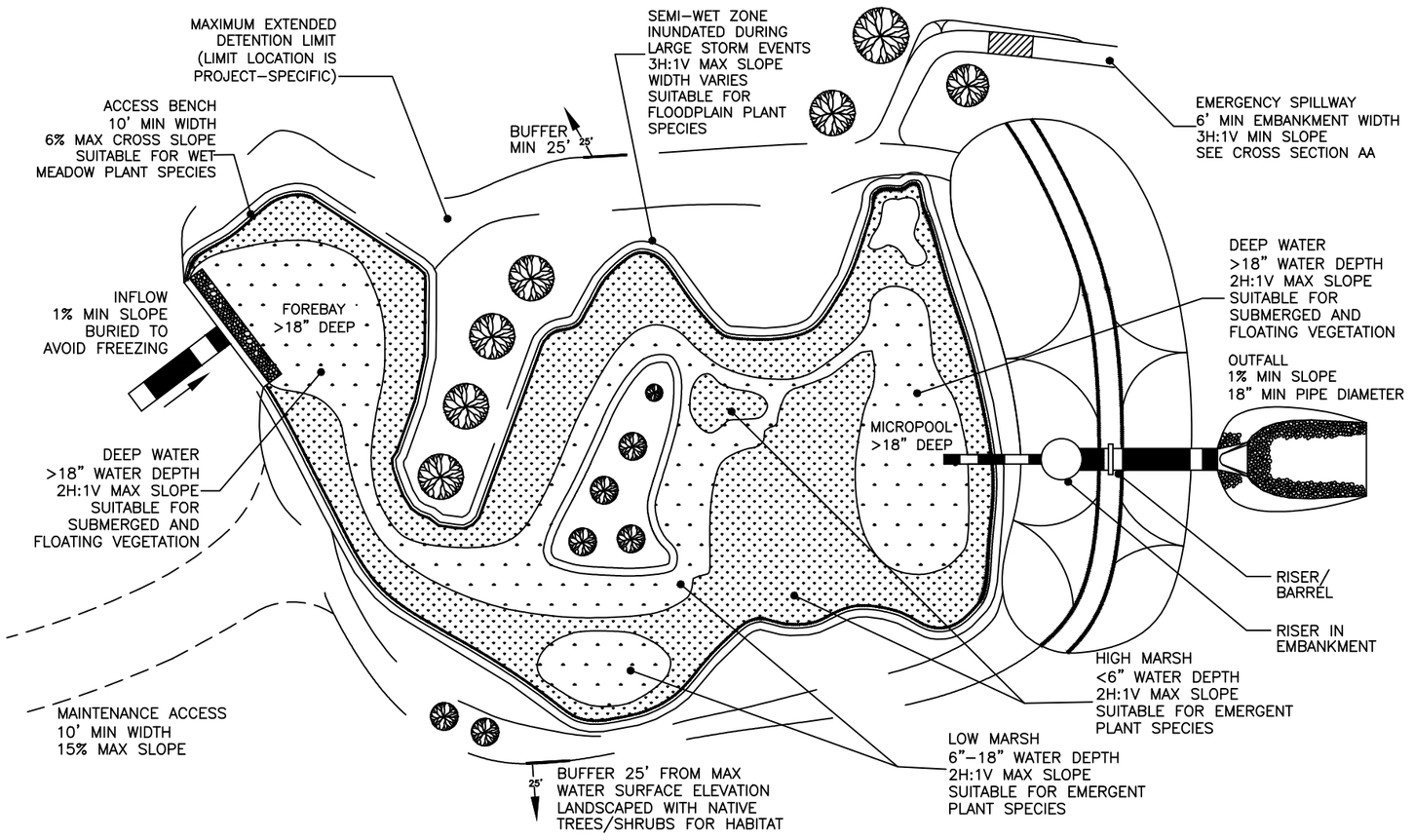
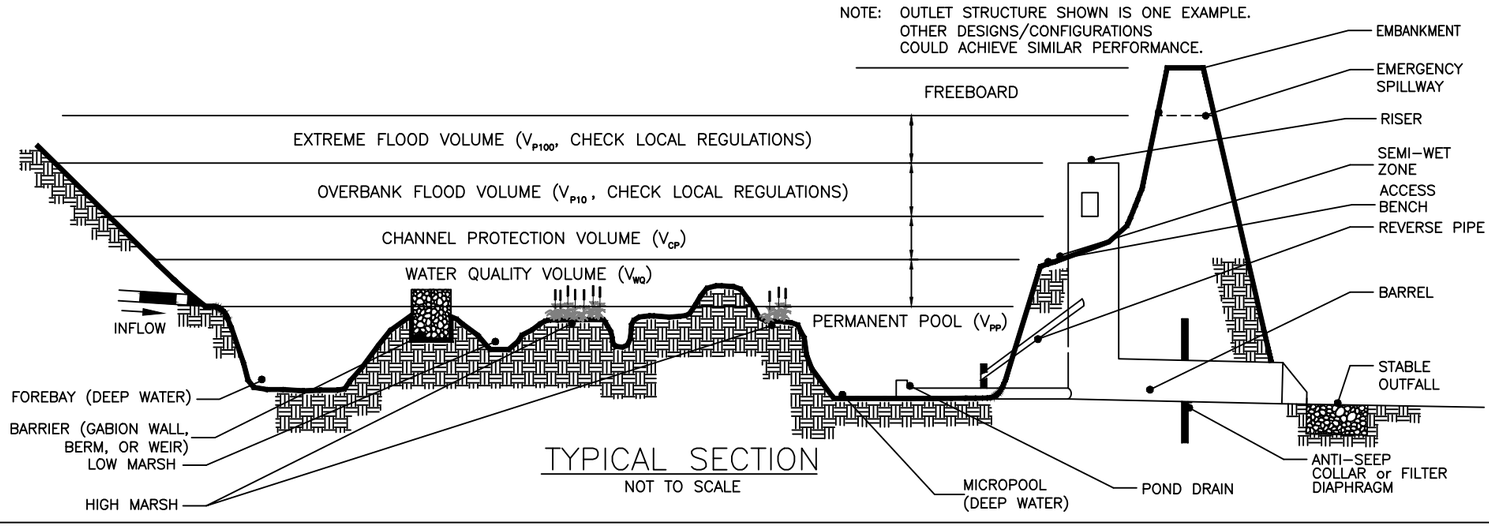


