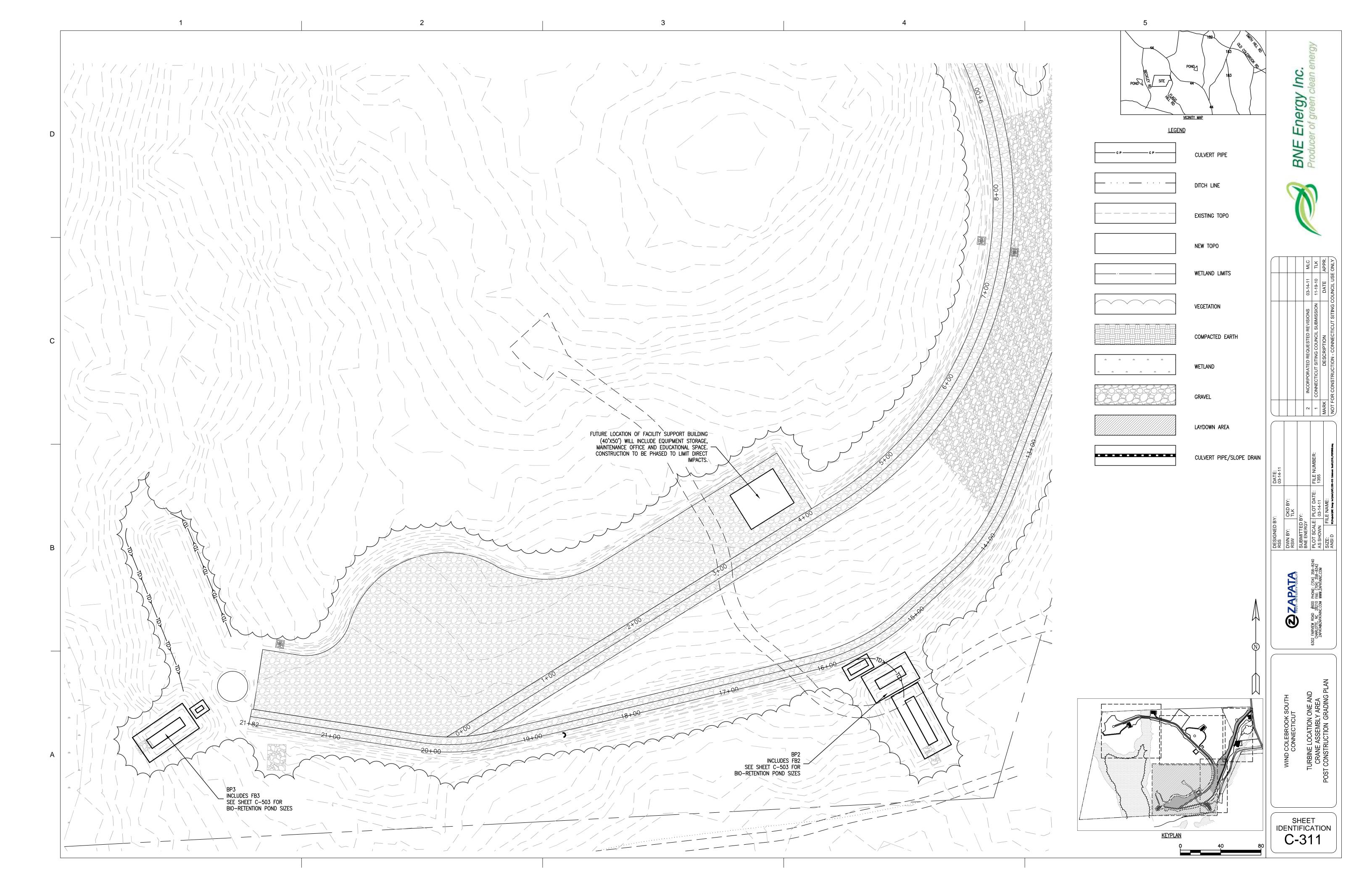
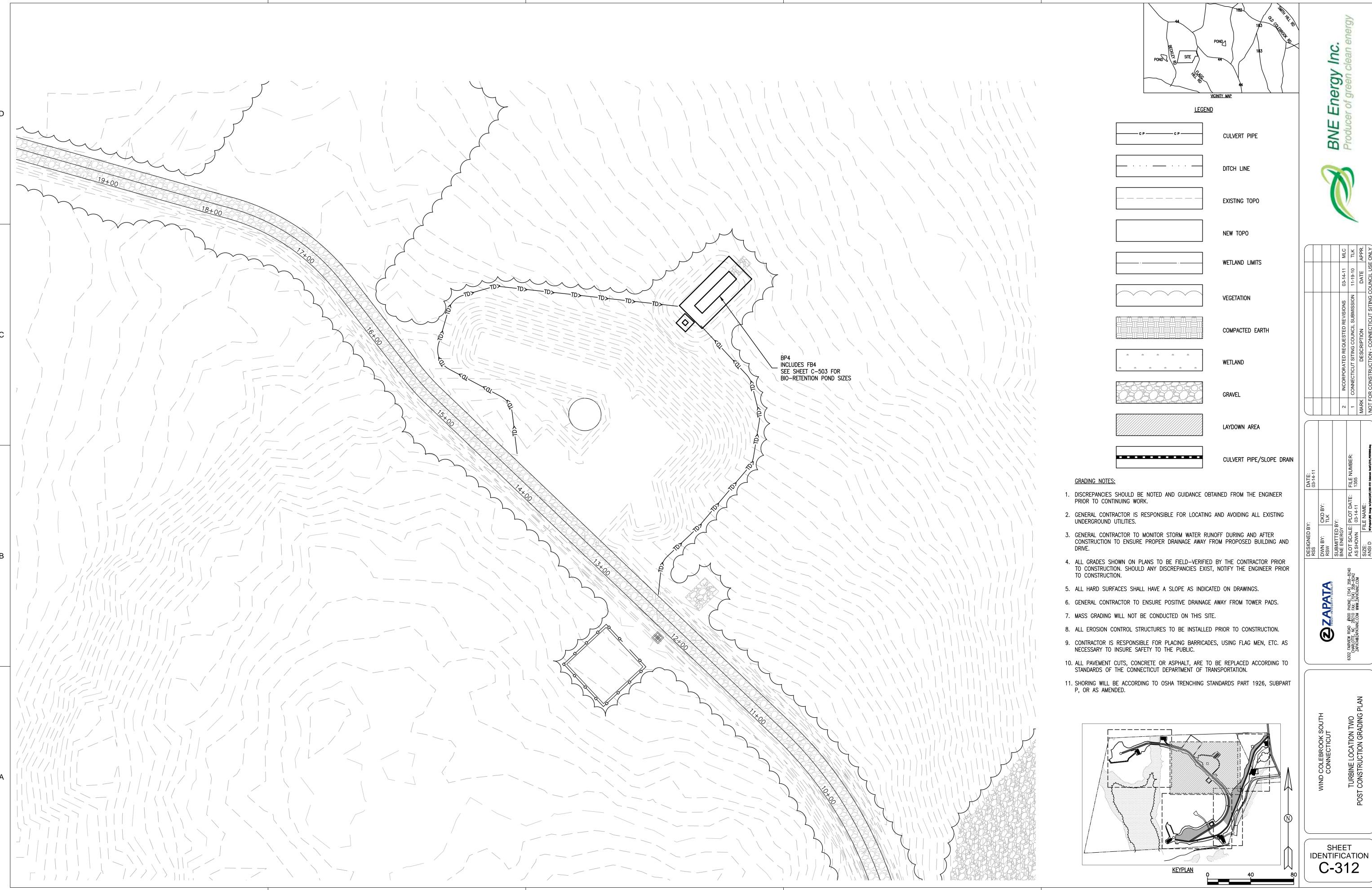
