

Chapter 3. Methods of In-Water Construction

The following pages contain illustrations, notes, and guidance on Best Practices for in-water construction work. These methods have been pre-approved by the DNR for use in the field; however, not all methods are appropriate for all work sites. Note that in most cases the applicable DNR Hydrologist will have to approve a method prior to construction. For this reason project designers, construction engineers, project managers, or contractors should work in consultation with the DNR for selection and approval of the appropriate method of in-water construction.



(Public Water Access installation, Mississippi River at Hastings, Dakota County MN)



(Lowry Ave Bridge, Minneapolis, Hennepin County. photo Peter Leete)

Demolition or Repair of Bridges over Water

The following is an overall checklist of items that may be required prior to (and during) bridge demolition or redecking repair:

Potential permits or notifications required:

DNR Public Waters Work Permit
MPCA Asbestos Abatement Notification (14 day)
MPCA Demolition Notification (14 day lead time)
US Corps of Engineers
Watershed District Permits

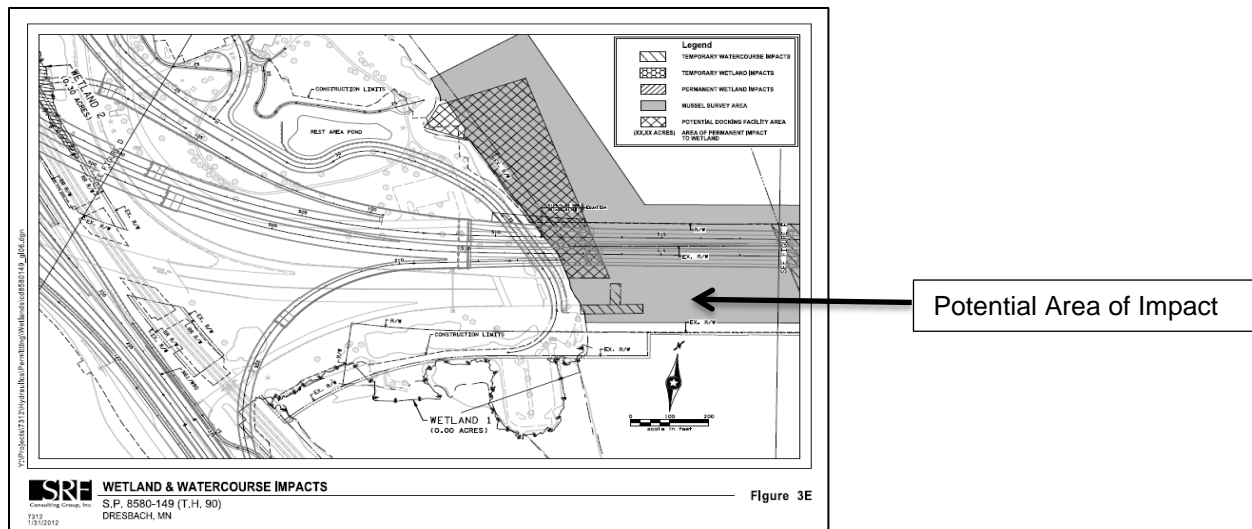
DNR Temporary Appropriations Permit
MPCA Construction Site NPDES
MPCA 401 Water Quality Certification
US Coast Guard
Wetland Conservation Act (wetland impacts)

Check Work Exclusion dates for Staging/scheduling:

Work exclusion dates that protect fish migration and spawning limit the time allowed for work in the water. See Chapter 1, Page 3. These dates may affect work schedules. Also see Chapter 3, Page 11 for guidance on in-stream work methods, as some methods of construction will not be allowed if fish movement is a concern.

Identify Work Area Limits (Potential Area of Impact)

DNR permitting authorizations can be more efficient if both permanent impacts and temporary impacts are reviewed simultaneously. Often, temporary work areas are not known by regulatory authorities until after contract letting, as these areas may be determined by contractor after project letting. However, the project proposer should make attempts to define the potential area of impact for regulatory review at the onset of project development. Special provisions can be added to bid documents to constrain contractors to these areas. Thus avoiding a second round of review (and possible delays) should the contractor propose work outside the identified 'Potential Area of Impact'. The potential area of impact should include areas of permanent disturbance plus those areas that may be disturbed temporarily during demolition or construction activities. This includes staging areas and in-water areas such as cofferdams, temporary fill for access, barge loading/unloading facilities, areas of spud pole use, or any other activity that could limit public use of the water or cause permanent or temporary impacts to the cross section of the lake or riverbed.



The early identification of the in-water 'Potential Area of Impact' is utilized by the DNR to review for all potential resources in or near the project area. This example shows the area identified by MnDOT for potential impacts. All resources were identified (including a native Mussel Survey) within this 'box' prior to permit review or amendment request, thus there is no need to re-survey resource concerns as the project moved from design to construction to in-water work proposals by contractor for demolition/construction. Thus project delay from redundant regulatory review of adjacent areas is avoided. Conversely the 'potential area of impact' is not expected to be completely impacted, though has a high enough possibility for some impact during construction that it should be included in the early review process.

Check for Protected Species and Ecologically Sensitive Areas.

Bird nests and mussel species are commonly encountered at bridges. The most common bird nests on bridges over water are Barn & Cliff Swallow nests. If swallow nests are present, the structure must be netted (figure 5) or use other suitable methods to prevent nesting should work be proposed during that time (Spring to early summer). Mussel Surveys may also be required prior to demolition. For questions regarding Threatened and Endangered Species, contact:

- DNR Natural Heritage Information System
<http://www.dnr.state.mn.us/eco/nhnrp/nhis.html>
- or refer to MnDOT's Highway Project Development Process (HPDP)
<http://www.dot.state.mn.us/planning/hpdp/environment.html>

Check for Regulated Materials.

An assessment/inspection must be done to identify regulated materials a minimum of 9 months before letting to set up assessment of bridge to be demolished, renovated, or moved. Additional information can be found on Chapter 3, page 6 or the MnDOT Office of Environmental Stewardship Regulated Material Management website: <http://www.dot.state.mn.us/environment/buildingbridge/index.html>

Check with MPCA Stormwater Program for Construction Activity.

MPCA administers the requirements of the National Pollutant Discharge Elimination System and the State Disposal System (NPDES/SDS) requirements. To ensure state water quality standards during construction are not violated, check with the MPCA Stormwater Program <http://www.pca.state.mn.us/stormwater> for permit application requirements, pollution prevention guidance documents, and additional measures required for work in Special or Impaired Waters.

The MPCA requires increased water quality protection measures on projects located within one mile of waters designated Special Waters and/or Impaired Waters. Check the interactive map called "Special Waters and Impaired Waters Search" located at

<http://pca-gis02.pca.state.mn.us/csw/index.html>

NPDES/SDS permits from MPCA for construction sites near specially-protected and impaired waters require additional controls, conditions or an individual permit:

- a. Sites that discharge near waters with qualities that warrant extra protection (special waters) must use additional best management practices and enhanced runoff controls.
- b. Sites that discharge near an "impaired water," impaired for phosphorous, turbidity, dissolved oxygen, and biotic impairment, must meet special conditions during project design and/or when preparing a Stormwater Pollution Prevention Plan (SWPPP), or a Construction Stormwater permit application.

Failure to incorporate increased protection measures on Special and/or Impaired Waters could be a violation of MPCA Water Quality regulations.

Demolition Notification.

