of site development, minimal alteration of existing drainage patterns is proposed. However, the first proposed wetland crossing will bisect a wetland system perpendicular to the direction of flow. While no visual evidence of surface water movement through this area was observed, since this area is level, proximate to a 100-yr floodplain, and bordering a watercourse, some overland flow should be anticipated. *As such, constructing this roadway crossing at-grade, to allow for unrestricted overland flow, should be considered.*

3. Approximately 4,400 square feet (sqft) of wetlands would be subject to direct, permanent impacts (filling/piping) associated with two wetland/intermittent watercourse crossings and the northern billboard foundation. Wetland filling will not adversely affect the identified principal function (Sediment/Shoreline Stabilization) since the proposed activities would reinforce the streambanks at the crossing locations, which are currently subjected to bank erosion (see Photo 2). Further, bank stabilization is proposed as a part of project mitigation (refer to Section 7).

4. The site is an undeveloped, wooded property surrounded by transportation corridors and development. Due to this fact, which effectively creates a habitat island, suitable habitat is limited to species that are commonly referred to as "disturbance tolerant". Such species are capable of thriving in urban environments in which the habitat is largely fragmented, and wetlands are often disturbed, subject to light pollution, and lack contiguous riparian buffer habitat. No rare species habitat was identified (refer to Section 4.5). Due to these facts and the very limited area of proposed development, the project would not adversely affect flora, fauna, or rare species.

5. *Detailed plans should be developed for each of the two stream crossings. Stream crossings should be designed and constructed on accordance with the Army Corps of Engineers ("ACOE") Connecticut General Permits, Stream Crossing Best Management Practices ("BMPs"), in Appendix G (refer to Appendix C).*

6. The first crossing is proposed at the southern tip of a 100-yr floodplain. Since this is the outermost extent of the floodplain, no adverse impacts to floodflows are anticipated provided that this crossing is constructed in accordance with the ACOE Stream Crossing BMPs.

7.0 MITIGATION RECOMMENDATIONS

The following mitigation activities are intended to improve existing resource conditions by stabilizing eroded streambanks to reduce ongoing erosion and sedimentation. Refer to Photos 1 & 2, and Plan Sheet SP-1.

[1] Connecticut Watershed Response Plan for Impervious Cover, Effects of Stormwater on Water Quality. CTDEEP & FB Environmental Associates, Inc., 97A Exchange Street, Suite 305, Portland, Maine 04101

Bank Stabilization/Erosion Control Plantings (Live Stakes)

Bank stabilization/erosion control plantings are live stake plantings of shrub species known for their erosion control potential. The plantings would be situated along identified eroded banks within embedded watercourses in order to stabilize the banks and minimize future soil erosion.

1. A pre-construction meeting shall be held with the general contractor, installation contractor and project wetland scientist prior to any work in this area. The purpose of this meeting will be to discuss plant species and planting locations.
2. Live stakes shall be purchased and installed during the dormant season, between November 15 and March 15.
3. Live stakes shall be dormant live cut branches of willow *(Salix spp.)* and dogwood *(Cornus spp.)* Purchased from an approved supplier. Plant material shall be dormant and free of splits, rot, disease and insect infestation.
4. Dormant live stakes shall be between 0.75 and 2 inches in diameter and 3 to 4 feet in length. Side branches shall be cleanly removed. The basal end of the cutting shall be cleanly cut at an angle and the top shall be cut square (flat).
5. If live stakes must be stored prior to planting, one third of the basal end shall be submerged in cold water.
6. Live stakes shall be installed basal end down, 2 – 3’ apart, with at least two buds or bud scars above ground (generally 3 to 6 inches exposed). Exposure should be minimized to prevent desiccation.
7. Tubelings may also be used if live stakes are not available due to seasonal or other constraints. Tubelings shall be 5” deep plugs, 8’-24” in height, *Salix spp.* or *Cornus spp.*
8. The project wetland scientist shall inspect the installation during construction.
9. The contractor shall irrigate the live stakes or tubelings per supplier’s recommendation.
10. The project wetland scientist shall inspect the plantings once per year for three complete growing seasons after installation. Remedial actions shall be implemented as required by the wetland scientist.

Streambank Stabilization Planting Schedule

Botanical Name	Common Name	Size	Min. Spacing	Quantity
Live Stakes				
Salix spp.	Willow	3 – 4’	4’	246
Cornus spp.	Dogwood	3 – 4’	4’	246

Wetland plants to be provided by New England Wetland Plants, Inc. (413-548-8000), or approved nursery. Live stakes shall be placed along opposite banks of eroded watercourses within the bank stabilization area. Planting locations shall be determined in coordination with the project wetland scientists.

8.0 REFERENCES

Connecticut Environmental Conditions Online (CTECO) (http://www.cteco.uconn.edu/)

Dowhan, J. and R. J. Craig. 1976. Rare and Endangered Species of Connecticut and Their Habitats. State Geological and Natural History Survey of Connecticut.