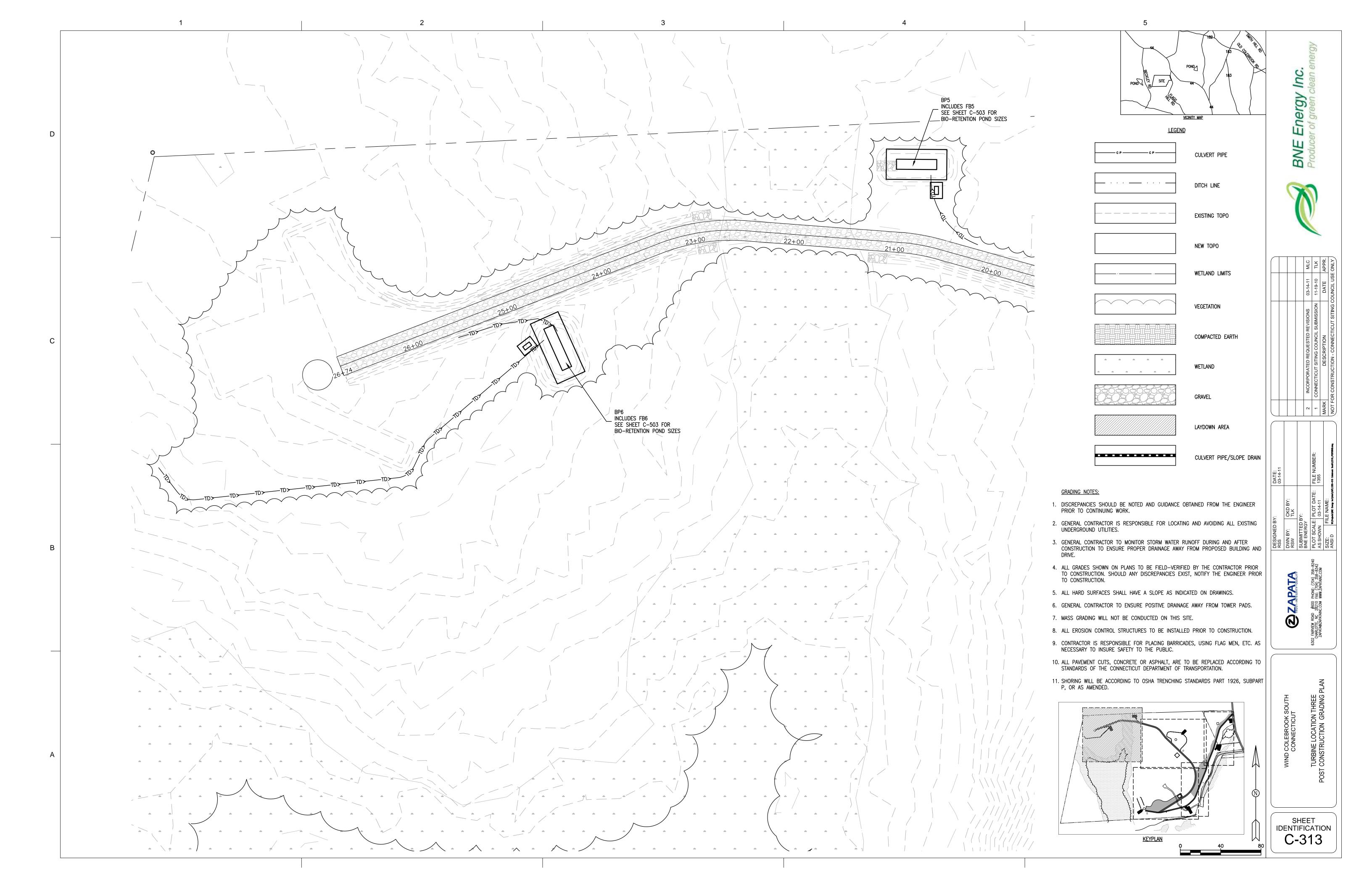