MPCA Notification of Demolition is required at least 10 working days prior to demolition or re-decking repair (<http://www.dot.state.mn.us/environment/buildingbridge/pdf/mpca-bridge-form.doc>). Debris shall not be allowed to drop into the water without prior written approval of the appropriate DNR Hydrologist. Methods to contain materials and dust must be undertaken, such as:

- Demolition onto temporary access road or utilize barges. (ex: figure 1 &2).
- Cutting and lifting bridge pieces/sections when dropping into water is not allowed (ex: figure 3).
- Temporary work pads in the water for placing of equipment must meet guidance on Chapter 3 Page 13 (figure 6).
- Use of demolition debris may be offered for use by other federal, state, or local government for beneficial use.
- All regulated materials need to be managed appropriately.

Check for appropriate in-stream work methods.

The DNR or MPCA may limit types of construction methods based on natural resources or water quality concerns. Limitations should be written into project bid documents. See Chapter 3, Page 11 for guidance on in-Water construction methods.

Spill Containment.

Spill containment kits or supplies must be located on the site, near where potential spills could occur (figure7)



figure 1. Temporary causeway built for demolition and construction



figure 2. Barge use for capturing debris



figure 3. Cut and lifting sections instead of dropping debris



figure 4. Redundant BMPs for added protection of the waterway



figure 5. Net bridges prior to nesting season.



figure 6. Access pad with filter fabric pad and silt curtain for waterway protection.



figure 7. Spill Containment kit must be on site

MnDOT Assessment/Inspection for Regulated Materials

Prior to bridge demolition or repair, the bridge must be assessed for asbestos containing material, loose or peeling lead based paint, and other regulated materials such as treated wood, florescent bulbs, light ballasts, transformers and other electronic components. If the bridge contains asbestos, lead based paint or other regulated materials such as mercury or PCBs, the materials must be properly managed and disposed/recycled by MnDOT certified contractors and at MnDOT approved end sites. The inspector conducting the assessment must be licensed by the Minnesota Department of Health (MDH). The assessment will determine if the bridge contains regulated amounts of asbestos and other regulated materials. More information is located on the MnDOT's Office of Environmental Stewardship Regulated Materials and Waste website: <http://www.dot.state.mn.us/environment/regulatedmaterials/index.html>

Contact: MnDOT Districts 1,2,3,4 and Metro N or E:
Mark Vogel, MnDOT, Office of Environmental Stewardship.
Mark.Vogel@state.mn.us or 651-366-3630

Or

MnDOT Districts 7,8, and Metro S or W:
Jackie Klein, MnDOT, Office of Environmental Stewardship.
Jackie.Klein@state.mn.us 651-366-3637

Description: There are numerous regulations that apply to management and disposal of regulated materials/waste. The environmental management of asbestos and other wastes are regulated by the following agencies: US Environmental Protection Agency, US Department of Transportation, Minnesota Pollution Control Agency, and Minnesota Department of Health. These regulations place both short and long term liability on the owner or generator of the material/waste.

MnDOT Office of Environmental Stewardship coordinates with MnDOT approved contractors and regulatory agencies for proper notification and management of asbestos containing materials and other regulated waste. All assessments, sampling, testing, removal, transportation, and disposal will be done under oversight of MnDOT Office of Environmental Stewardship and performed by personnel certified by the Minnesota Department of Health and on MnDOT's certified contractor list.

Best Practice: **An assessment/inspection must be done to identify regulated materials. Contact Mark Vogel, MnDOT Office of Environmental Stewardship, a minimum of 9 months before letting to set up assessment of bridge to be demolished or redecked.** Information includes: SP#, TH#, bridge#, district contact, and bridge as-built plans. The Office of Environmental Stewardship will prepare contracts for structure assessment and oversight of asbestos removal procedure.

Note: For local projects, the same process is required, though local coordination with the MPCA is required (provide MPCA links for local folks here). The following materials shall be separated from general construction debris and treated accordingly:

- **Asbestos:** Asbestos Containing Material (ACM) will be removed prior to or during demolition
- **PCBs:** Polychlorinated Biphenyls (PCBs) will be removed from the bridge prior to demolition.
- **Mercury:** Material containing mercury will removed from the bridge prior to demolition.
- **Treated Wood:** Treated wood will be removed from the bridge prior to demolition.
- **Lead:** Lead plates will be removed and peeling or loose lead paint will be encapsulated or be removed prior to demolition

Typical regulated material and locations:



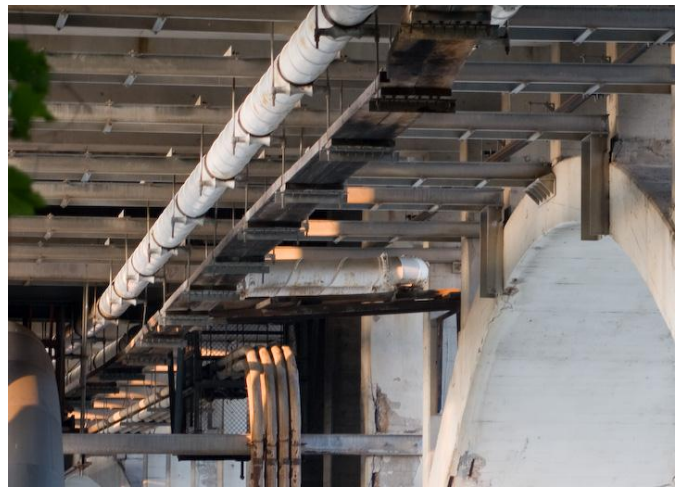
Wood preservatives



lead plates



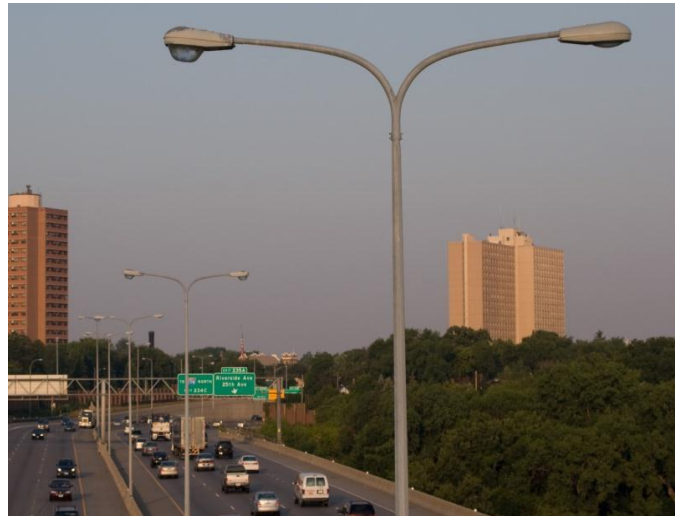
deck materials & joint compounds



asbestos



lead paint



lighting ballasts

Erosion Prevention and Sediment Control

The following erosion prevention and sediment control requirements are taken from Part IV (Construction Activity Requirements) and Appendix A (Special Waters and Impaired Waters) of MPCA Permit #MN R100001 (General Permit Authorization to Discharge Stormwater Associated with Construction Activity under the National Pollutant Discharge Elimination System). The text has been reworded as a stand-alone document for meeting DNR GP 2004-0001 Erosion Prevention and Sediment Control requirements for in-water projects regardless if a MPCA permit is required or not.

1. A MPCA NPDES stormwater permit for construction activity (Permit #MN R100001) is required for any construction activity disturbing:
 - a. One acre or more of soil.
 - b. Less than one acre of soil if that activity is part of a "larger common plan of development or sale" that is greater than one acre.
 - c. Less than one acre of soil, but the MPCA determines that the activity poses a risk to water resources.

The requirements in this section are a subset of requirements of MPCA's Permit #MN R100001. As a standalone guidance document, parts A through G below may not meet all MPCA Construction Activity NPDES permit requirements. To ensure state water quality standards during construction are not violated, check with the MPCA Stormwater Program <http://www.pca.state.mn.us/stormwater> for permit application requirements, pollution prevention guidance documents, and additional measures required for work in Special or Impaired Waters.