PLAN VIEW

NOT TO SCALE



TYPICAL SECTION

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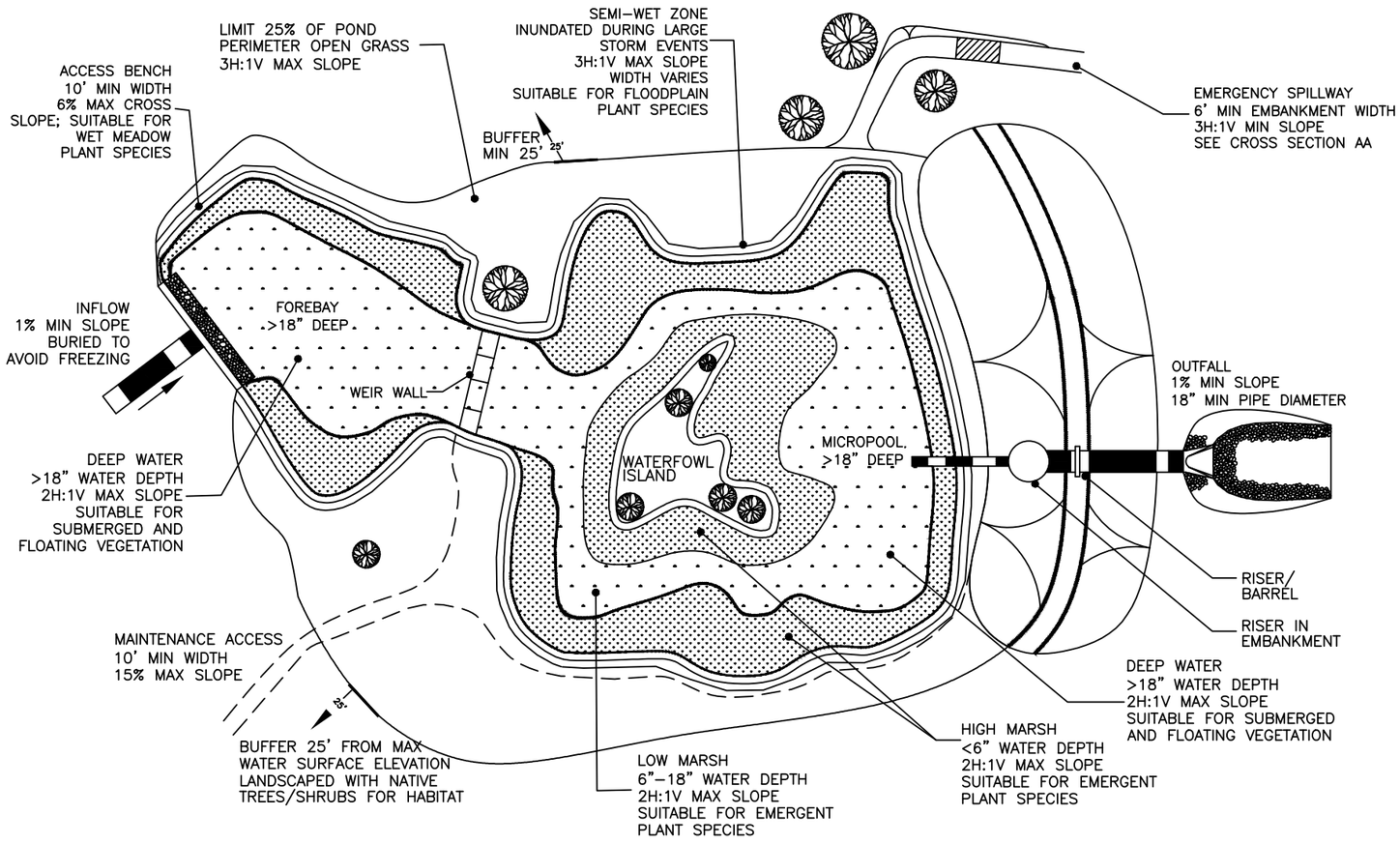
MINNESOTA STORMWATER MANUAL