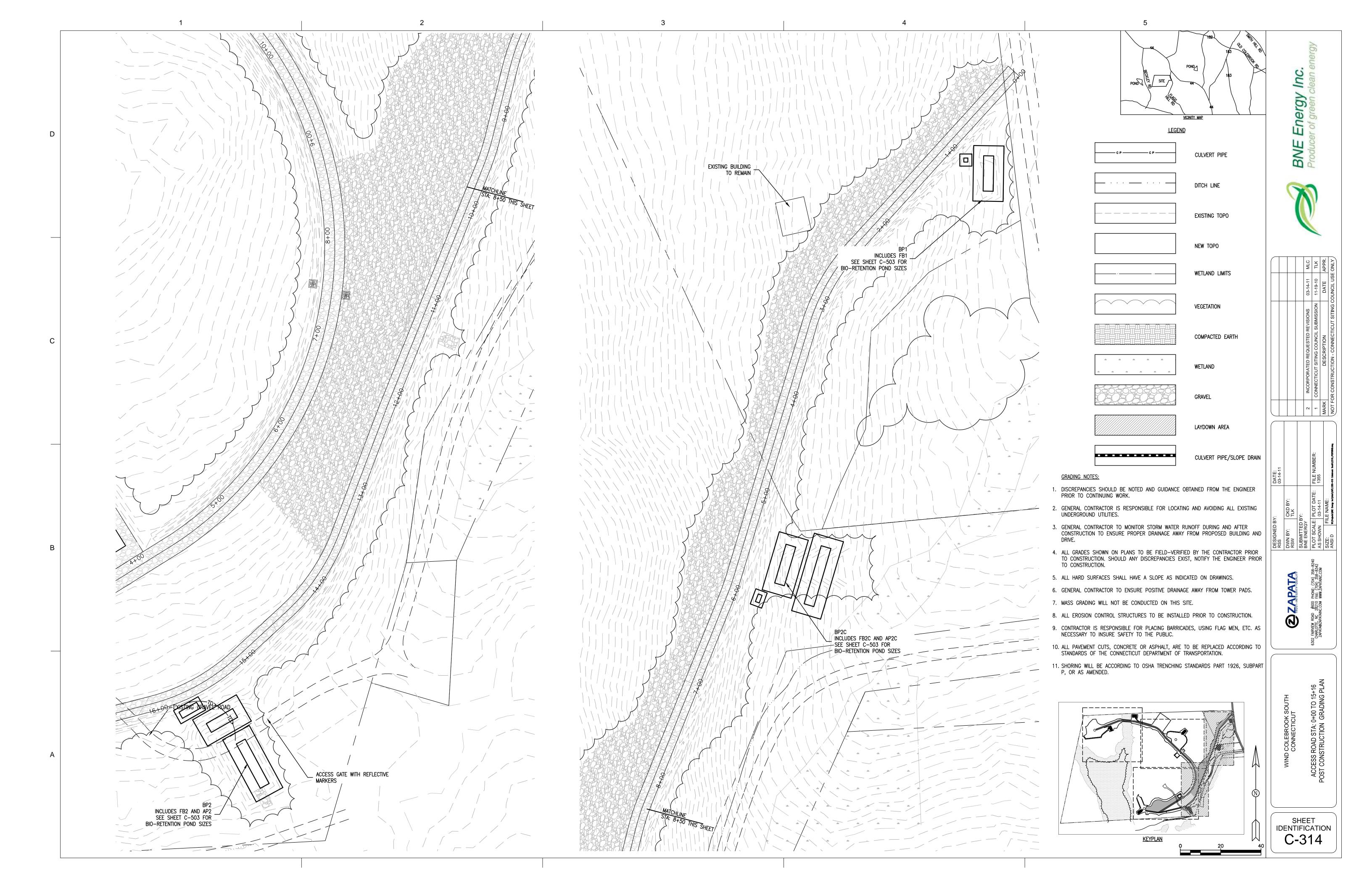
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PROJECT DESCRIPTION