2. Temporary work below the Ordinary High Water (OHW) elevation, such as channel diversions, placement of temporary fill, structures for work pads/dock walls, bypass roads, coffer dams, or staging areas to aid in the demolition or construction of any authorized structure shall be submitted for review and approval in writing by the DNR Transportation Hydrologist or Area Hydrologist prior to beginning work
3. The DNR may prohibit in-water construction if the project will be detrimental to water quality or significant fish and wildlife habitat. Erosion Prevention and Sediment Control practices that have been determined to be the most effective and practical means of preventing or reducing sediment from leaving the worksite are required. These practices shall be installed in areas that slope to the water and on worksite areas that have the potential for direct discharge due to pumping or draining of areas from within the worksite (EG coffer dams, temporary ponds, stormwater inlets). These methods, such as mulches, erosion control blankets, temporary coverings, silt fence, silt curtains or barriers, vegetation preservation, redundant methods, isolation of flow, or other engineering practices, shall be installed concurrently or within 24 hours after the start of the project, and will be maintained for the duration of the project in order to prevent sediment from leaving the worksite.
 - a. Any cofferdams, turbidity barriers, or berms placed within Public Waters must be installed and maintained in a manner that does not allow soil erosion or deposition of soil or debris into the water. If they are constructed using earthen material, then sheet piling, armoring with riprap, or a synthetic cover such as silt curtain or filter fabric must be included to prevent their erosion. Upon removal of a cofferdam or turbidity barrier, the affected area must be restored to pre-project conditions.
 - b. In-water sediment control measures must be properly installed prior to the authorized activities and must be maintained for the duration of the in-water disturbances. The chosen measures must be monitored to ensure turbidity or sedimentation are not occurring outside of the expected area of impact (work area). If the measures fail to contain sediment or turbidity the Permittee must immediately repair, replace or use an alternative measure, which will adequately control turbidity and sedimentation.

To aid in determining appropriate methods to be identified in a Storm Water Pollution Prevention Plan or Site Plan, see:

- The MPCA Stormwater Best Management Practices Manual 'Protecting Water Quality in Urban Areas' (www.pca.state.us/index.php/water/water-types-and-programs/stormwater/stormwater-management/stormwater-best-practices-manual.html), and
- The following section on 'Typical In-Water Construction Methods' of construction (Chapter 3, page 11).

A. SITE MANAGEMENT PLAN

A Storm Water Pollution Prevention Plan (SWPPP) is a document required by the MPCA for compliance to the Construction Stormwater Permitting requirements. A SWPPP is not required by the DNR, however it may be utilized as part of the site management plan for review and authorization for work authorized by DNR Public Waters Work Permitting. See GP2004-0001 condition 'TEMPORARY IMPACTS DURING CONSTRUCTION' and items 'A' through 'L' for subjected conditions.

The Permittee (or its contractor) must submit for approval a site management plan detailing proposed measures and schedules indicating construction operations. These must meet the requirements listed here in Parts A through G (also refer to Site Management Plan requirements in MnDOT Construction Specification 1717.2.D). The Best Practices selected to meet these requirements are to be identified in the plan. Following DNR approval, these practices must be installed and maintained in an appropriate and functional manner that is in accordance with relevant manufacturer specifications and accepted engineering practices.

1. The plan shall implement appropriate demolition and construction phasing, and other construction practices to prevent adverse impacts from debris, minimize erosion, and prevent sediment from leaving the worksite.
2. The location of areas not to be disturbed must be delineated (e.g. with flags, stakes, signs, fence, etc.) on site before work begins.
3. Other provisions of GP 2004-0001 may have requirements more stringent than those listed here. In such cases, the more stringent provision takes precedence (Example: selected practices shall not adversely affect endangered or threatened species, Areas of Environmental Sensitivity (see Chapter 1 page 10), or MPCA Special or Impaired Waters water quality requirements).

B. EROSION PREVENTION PRACTICES

1. In all cases, erosion prevention and sediment control methods that have been determined to be the most effective and practical means of preventing or reducing sediment from leaving the worksite shall be installed in areas that are within 200 feet of the water's edge and drain to these waters, and on worksite areas that have the potential for direct discharge due to pumping or draining of areas from within the worksite (EG coffer dams, temporary ponds, stormwater inlets). These methods, such as mulches, erosion control blankets, temporary coverings, silt fence, silt curtains or barriers, vegetation preservation, redundant methods, isolation of flow, or other engineering practices, shall be installed concurrently or within 24 hours after the start of the project, and shall be maintained for the duration of the project in order to prevent sediment from leaving the worksite. DNR requirements may be waived in writing by the authorized DNR staff based on site conditions, expected weather conditions, or project completion timelines.
2. For Designated Trout Waters, including all perennially flowing tributaries to the designated trout streams within the Public Land Survey (PLS) Section where the designated trout stream is located, the following also apply:
 - a. Stabilization of all exposed soil areas must be initiated immediately to limit soil erosion but in no case completed later than seven (7) days after the construction activity in that portion of the site has temporarily or permanently ceased.
 - b. Where possible, a 100 foot undisturbed vegetated buffer zone from the designated Trout Waters shall be preserved as part of the construction phasing, unless encroachment is necessary to complete the project.
 - c. The permanent stormwater management system must be designed such that the discharge from the project will minimize any increase in the temperature of trout stream receiving waters resulting from the 1-and 2-year 24-hour precipitation events.
3. For areas not in Public Land Survey System (PLSS) sections with Designated Trout Waters, stabilization of all exposed soil areas must be initiated immediately to limit soil erosion whenever any construction activity has permanently or temporarily ceased and will not resume for a period of 14 calendar days.
4. Work exclusion dates (no work in the water during fish migration and/or spawning): Areas landward of the OHW may be worked during the DNR work exclusion dates (See Chapter 1 page 3). However, in areas that are within 200 feet of the Public Water OHW, and drain to these waters, must complete stabilization activities within 24 hours during this restricted work period.
5. Pipe outlets must be provided with temporary or permanent energy dissipation within 24 hours.

C. SEDIMENT CONTROL PRACTICES

1. Sediment control practices must be established before any shoreline or in-water disturbing activities begin.
2. Sediment control practices must minimize sediment from leaving the worksite. If the selected practices become overloaded, additional sediment control practices or redundant Best Practices must be installed to eliminate the overloading.
3. The timing of the installation of sediment control practices may be adjusted to accommodate short-term in-water activities.
4. Contributing curb or storm drain inlets must be protected by appropriate Best Practices during construction until all sources with potential for discharging sediment to Public Waters have been stabilized.
5. Temporary stockpiles must have silt fence or other effective sediment controls, and shall not be placed in

wetlands or surface waters.