EXTENDED DETENTION SHALLOW WETLAND CONCEPT PLAN & PROFILE

Sheet No. of Sheets



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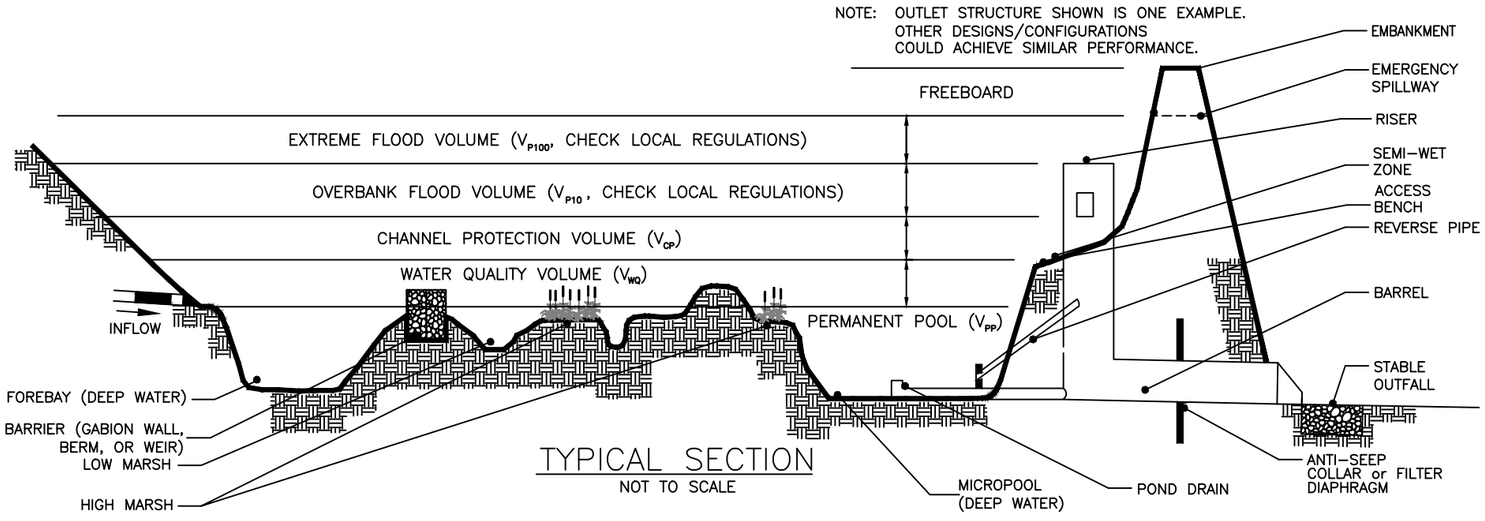