Mitsch, W.J. and Gosselink, J.G. 2007. Wetlands, fourth edition. John Wiley and Sons, Inc.

New England Wetland Plants, Inc. http://newp.com/catalog/seed-mixes/

U.S. Army Corp of Engineers. 1995. The Highway Methodology Workbook – Wetland Functions and Values: A Descriptive Approach.

APPENDIX A – WETLAND / WATERCOURSE PHOTOS

Photo 1: View of stream crossing #1 location looking west

Photo 2: View of eroded stream bank south of crossing #1

Photo 3: View of crossing #2 location looking west

Photo 4: View of point of origin of the intermittent watercourse upgradient of crossing #2. Interstate 91 is in background. Note concrete bed.

APPENDIX B – NRCS SOIL MAP

Soil Map—State of Connecticut
(1201 Research Parkway, Meriden, CT)

Map Scale: 1:3,930 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 20, Jun 9, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 30, 2019—Oct 15, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5	Wilbraham silt loam, 0 to 3 percent slopes	26.8	32.4%
37C	Manchester gravelly sandy loam, 3 to 15 percent slopes	20.4	24.7%
40B	Ludlow silt loam, 3 to 8 percent slopes	6.2	7.6%
55A	Watchaug fine sandy loam, 0 to 3 percent slopes	0.5	0.6%
63B	Cheshire fine sandy loam, 3 to 8 percent slopes	0.8	0.9%
87B	Wethersfield loam, 3 to 8 percent slopes	11.5	13.9%
87C	Wethersfield loam, 8 to 15 percent slopes	4.4	5.3%
306	Udorthents-Urban land complex	12.1	14.6%
Totals for Area of Interest		**82.7**	**100.0%**

APPENDIX C – ACOE CONNECTICUT GENERAL PERMITS, STREAM CROSSING BMPS

US Army Corps of Engineers®
New England District

APPENDIX G

Connecticut General Permits
Stream Crossing Best Management Practices (BMPs)

Design and construction guidance may be found in the U.S. Forest Service stream simulation manual, "Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings"[1]. Section 5.3.3 Headcutting Potential and 6.2 Design of the Stream-Simulation Channel Bed are particularly relevant. Sections 7.5.2.3 Construction Methods and 8.2.11 Stream-Simulation Bed Material Placement both show important steps in the project construction. Chapter 6.1 is relevant for proper alignment and construction to prevent bank erosion or streambed scour.

Permanent Crossings in Tidal Streams

These are relevant for new and replacement crossings and culvert extensions.

1. Match the velocity, depth, cross-sectional area, and substrate of the existing stream outside the crossing, if it exists, and size crossings such that they do not restrict tidal flow over the full natural tide range seaward of the crossing. The Corps will typically require a low lying property analysis to ensure flooding is not a concern.
2. Construct crossings in dry conditions.

Permanent Crossings in Non-Tidal Streams

These are relevant for new and replacement crossings and culvert extensions.

1. Span[2] streams or size culverts or pipe arches such that they are wider than bankfull width (BFW). Spans are strongly preferred as they avoid or minimize disruption to the streambed, and avoid entire streambed reconstruction and maintenance inside the culvert or pipe arch (see 4, 5 & 7 below), which may be difficult in smaller structures. The span width of bridges, box culverts and arches at bankfull elevation should be ≥1.2 times BFW where practicable. In many cases bankfull width is not necessarily interchangeable with the elevation of ordinary high water.[3]
2. Embed culverts or pipe arches below the grade of the streambed. This is not required when ledge/bedrock and/or utilities prevents embedment, in which case spans are preferred. The following depths are recommended to prevent streambed washout, and ensure compliance and long-term success:
    a. ≥ 1-2 feet for box culverts and pipe arches[4], or
    b. ≥ 1-2 feet and at least 25% for round pipe culverts.
3. Match the culvert gradient (slope) with the stream channel profile.
4. Construct crossings carrying normal flows with a natural bottom substrate within the structure matching the characteristics of the substrate in the natural stream channel and the banks

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[1] www.nae.usace.army.mil/missions/regulatory.aspx >> "Stream and River Continuity."

[2] For the purposes of this GP, spans are bridges, three-sided box culverts, open-bottom culverts or arches that span the stream. The use of bridge piers or similar supports does not prevent a structure from being considered as a span.

[3] BFW corresponds with "bankfull stage" and this should be field delineated in accordance with the U.S. Forest Service documents: a) U.S. Forest Service stream simulation manual[1]; b) "Stream Channel Reference Sites: An Illustrated Guide to Field Technique[1]" (Harrelson, et al. 1994); and c) "A Guide to Identification of Bankfull Stage in the Northeastern United States".