6. Vehicle tracking of sediment off the construction site must be minimized.

D. WORKSITE DEWATERING

1. Worksite Dewatering (e.g., pumped discharges of coffer dams and other work areas,) related to the construction activity must be discharged to a temporary or permanent sedimentation basin on the project site. If the water cannot be discharged to a sedimentation basin prior to entering the surface water, it must be treated with the appropriate Best Practices, such that the discharge does not adversely affect the receiving water or downstream landowners. Sediment control devices can be bypassed when the discharge water appears clear.
2. Stream Diversion Water, such as a pumped bypass, shall be immediately returned to the original channel downstream. This water does not require treatment prior to discharge.
3. In either case (worksite dewatering or stream diversion water), practices must be in place to ensure that discharge points are adequately protected from erosion and scour.
4. All drain plugs on pumps shall be removed and all dewatering equipment, including hoses, shall be drained prior to transport off site (see Best Practices for Prevention of Spread of Aquatic Invasive Species, Chapter 1 page 8).
5. For construction dewatering amounts that exceed 10,000 gallons/day or 1 million gallons/yr, the permittee or their Contractors must submit a GP 1997-0005 Notification Form to the DNR at least 5 days prior to the start of pumping operations. Prior authorization to use General Permit 1997-0005 must be obtained by submitting an application using the **MNDNR Permitting and Reporting System**.
 - a. **Note:** GP 1997-0005 is not valid for appropriations from surface water sources that are designated as infested waters unless accompanied by an Infested Waters permit or written notification from the Department that an Infested Waters permit is not required. For a current list of designated infested waters, see: <http://www.dnr.state.mn.us/invasives/ais/infested.html>
 - b. Application forms for an Infested Waters permit application are available at: http://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/permits.html

DI. INSPECTIONS AND MAINTENANCE

1. Either the Permittee, or whoever is identified in the SWPPP or Site Management Plan must routinely inspect the in-water work areas and determine the adequacy of existing measures. The MPCA requires this be conducted at least once every seven (7) days during active construction and within 24 hours after a rainfall event greater than 0.5 inches in 24 hours to ensure integrity and effectiveness of the selected practices.
2. All nonfunctional Best Practices must be repaired, replaced, or supplemented with functional Best Practices within 24 hours after discovery, or as soon as field conditions allow.
3. Should Best Practices fail, resulting in sediment deposition in Public Waters, the DNR shall be notified immediately. The Permittee and/or its contractor(s) must plan for corrective actions to remove all deltas and sediment deposited in Public Waters. Such a plan shall include DNR input, and removal and stabilization must take place within seven (7) calendar days of obtaining access. The Permittee and/or its contractor(s) is responsible for contacting all local, regional, state and federal authorities and receiving any applicable permits, prior to conducting any additional in-water work associated with delta removal.

DII. POLLUTION PREVENTION MANAGEMENT MEASURES

1. Storage and disposal of hazardous waste must be in compliance with MPCA regulations.
2. Liquid and solid wastes must be disposed of properly and in compliance with MPCA regulations.

DIII. FINAL STABILIZATION

1. All soil disturbing activities must be stabilized by a uniform perennial vegetative cover, or other equivalent means necessary to prevent soil failure under erosive conditions. The DNR prefers that native vegetation (grasses, forbs, shrubs and/or trees) that is suitable to the local habitat to be utilized where appropriate. In some case it may be required as part of the mitigation package for the permitted project.
2. Note that the current MPCA Construction Stormwater General Permit (R1000001) language has a subtle change from previous permits regarding permanent vegetative cover (final stabilization). The requirement is now that uniform perennial vegetative must provide cover with a density of 70 percent of its **expected** final growth density over the entire pervious surface area. This should remove disincentive for using native vegetation in permanent cover plans because even though a native mix might take longer to reach full coverage, it could potentially reach 70% of its mature density in an amount of time comparable to what it takes a non-native mix to reach 70% of its mature density. See Chapter 1 page 14 for native vegetation best practices.
3. All temporary synthetic and structural erosion prevention and sediment control practices (such as silt fence) must be removed. Best Practices designed to decompose on site (such as some compost logs) may be left in place.

Typical In-Water Construction Methods

To facilitate construction in Public Waters, it is usually necessary that portions of the worksite be separate from open water and be relatively dry. There are several options available for providing a stable, dry work area during construction. The following options shall be considered for project construction. Several options may be suitable for any specific site. However not all options are suitable for all projects. Suitable options are to be determined based on the project size, required resource protection levels, and available materials.

In-water work methods will require prior written approval from the applicable DNR Hydrologist (Area Hydrologist). Below is a list of options for in-water work or stream diversions during construction.

For All Options:

1. Potential permits or notifications required: The following is an overall checklist of items that may be required prior to authorization of temporary in-water impacts for construction:
 - DNR Public Waters Work Permit
 - MPCA Construction Site NPDES Permit
 - MPCA 401 Water Quality Certification
 - US Corps of Engineers
 - US Coast Guard
 - Watershed District Permits
 - Wetland Conservation Act (wetland impacts)
 - Local Floodplain Zoning administrator
2. Check DNR work exclusion dates that protect fish migration and spawning (see Chapter 1 page 3). These dates may affect work schedules.
3. All equipment intended for use at a project site must be free of prohibited invasive species and aquatic plants prior to being transported into or within the state and placed into state waters. All equipment used in designated infested waters shall be inspected by the Permittee or their authorized agent and adequately decontaminated prior to being transported from the worksite. See Best Practices for Prevention of Spread of Aquatic Invasive Species, Chapter 1 page 8).
4. Check navigation requirements for the effected waterway (see chapter 2, page 22).
5. MPCA may have designated a Public Water as a Special Water and/or an Impaired Water. The MPCA requires increased water quality protection measures on projects located within one mile of waters designated Special Waters and/or Impaired Waters. To determine if Special or Impaired waters are near the project area, check the interactive map "Special Waters and Impaired Waters Search" located at:
<http://pca-gis02.pca.state.mn.us/csw/index.html>

To determine MPCA design requirements for work in Special Waters and/or Impaired Waters, go to the MPCA Stormwater Program for Construction Activity website:
<http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/construction-stormwater/construction-stormwater.html>
6. A mussel survey may be required prior to authorization of work in the water. Generally streams with native mussel populations are the larger streams or rivers.
7. Dewatering. A separate water use permit is required for withdrawal of more than 10,000 gallons of water per day or 1 million gallons per year from surface water or ground water. GP1997-0005 (temporary water appropriations) covers a variety of activities associated with road construction and should be applied if applicable. An individual appropriations permit may be required for projects lasting longer than one year or exceeding 50 million gallons. Information is located at: http://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/permits.html
However, in all cases:
 - a. In-stream pump intakes shall be fitted with screens, filter geotextiles, rock berms, or similar to prevent fish from being drawn into the system.
 - b. Keep stream diversion water separate from worksite water (diverted stream water does not require treatment prior to discharge).
 - c. Stream diversion water must be returned to the original channel downstream.

- d. All worksite water requires treatment prior to discharge.
 - e. All discharge points shall be adequately protected from erosion and scour by use of riprap, plastic sheeting, geotextiles, plywood, existing vegetation, or suitable alternatives.
 - f. Sediment control devices can be by-passed when discharge water appears clear.
 - g. Pumps are to be sized for a typical storm event for the time period when work is proposed, commonly a 2 year – 24 hour event.
 - h. A second pump of the same size should be on site for contingency purposes.
 - i. All drain plugs shall be removed and hoses drained prior to transport off site.
8. Any temporary in-water construction methods, such as cofferdams, turbidity barriers, berms, or access facilities (EG temp access roads, workpads, temporary barge facilities) placed within Public Waters must be installed and maintained in a manner that they do not lead to streambank erosion or allow sediment to leave the worksite. If they are constructed using earthen material, then sheet piling, armoring with riprap, or a synthetic cover such as silt curtain or filter fabric must be included to prevent their erosion and creation of sediment. Erosive slopes must be stabilized with aggregate, slash mulch, or comparable non-erosive material. In-water materials may consist of any number of alternative measures:
- a. Rock burrito [washed rock wrapped in geotextile].
 - b. Earthen berm – only allowed when there is no sediment issue to surrounding areas such as fish habitat or Areas of Environmental Sensitivity (see Chapter 1, page 10). The MCPA has regulations prohibiting earthen berm use on waters designated as Special Waters or Impaired Waters
 - c. Silt curtain
 - d. Heavy duty silt fence (jersey barriers)
 - e. Sand bags (large or small)
 - f. Water dams (such as the Aqua Barrier)
 - g. Sheet piling
 - h. Cookie cutter barrier (large sheets of metal or plywood pressed into the ground)
- If approved, temporary fill shall be free of organic material or any material that may cause siltation or pollute the waterbody. All such material shall be removed and the area restored to pre-existing profiles prior to project completion.
9. Hydrologic modeling of temporary fill or temporary structures may be required by DNR Transportation Hydrologist or Area Hydrologist in order to evaluate impacts to the 100-yr (1% chance) flood elevation. Contingency plans may also be required to ensure all construction equipment and unsecured construction materials are moved out of the floodplain to prevent impacts to the 100-yr (1% chance) flood elevation or from being swept away by flood waters.
10. Diversion structures or cofferdam construction placed in the water should be constructed and maintained so not to cause scouring conditions.
11. Project materials must be deposited or stored in an upland area, in a manner where the materials will not be deposited into the public water by reasonably expected high water or runoff.
12. Spill containment kits or supplies must be located on the site, near where potential spills could occur.
13. Site Restoration. All in-stream materials shall be removed upon project completion. The impacted area must be restored to the original cross-sections and existing shoreline restored. Revegetation plans must be reviewed in consultation with the landowner and the DNR. It is common that the DNR require revegetation of disturbed soil with native plant species suitable to the local habitat (grasses, forbs, shrubs, and/or trees) see Selecting a Seed Mix in Chapter 1, page 14).
14. Use MnDOT Spec 1717 Site Management Plan requirements and Erosion Control Schedule