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SHALLOW WETLAND CONCEPT PLAN AND PROFILE

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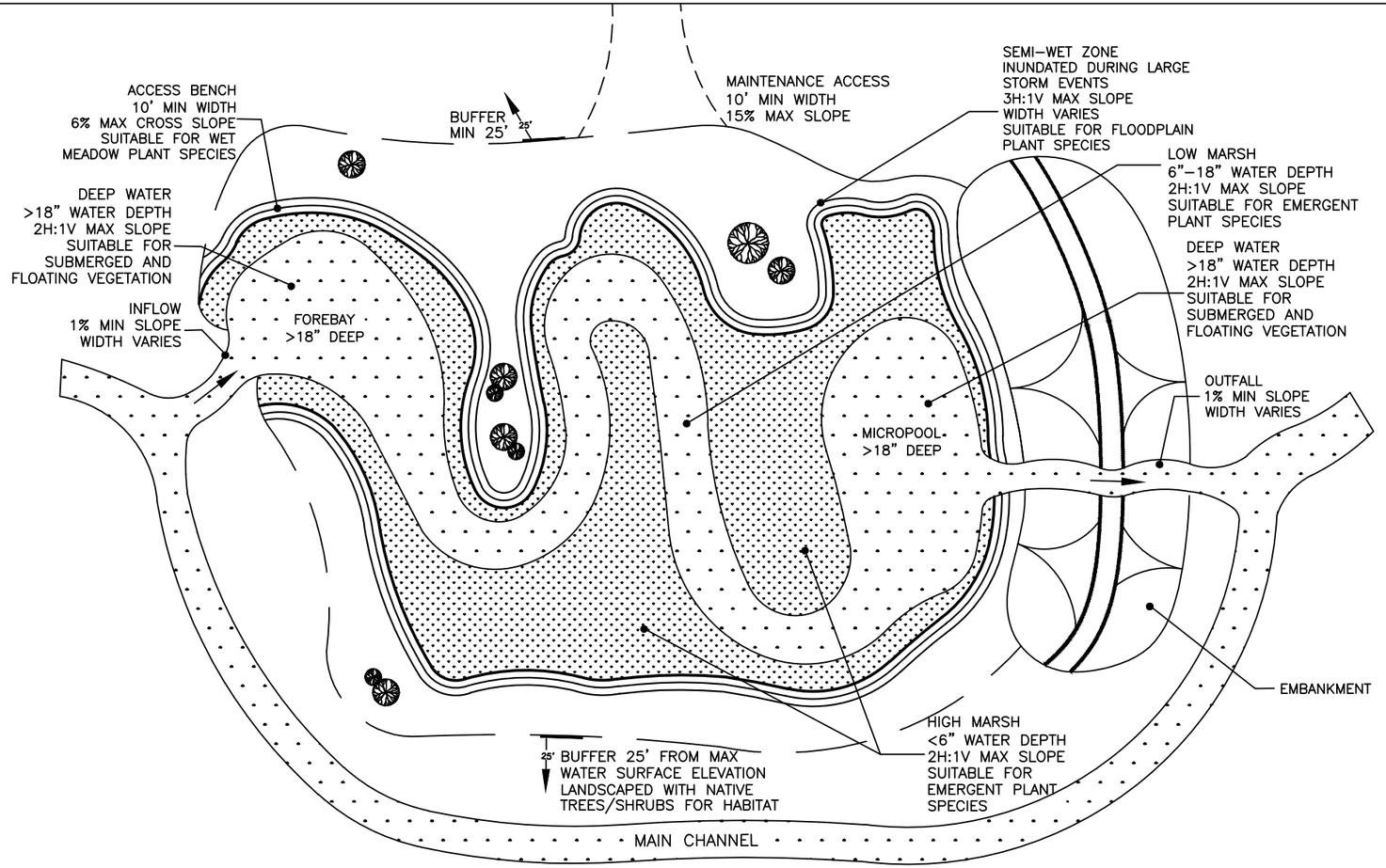