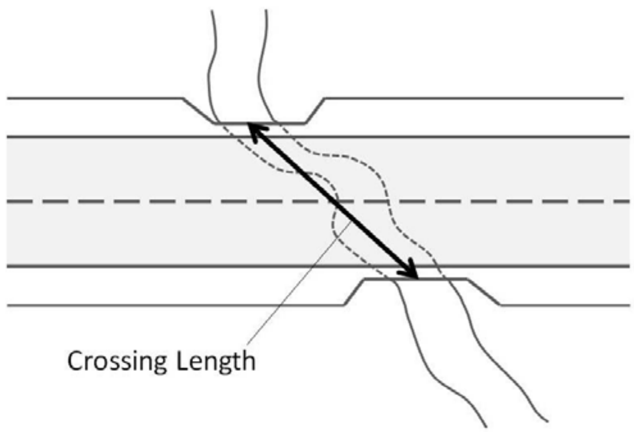
[4] For 2(a) and 2(b), deeper embedment depths may be needed if there are elements of the constructed stream bed that are greater than 15 inches in diameter.

(mobility, slope, stability, confinement, grain and rock size) at the time of construction and over time as the structure has had the opportunity to pass substantial high flow events.

5. Construct crossings with appropriate bed forms and streambed characteristics so that water depths and velocities are comparable to those found in the natural channel at a variety of flows at the time of construction and over time. In order to provide appropriate water depths and velocities at a variety of flows and especially low flows, it is usually necessary to reconstruct the streambed (sometimes including a low flow channel), or replicate or preserve the natural channel within the structure. Otherwise, the width of the structure needed to accommodate higher flows will create conditions that are too shallow at low flows. The grain and rock size, and arrangement of streambed materials within the structure should be in accordance with (4) above. Flows could go subsurface within the structure if only large material is used without smaller material filling the voids.

6. Openness> 0.82 feet (0.25 meters)

Openness is the cross-sectional area of a structure opening divided by its crossing length when measured in consistent units (e.g. feet). For a box culvert, openness = (height x width)/ length.



For crossing structures with multiple cells or barrels, openness is calculated separately for each cell or barrel. At least one cell or barrel must meet the appropriate openness standard. The embedded portion of a culvert is not included in the calculation of cross-sectional area for determining openness.[5]

Openness > 0.82 feet is recommended to make the structure more likely to pass small, riverine wildlife such as turtles, mink, muskrat and otter that may tend to avoid structures that appear too constricted. This openness standard is too small to accommodate large wildlife such as deer, bear, and moose. Structures that meet this openness standard are much more likely than traditional culverts to pass flood flows and woody debris that would otherwise obstruct water passage. It is likely that most structures that meet all the other general standards will also meet this openness standard. However, for some very long structures it may be impractical or impossible to meet this standard.

7. Construct banks on each side of the stream inside the span that match the horizontal profile of the existing stream and banks outside the span. To prevent failure, all constructed banks should have a height to width ratio of no greater than 1:1.5 (vertical:horizontal) unless the stream is naturally incised. Tie the banks into the up and downstream banks and configure them to be stable during expected high flows. Use materials that match the up and downstream banks (avoid the use of angular riprap and armored slopes, except where necessary for structural reasons, in which case they should be top-dressed with natural stream bed material). Construct a wildlife shelf on at least one of the banks. The constructed banks (with a wildlife shelf) will allow for terrestrial passage for wildlife and prevent flow from being focused to one side and

[5] An Openness Ratio Spreadsheet shows how to calculate the open area for embedded pipe culverts to meet the 0.82 standard for openness. See www.nae.usace.army.mil/missions/regulatory.aspx >> Stream and River Continuity.

scouring the bed, especially against the structure's sidewall which may undermine the footings in the case of spans.

Temporary Crossings in Non-Tidal Streams

Temporary crossings shall consist of spans, culverts, construction mats or fords designed and constructed as follows:

1. All temporary crossings:

    a. Impacts to the streambed or banks require restoration to their original condition (see U.S. Forest Service stream simulation manual referenced on page 1 of this document for stream simulation restoration methods). Use geotextile fabric or other appropriate bedding for stream beds and approaches where practicable to ensure restoration to the original grade.

    b. Avoid excavating the stream or embedding crossings.

2. Culverts:

    a. Install energy dissipating devices downstream if necessary to prevent scour.

3. Stream fords: Equipment may ford streams when: it is not feasible to construct a span or culvert (e.g., streams having no or low banks, emergency situations); the natural stream bed and banks consist of ledge, rock or sand that prevents disturbance and turbidity; and there is a stable, gradual approach.

4. Spans: Anchor spans where practicable so they do not wash out during high water.

5. Construction mats: Build construction mat stream crossings in accordance with the Construction Mat BMPs, specifically the Wetland/Stream Channel Crossing section. See www.nae.usace.army.mil/missions/regulatory.aspx >> State General Permits >> Connecticut General Permit Documents.