Option 1. Temporary Stream Block

This method is applicable to low flow stream characteristics with no fish passage concerns during the time of construction. With large bypass pumps it has been utilized on larger streams as well. It is also common for stormwater outfall repairs. With little or no flow, a bypass pump may not be needed at all. It is also a common choice for very short term projects.

Construct temporary berms upstream and downstream of the proposed structure in order to block off water from the construction area. To install structures in this manner, approval may require up to three pumps; A stream diversion pump, a worksite dewatering pump, and a standby pump. When flowing water is present, install pumps to direct water around the construction site to provide downstream flow. See Chapter 3, page 15 for an illustration of this setup.

Option 2: Culvert By-Pass

This method is applicable to higher flow characteristics, though may not be allowed by the DNR during periods of fish migration unless velocity criteria to facilitate fish passage is met. They are generally utilized for larger culvert installations that have larger flow regimes, access requirements, or on projects that will take a considerable amount of time.

Construct temporary dikes upstream and downstream of the proposed structure in order to block off water from the construction area. Install a temporary culvert, tube, or hose to carry the water through or around the work area.

See Chapter 3, page 16 for an illustration of this setup

Option 3: By-Pass Channel

This method provides for better accommodation for fish passage during construction. They are generally utilized for larger or longer culvert installations that have larger flow regimes, fish passage requirements during construction, or on projects that will take a considerable amount of time.

Construct a by-pass channel around the culvert/bridge installation site. The channel must be designed to withstand erosion and bed shear potential. Commonly they are lined with plastic or other non-erosive materials, sometimes jersey barriers are incorporated into the side berms to protect the channel as well. With the channel diverted, the work area is isolated for the duration of the project. Any water pumped from the worksite area must be treated prior to discharge to the stream

See Chapter 3, page 16 for an illustration of this setup

Option 4: Partial Stream Diversion

This method is often utilized on wide streams, multiple culvert installations, or bridge construction. The natural channel is partially spilt by a berm, thus allowing water to continue on its same alignment, though in a constricted state. The berm may split the channel in half, working on one side, and then shifting to the other at a later date. Only the upper and lower ends need moving from one phase to the other. Alternately, where conditions allow, a berm may be placed along both stream banks to provide simultaneous work areas to both banks, while water flows through the middle.

See Chapter 3, page 17 for an illustration of this setup

Option 5: Speed BMP

This method is appropriate when there is little to no flow, no need to pump the worksite, and it can be done within 24 hrs. These are usually on culverts that are smaller than those found on Public Waters, though can include stormwater outfall work during relatively dry conditions. Temporary berms may be placed for worksite protection from water seepage.

All materials, including final stabilization materials, must be on-site before any in-water work begins. Once work begins, continue until the installation is 100% complete in 24 hours or less. This includes final grading and seeding. Often temporary erosion control is not needed with this method.

Option 6: Winter Work

This method is becoming more common, especially on projects that would normally require work in the water during the Work Exclusion Dates (see Chapter 1 page 3). It is also well suited for in-water pier work or demolition. This method has no specific construction methods, other than scheduling portions of the project that are adjacent to or in-water when conditions are frozen, and before the Work Exclusion Dates for Fish Migration and Spawning.

Option 7: Temporary Fill for Workpads, Isolating Worksites, Cofferdams, and Staging Areas.

This method is a regular requirement for bridge construction. It utilizes any combination of the above options (options 1 through 6), plus requires temporary fill for workpads, causeways, and/or cofferdams. Large areas may be required to be impacted. Habitat protection items and floodplain protection items often require added precautions and detailed workplans for the site prior to approval. Several options for in-water berms are available. Typically they are constructed with sheetpile, rock, or jersey barrier, and may be backfilled. Often the work area is not backfilled, and berms only function as containment barriers for debris and materials during construction.

1. When rock is utilized for berm or workpad construction, typically it is the same rock that will ultimately be used for

final riprap for abutment and streambank protection.