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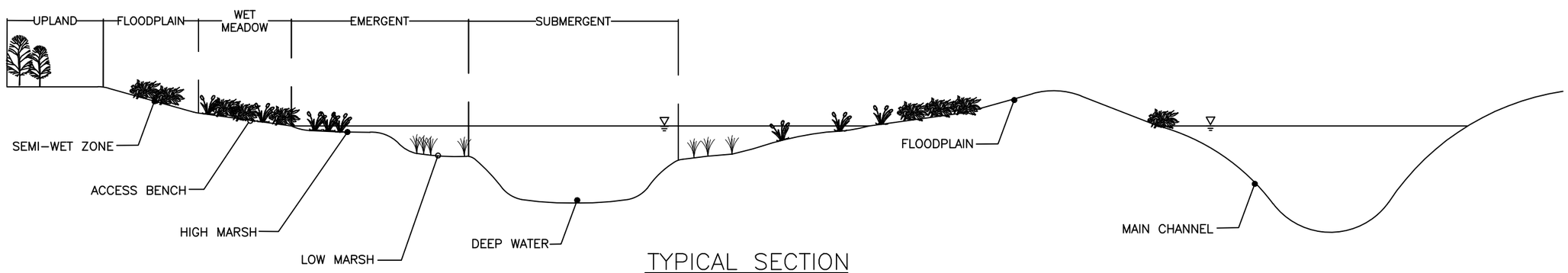

TYPICAL SECTION

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MINNESOTA STORMWATER MANUAL

OFF-CHANNEL WETLAND CONCEPT PLAN AND PROFILE

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CONSTRUCTION STANDARDS AND SPECIFICATIONS

SITE PREPARATION

1. TEMPORARY EROSION CONTROL MEASURES IN ACCORDANCE WITH MNDOT GENERAL CONDITIONS 2573 SHALL BE INSTALLED PRIOR TO THE START OF ANY CONSTRUCTION OPERATION THAT MAY CAUSE ANY SEDIMENTATION OR SILTATION AT THE SITE.
2. WILDLIFE FRIENDLY TEMPORARY EROSION CONTROL PRODUCTS SHOULD BE USED PER MNDOT SPECIFICATION 3885 (ROLLED EROSION PREVENTION PRODUCTS), INCLUDING HYDRO-MULCH THAT DOES NOT CONTAIN PLASTIC FIBERS.
3. AREAS DESIGNATED FOR BORROW AREAS, EMBANKMENT, AND STRUCTURAL WORKS SHALL BE CLEARED, GRUBBED AND STRIPPED OF TOPSOIL.
3. VEGETATION AND OTHER MATERIAL SHALL BE CLEARED FROM POND AREA.
4. TOPSOIL SHALL BE STOCKPILED FOR FUTURE USE AS SPECIFIED.

EARTH FILL

1. FILL MATERIAL SHALL BE TAKEN FROM APPROVED BORROW AREAS AND SHALL BE FREE OF ROOTS, STUMPS, WOOD, RUBBISH, STONES GREATER THAN 6", FROZEN MATERIAL, AND OTHER OBJECTIONABLE MATERIALS.
2. FILL MATERIAL FOR CENTER OF EMBANKMENT SHALL CONFORM TO UNIFIED SOIL CLASSIFICATION GC, SC, CH, OR CL AND MUST HAVE AT LEAST 30% PASSING THE #200 SIEVE. CONSIDERATION MAY BE GIVEN TO THE USE OF OTHER MATERIALS IN THE EMBANKMENT IF DESIGNED BY A GEOTECHNICAL ENGINEER.
3. MATERIALS USED IN THE OUTER SHELL OF THE EMBANKMENT MUST HAVE THE CAPABILITY TO SUPPORT VEGETATION OF THE QUALITY REQUIRED TO PREVENT EROSION OF THE EMBANKMENT.
4. AREAS ON WHICH FILL IS TO BE PLACED SHALL BE SCARIFIED PRIOR TO PLACEMENT OF FILL. FILL MATERIALS SHALL BE PLACED IN MAXIMUM 8 INCH THICK (BEFORE COMPACTION) LAYERS WHICH ARE TO BE CONTINUOUS OVER THE ENTIRE LENGTH OF THE FILL. THE MOST PERMEABLE BORROW MATERIAL SHALL BE PLACED IN THE DOWNSTREAM PORTIONS OF THE EMBANKMENT. THE PRINCIPAL SPILLWAY MUST BE INSTALLED CONCURRENTLY WITH FILL PLACEMENT AND NOT EXCAVATED INTO THE EMBANKMENT.
5. WHEN REQUIRED BY THE REVIEWING AGENCY THE MINIMUM REQUIRED DENSITY SHALL NOT BE LESS THAN 95% OF MAXIMUM DRY DENSITY WITH A MOISTURE CONTENT WITHIN 2% OF THE OPTIMUM. EACH LAYER OF FILL SHALL BE COMPACTED AS NECESSARY TO OBTAIN THAT DENSITY, AND IS TO BE CERTIFIED BY THE ENGINEER AT THE TIME OF CONSTRUCTION. ALL COMPACTION IS TO BE DETERMINED BY AASHTO METHOD T-99 (STANDARD PROCTOR).
6. THE CORE OF THE EMBANKMENT SHALL BE PARALLEL TO THE CENTERLINE OF THE EMBANKMENT. THE TOP WIDTH OF THE CORE SHALL BE A MINIMUM OF FOUR FEET. THE HEIGHT SHALL EXTEND UP TO AT LEAST THE 10 YEAR WATER ELEVATION OR AS SHOWN ON THE PLANS. THE SIDE SLOPES SHALL BE 1 TO 1 OR FLATTER. THE CORE SHALL BE COMPACTED WITH CONSTRUCTION EQUIPMENT, ROLLERS, OR HAND TAMPERS TO ASSURE MAXIMUM DENSITY AND MINIMUM PERMEABILITY. IN ADDITION, THE CORE SHALL BE PLACED CONCURRENTLY WITH THE OUTER SHELL OF THE EMBANKMENT.