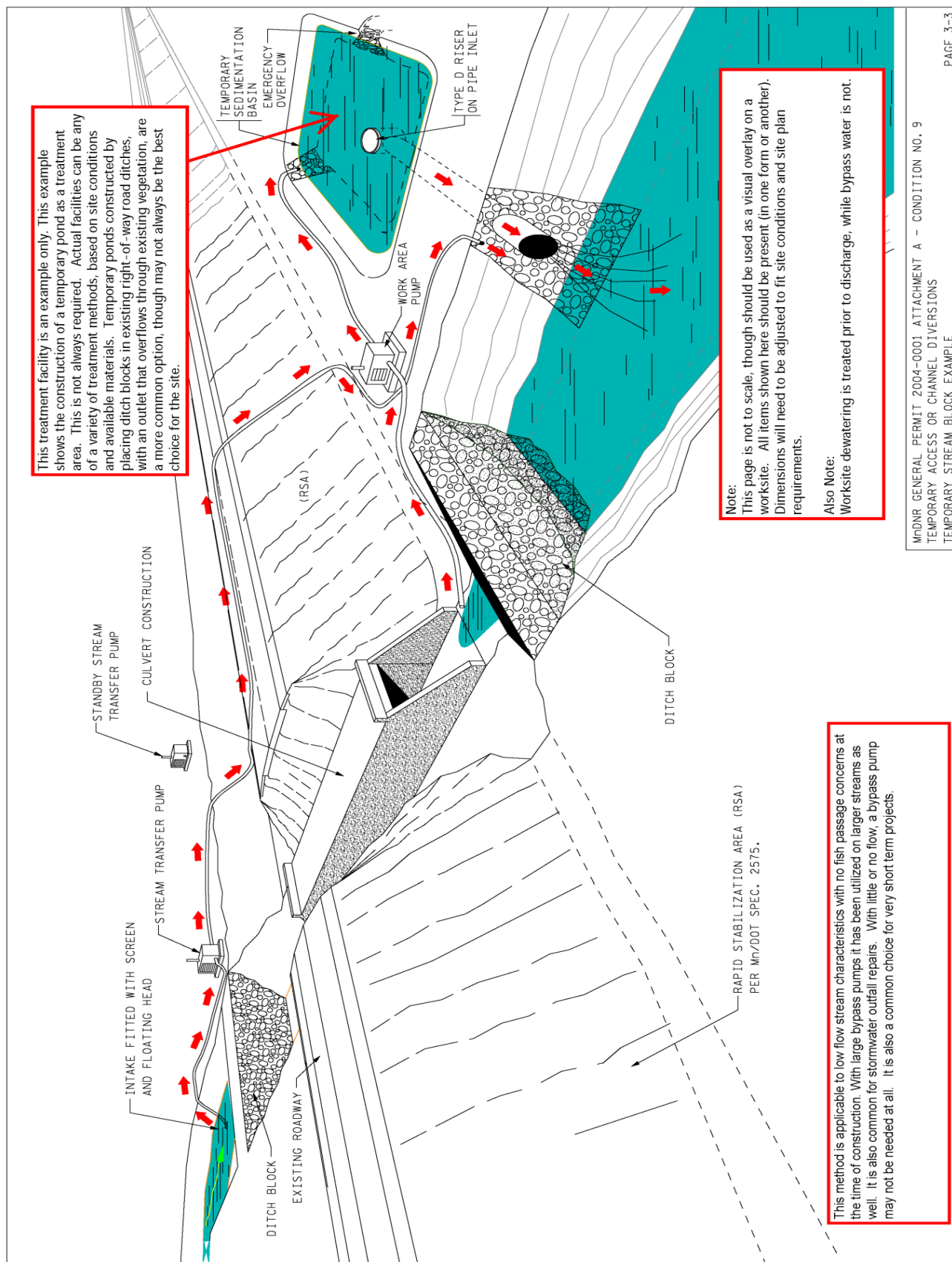
2. Silt curtain (turbidity barrier) shall be placed as close to the area of impact as possible prior to workpad installation. In moving water it is essential that the silt curtain not cause scour to undisturbed streambed. After installation of workpads or berms in moving water, silt curtain should be pulled tight against the outer edge. Silt curtain is not required on sheetpile walls.
3. The area separated from the water may be back filled or left with shallow water. Should dewatering be required the items listed above will apply.
4. Flood Protection:
 - a. An unobstructed opening shall be provided for normal river flow and navigation.
 - b. The temporary fill must be built to withstand the flows of the 'design flood event' chosen by the permittee/contractor.
 - c. The choice of the 'design flood event' is up the permittee/contractor.
 - d. Modeling may be required to show the fill material used in construction will withstand the shear stresses of the design flood event.
 - e. Additional modeling may be required to show flood elevation impacts. A rise in 100yr elevations may require reporting and concurrence from the impacted communities, plus legal notification to any impacted property owners. See 'Reporting Impacts to Flood Elevation' Flow Charts in Page 2 page 18 or bridge/culvert floodplain requirements at:
http://www.dnr.state.mn.us/waters/watermgmt_section/floodplain/fp_resource_material.html
 - f. Floodplain Modeling requirements may be waived by the DNR should a Removal Contingency Plan be adequate for the site (item 'g' below).
 - g. The Contractor may be required to provide a Removal Contingency Plan to the DNR and/or erosion control inspector for approval. This plan must detail how the Contractor plans to remove or protect the temporary fill before flooding would occur and how the Contractor will ensure all construction equipment and materials are removed from flood prone areas to prevent being swept away by the river.

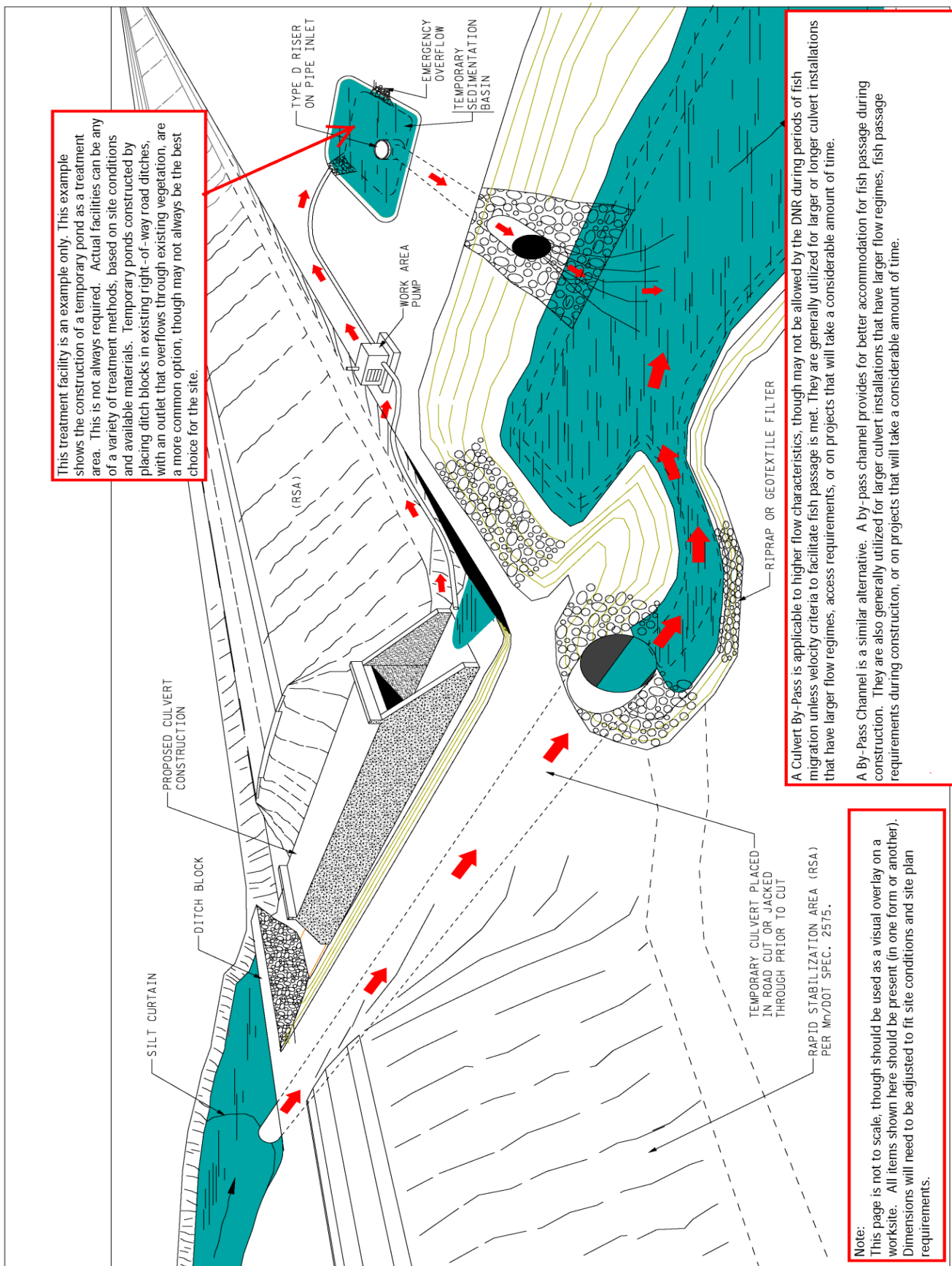
Option 8: Specific site management plan

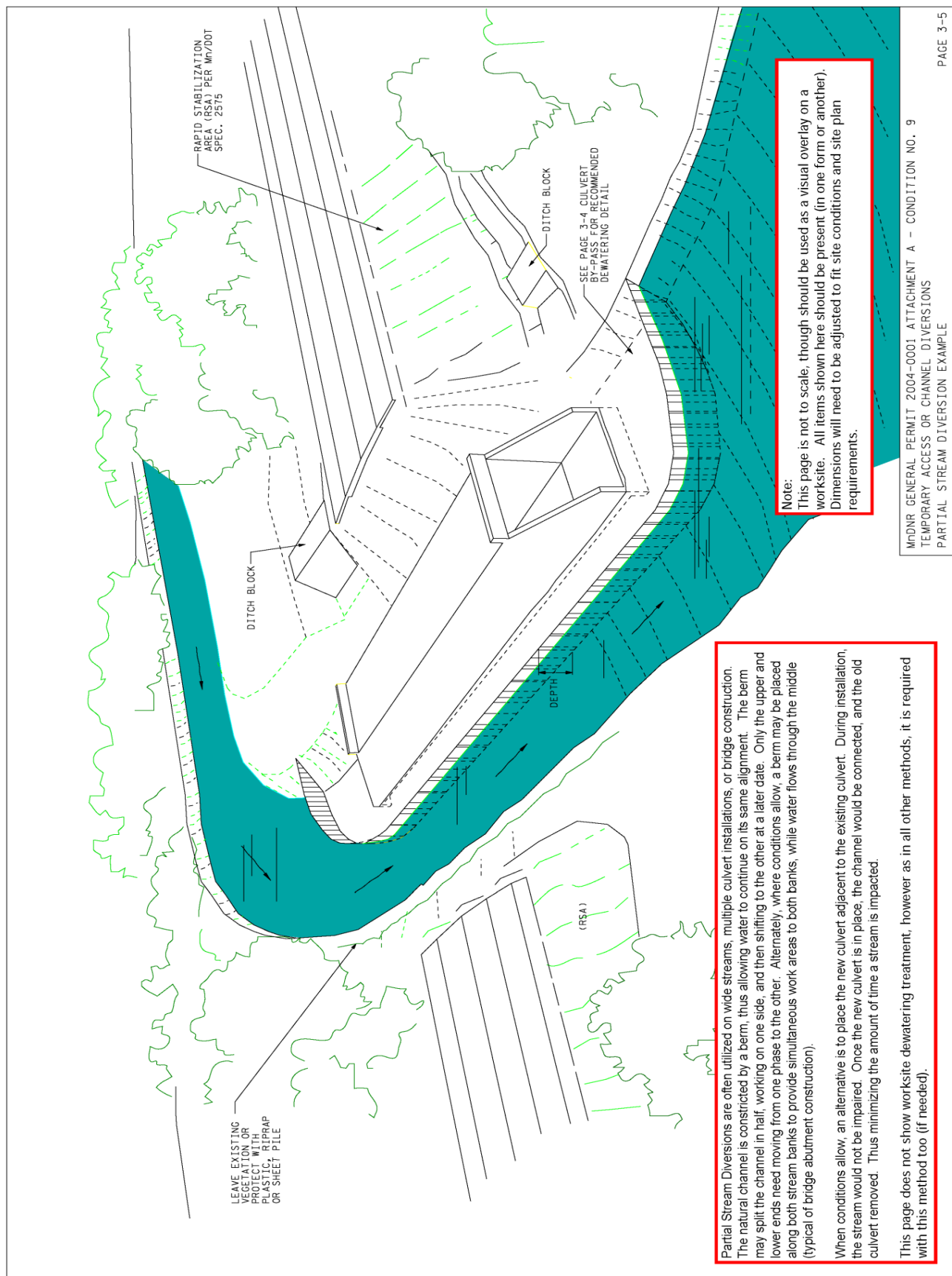
This method occurs for those unique situations that come up due to unique combinations of concerns relating to topography, natural resources, cultural or historical resources, or contaminated property. An approved plan is developed in consultation with the DNR Hydrologist, US Army Corps of Engineers, MPCA, MnDOT Office of Environmental Stewardship, and other effected parties.



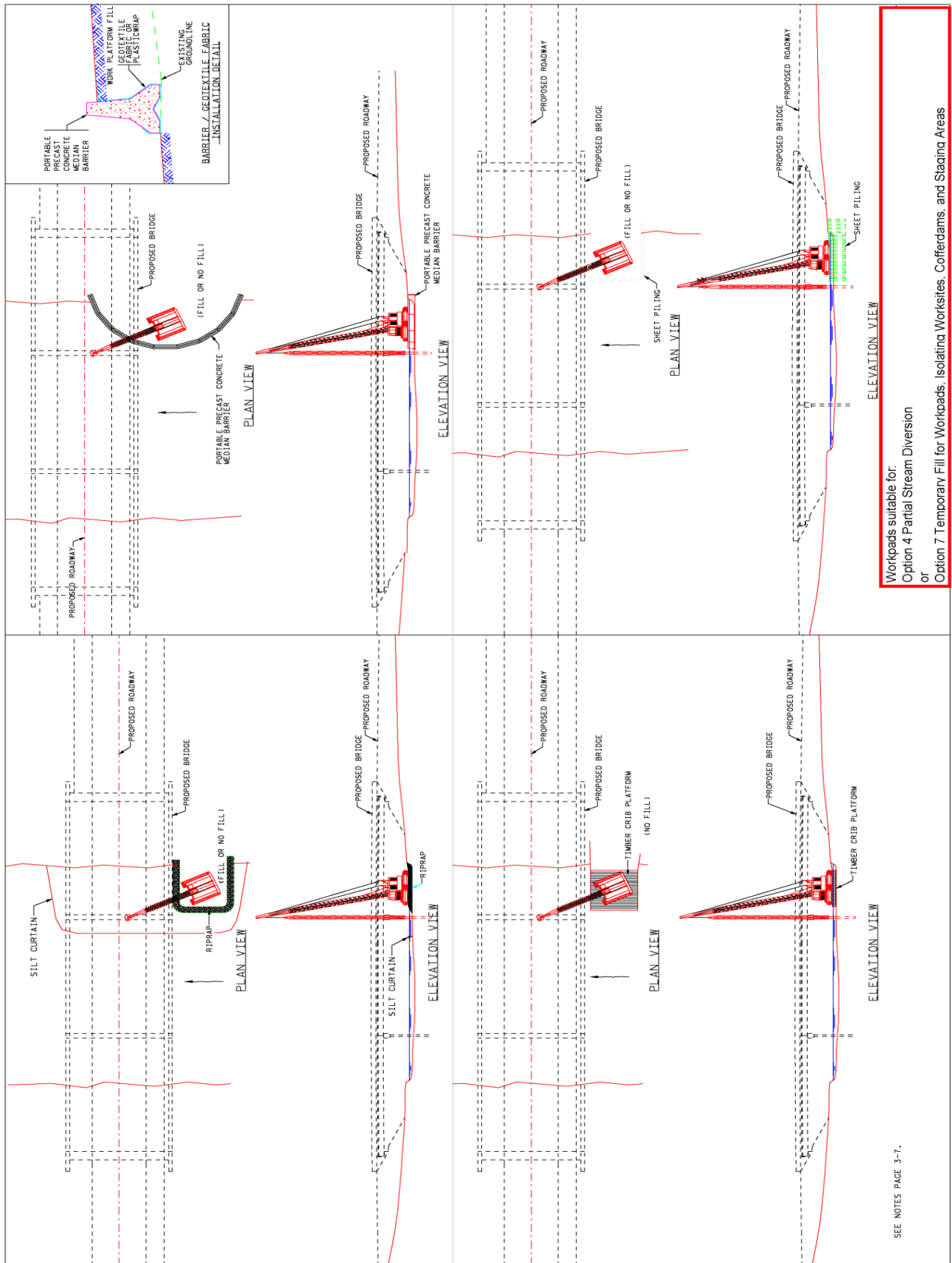
I-90 Mississippi River Bridge Replacement, Dresbach, MN