STRUCTURE BACKFILL

1. BACKFILL ADJACENT TO PIPES OR STRUCTURES SHALL BE OF THE TYPE AND QUALITY CONFORMING TO THAT SPECIFIED FOR THE ADJOINING FILL MATERIAL. THE FILL SHALL BE PLACED IN HORIZONTAL LAYERS NOT TO EXCEED FOUR INCHES IN THICKNESS AND COMPACTED BY HAND TAMPERS OR OTHER MANUALLY DIRECTED COMPACTION EQUIPMENT. THE MATERIAL NEEDS TO FILL COMPLETELY ALL SPACES UNDER AND ADJACENT TO THE PIPE.
2. AT NO TIME DURING THE BACKFILLING OPERATION SHALL DRIVEN EQUIPMENT BE ALLOWED TO OPERATE CLOSER THAN FOUR FEET, MEASURED HORIZONTALLY, TO ANY PART OF A STRUCTURE. UNDER NO CIRCUMSTANCES SHALL EQUIPMENT BE DRIVEN OVER ANY PART OF A CONCRETE STRUCTURE OR PIPE, UNLESS THERE IS A COMPACTED FILL OF 24" OR GREATER OVER THE STRUCTURE OR PIPE.

CARE OF WATER DURING CONSTRUCTION

1. ALL WORK ON PERMANENT STRUCTURES SHALL BE CARRIED OUT IN AREAS FREE FROM WATER. TEMPORARY DIKES, LEVEES, COFFERDAMS, DRAINAGE CHANNELS, AND STREAM DIVERSIONS NECESSARY TO PROTECT THE AREAS TO BE OCCUPIED BY THE PERMANENT WORKS SHALL BE INSTALLED, AS WELL AS PUMPING AND OTHER EQUIPMENT REQUIRED FOR REMOVAL OF WATER FROM VARIOUS PARTS OF THE WORK.

NOT FOR CONSTRUCTION PURPOSES

CARE OF WATER DURING CONSTRUCTION (CONTINUED)

2. AFTER HAVING SERVED THEIR PURPOSE, ALL TEMPORARY PROTECTIVE WORKS SHALL BE REMOVED OR LEVELED AND GRADED TO THE EXTENT REQUIRED TO PREVENT OBSTRUCTION OF THE FLOW OF WATER TO THE SPILLWAY OR OUTLET WORKS.
3. STREAM DIVERSIONS SHALL BE MAINTAINED UNTIL THE FULL FLOW CAN BE PASSED THROUGH THE PERMANENT WORKS.

STABILIZATION AND EROSION CONTROL

1. ALL EXPOSED SURFACES OF THE EMBANKMENT, SPILLWAY, SPOIL AND BORROW AREAS, AND BERMS SHALL BE STABILIZED BY SEEDING, LIMING, FERTILIZING AND MULCHING IN ACCORDANCE WITH LOCAL NATURAL RESOURCES CONSERVATION SERVICE STANDARDS AND SPECIFICATIONS. A 4-INCH LAYER OF TOPSOIL SHALL BE PLACED ON THESE AREAS TO SUPPORT STABILIZING VEGETATION
2. FILTER FABRIC PLACED BENEATH THE RIP-RAP SHALL MEET STATE OR LOCAL DEPARTMENT OF TRANSPORTATION REQUIREMENTS FOR A CLASS "C" FILTER FABRIC.