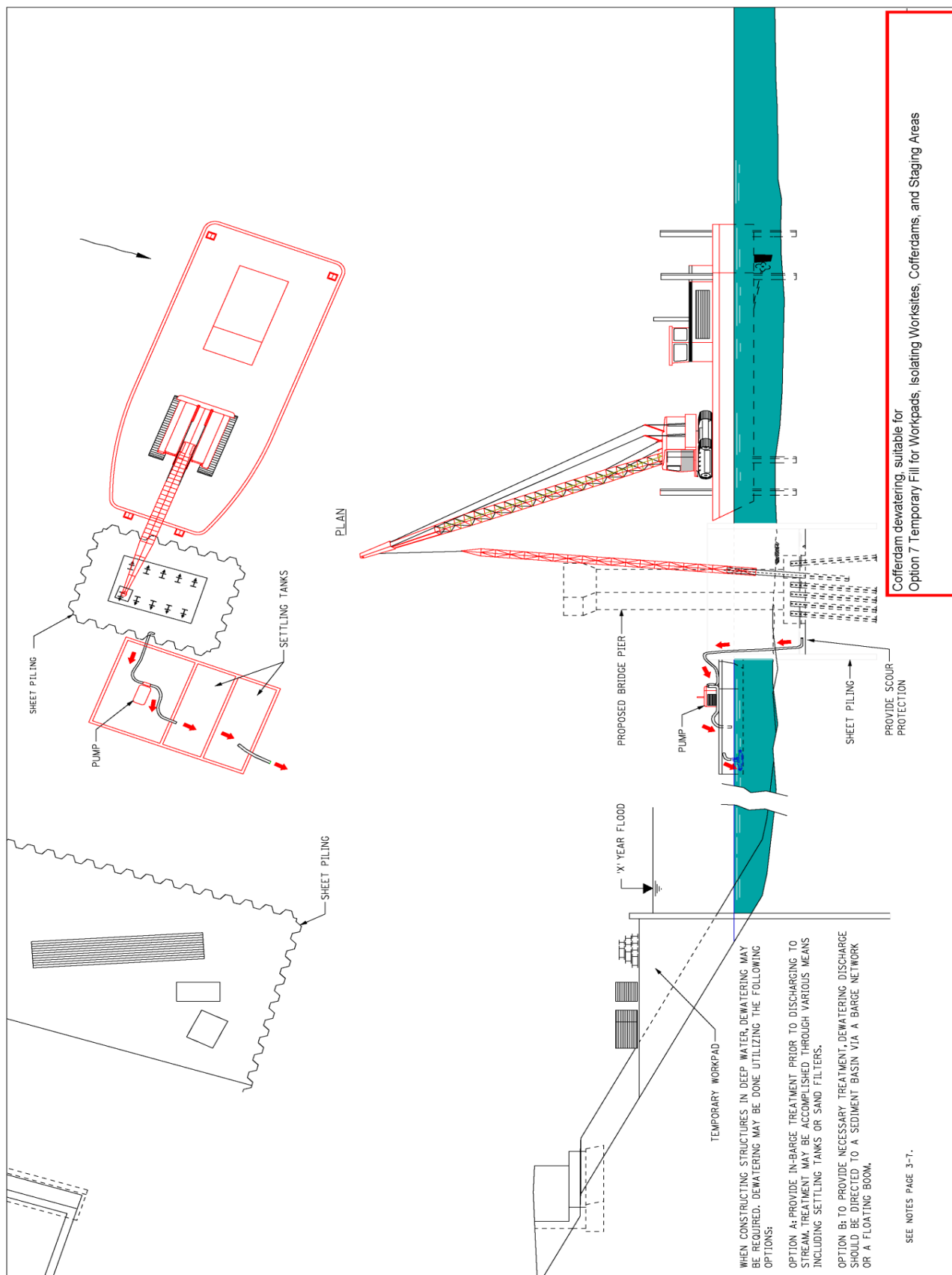


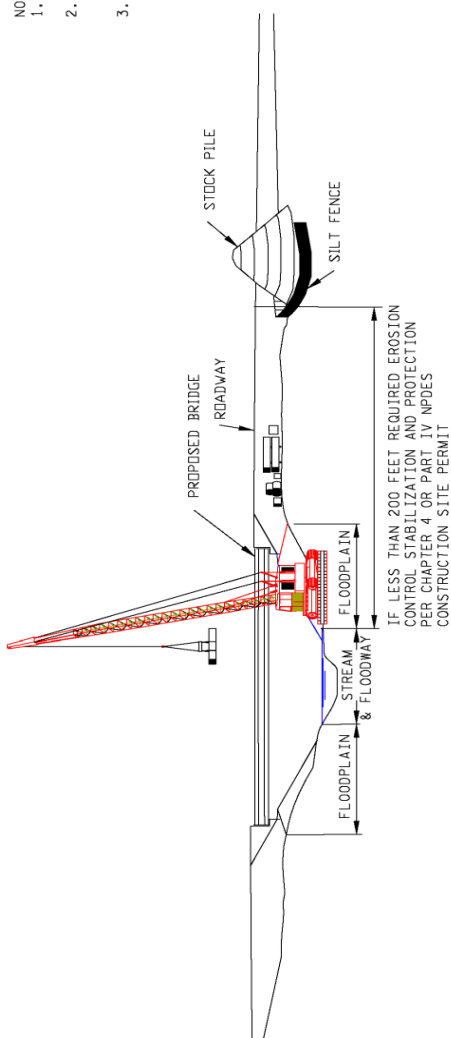
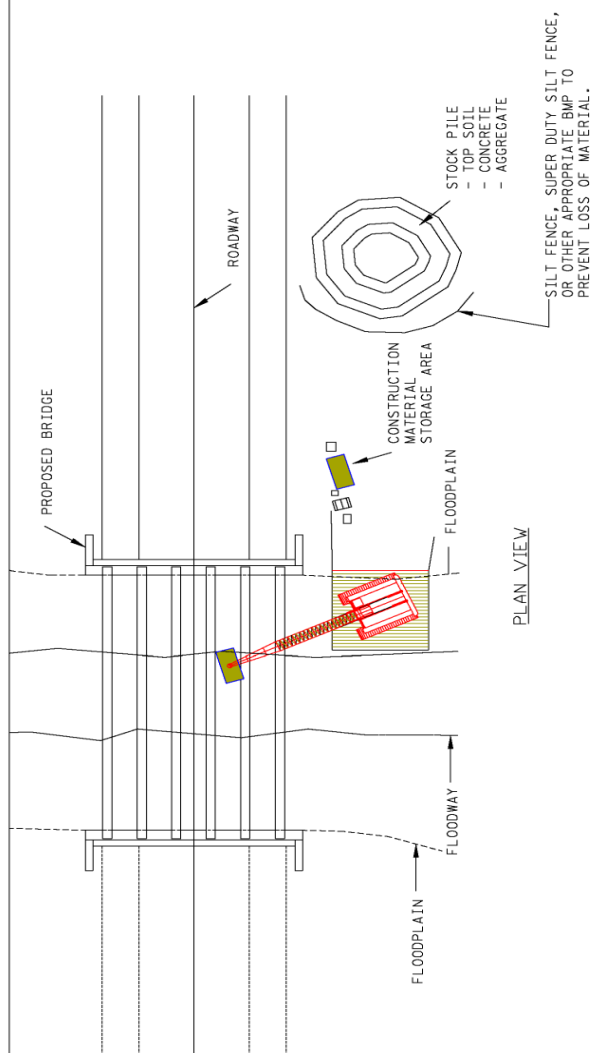






Workpads suitable for:
Option 4 Partial Stream Diversion
or
Option 7 Temporary Fill for Workpads, Isolating Worksites, Cofferdams, and Staging Areas





- NOTE:
1. STABILIZATION FOR WIND EROSION SHOULD ALSO BE CONSIDERED.
 2. ALL EROSION CONTROL MEASURES SHOULD BE FOLLOWED PER NPDES REQUIREMENTS.
 3. EXCEPT AS ALLOWED UNDER CHAPTER 3 (INSTREAM CONSTRUCTION) PROJECT MATERIALS MUST BE DEPOSITED OR STORED IN AN UPLAND AREA.

Option 4 Partial Stream Diversion
or
Option 7 Temporary Fill for Workpads, Isolating Worksites, Cofferdams, and Staging Areas