SOIL HEALTH PRACTICES

1. IT IS RECOMMENDED THAT SUBGRADE AND DECOMPACTION MEASURES BE PERFORMED IN ACCORDANCE WITH MNDOT SPECIFICATION 2574 THROUGHOUT THE DURATION OF CONSTRUCTION.
2. PRIOR TO CONSTRUCTION
   - 2.1. DEVELOP A SOIL MANAGEMENT PLAN.
3. DURING CONSTRUCTION
   - 3.1. TO PREVENT SOIL COMPACTION, PROTECT AREAS THAT ARE NOT TO BE DISTURBED AND IMPACT AREAS ONLY WHERE NECESSARY.
   - 3.2. SELECT MINIMALLY COMPACTING EQUIPMENT FOR CONSTRUCTION WORK AND PLANTING.
   - 3.3. AVOID DEGRADING SOIL STRUCTURE BY OVERWORKING OR SMEARING SOILS DURING CONSTRUCTION, AND AVOID DISTURBING MOIST OR WET SOILS.
   - 3.4. REMOVE AND PROTECT TOPSOIL USING BEST STOCKPILING PRACTICES.
4. POST CONSTRUCTION
   - 4.1. UTILIZE SOIL RIPPING OR SUBSOILING TO DECOMPACT SUBSOIL COMPACTED DURING CONSTRUCTION.
   - 4.2. REAPPLY THE TOPSOIL AND AMEND WITH COMPOST AS NEEDED, AND TILL COMPOST INTO THE TOP FEW INCHES OF TOPSOIL.
   - 4.3. PLANT VEGETATION TO PREVENT SOIL MIGRATION AND STABILIZE THE SUBSOIL (SEE PLANTING NOTES BELOW).

PLANTING

1. IT IS RECOMMENDED THAT A KNOWLEDGEABLE PROFESSIONAL PREPARE A LANDSCAPING PLAN THAT INCLUDES BOTH PLANT MATERIALS, BEDDING MATERIALS AND MAINTENANCE SCHEDULES.
2. VEGETATION SELECTED SHOULD BE BASED ON THE ANTICIPATED HYDROLOGIC FUNCTION OF THE STORMWATER WETLAND (E.G. WATER LEVEL FLUCTUATION).
3. DESIGN SHOULD CONSIDER CONTROL - PREDATION BY CARP, GEESE, DEER, ETC. CARP-RESISTANT PLANTS, FENCING, NETTING, AND PLANT BARRIERS ARE EXAMPLES OF CONTROLS THAT CAN BE IMPLEMENTED TO PROTECT AGAINST PREDATION.
4. THE LANDSCAPING PLAN SHOULD PROVIDE ELEMENTS THAT PROMOTE GREATER WILDLIFE AND WATERFOWL USE WITHIN THE WETLAND AND BUFFERS BY SELECTING NATIVE PLANT SPECIES OPTIMAL FOR TARGET WILDLIFE AND WATERFOWL SPECIES.
5. TWO TO THREE YEARS OF MAINTENANCE IS RECOMMENDED TO ENSURE PLANTS ESTABLISH PROPERLY.
6. SEE THE FOLLOWING RESOURCES FOR COMMON WETLAND SPECIES THROUGHOUT MINNESOTA:
   - 6.1. BWSR MN WETLAND RESTORATION GUIDE: https://bwsr.state.mn.us/mn-wetland-restoration-guide
   - 6.2. BWSR PLANT COMMUNITY TABLES: https://bwsr.state.mn.us/sites/default/files/2019-01/Appendix%205F-done.pdf
   - 6.3. UNIVERSITY OF MINNESOTA PLANTS FOR STORMWATER DESIGN BY SHAW & SCHMIDT: https://erosion.umn.edu/additional-materials-workshops

NOTES ADAPTED FROM STORMWATER MANAGER'S RESOURCE CENTER WITH SOME ADDITIONS AND THE MINNESOTA POLLUTION CONTROL AGENCY STORMWATER MANUAL.

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MINNESOTA STORMWATER MANUAL

CONSTRUCTED WETLAND CONSTRUCTION NOTES

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