THIS PROJECT WILL CONSIST OF THE CONSTRUCTION OF THREE WIND TURBINES, ACCESS ROAD AND OTHER RELATED SUPPORT STRUCTURES.

SITE DESCRIPTION THE PROPERTY IS LOCATED AT 29 FLAGG HILL ROAD AND CONSISTS OF APPROXIMATELY 79.74 ACRES AND IS UNDEVELOPED WITH THE EXCEPTION OF THE METEOROLOGICAL TOWER, WHICH IS APPROXIMATELY 197 FEET IN HEIGHT. THE PROPERTY IS LOCATED ALONG THE NORFOLK TOWN LINE AND APPROXIMATELY 600 FEET FROM THE WINSTED/ WINCHESTER RESIDENTIAL DEVELOPMENT. THE PROPERTY IS LOCATED IN THE R-2 RESIDENTIAL ZONE. THE COLEBROOK ZONING REGULATIONS DO NOT ADDRESS WIND TURBINE INSTALLATIONS. THE PROPERTY IS ABUTTED BY THE UNDEVELOPED LAND OWNED BY THE NATURE CONSERVANCY TO THE WEST, LAND OWNED BY THE GUN CLUB TO THE NORTH AND RESIDENTIAL PROPERTIES TO THE EAST AND SOUTH. THE SITE IS CURRENTLY ACCESSED VIA FLAGG HILL ROAD. THIS ACCESS POINT WILL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PORCESS.

## PLANNED SEDIMENTATION AND CONTROL PRACTICES

<u>SEDIMENT FENCE (GSF):</u> WILL RETAIN SEDIMENT FROM SMALL DISTURBED AREAS. SEDIMENT FENCE WILL BE PLACED ALONG SLOPES AS SHOWN ON CONSTRUCTION DETAILS. THE CONTRACTOR WILL USE HIS BEST JUDGMENT TO INSTALL ADDITIONAL SEDIMENT FENCE AS NECESSARY TO PREVENT LOSS OF SEDIMENT. REFER TO SECTION 5-11 OF 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT

MAINTENANCE: INSPECT THE SILT FENCE AT LEAST ONCE A WEEK AND WITHIN 24 HOURS OF THE END OF A STORM WITH A RAINFALL AMOUNT OF 0.5 INCHES OR GREATER TO DETERMINE MAINTENANCE NEEDS. WHEN USED FOR DEWATERING OPERATIONS, INSPECT FREQUENTLY BEFORE, DURING AND AFTER PUMPING OPERATIONS. REMOVE THE SEDIMENT DEPOSITS, OR IF ROOM ALLOWS, INSTALL A SECOND SILT FENCE UP SLOPE FROM THE EXISTING FENCE WHEN DEPOSITS REACH APPROXIMATELY ONE HALF THE HEIGHT OF THE EXISTING FENCE. REPLACE OR REPAIR WITHIN 24 HOURS OF AN OBSERVED FAILURE. REFER TO CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL FIGURE GF-5 FOR TROUBLESHOOTING FAILURES. MAINTAIN SILT FENCE UNTIL THE CONTRIBUTING AREA IS STABILIZED.

HAY BALE BARRIER (HB): WILL RETAIN SEDIMENT FROM SMALL DISTURBED AREAS. HAY BALES WILL BE PLACED ALONG SLOPES AS SHOWN ON CONSTRUCTION DETAILS. THE CONTRACTOR WILL USE HIS BEST JUDGMENT TO INSTALL ADDITIONAL HAY BALES AS NECESSARY TO PREVENT LOSS OF SEDIMENT. REFER TO SECTION 5-11 OF 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL.

MAINTENANCE: INSPECT THE HAY BALE BARRIER AT LEAST ONCE A WEEK AND WITHIN 24 HOURS OF THE END OF A STORM WITH A RAINFALL AMOUNT OF 0.5 INCHES OR GREATER TO DETERMINE MAINTENANCE NEEDS. WHEN USED FOR DEWATERING OPERATIONS, INSPECT FREQUENTLY BEFORE, DURING AND AFTER PUMPING OPERATIONS. REMOVE THE SEDIMENT DEPOSITS, OR IF ROOM ALLOWS, INSTALL A SECONDARY BARRIER UP SLOPE FROM THE EXISTING BARRIER WHEN DEPOSITS REACH APPROXIMATELY ONE HALF THE HEIGHT OF THE BARRIER. REPLACE OR REPAIR WITHIN 24 HOURS OF AN OBSERVED FAILURE. REFER TO CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL FIGURE HB-5 FOR TROUBLESHOOTING FAILURES. MAINTAIN HAY BALE BARRIER UNTIL THE CONTRIBUTING AREA IS STABILIZED.

STONE CHECK DAM (SCD): WILL BE USED TO REDUCE VELOCITY OF CONCENTRATED FLOWS, THUS REDUCING EROSION OF THE DRAINAGE WAY.

MAINTENANCE: INSPECT THE STONE CHECK DAM AT LEAST ONCE A WEEK AND WITHIN 24 HOURS OF THE END OF A STORM WITH A RAINFALL AMOUNT OF 0.5 INCHES OR GREATER TO DETERMINE MAINTENANCE NEEDS. REMOVE THE SEDIMENT DEPOSITS WHEN DEPOSITS REACH APPROXIMATELY ONE HALF THE HEIGHT OF THE CHECK DAM. REPLACE OR REPAIR WITHIN 24 HOURS OF AN OBSERVED FAILURE. MAINTAIN UNTIL THE CONTRIBUTING AREA IS STABILIZED.

TEMPORARY PIPE SLOPE DRAIN (TSD): WILL BE USED TO CARRY WATER OVER EXCESSIVE CHANGES IN GRADE. TSD'S WILL CONVEY CONCENTRATED STORM WATER RUNOFF FLOWS WITHOUT CAUSING EROSION PROBLEMS EITHER ON OR AT THE TOE OF THE SLOPE.

MAINTENANCE: INSPECT THE TEMPORARY PIPE SLOPE DRAIN AT LEAST ONCE A WEEK AND WITHIN 24 HOURS OF THE END OF A STORM WITH A RAINFALL AMOUNT OF 0.5 INCHES OR GREATER TO DETERMINE MAINTENANCE NEEDS. REPAIR DAMAGE AS NECESSARY. AVOID THE PLACEMENT OF ANY MATERIAL ON THE TOP OF THE PIPE AND PREVENT VEHICULAR TRAFFIC FROM CROSSING THE SLOPE DRAIN.

TEMPORARY DIVERSION (TD): WILL BE USED TO DIVERT SEDIMENT LADEN RUNOFF FROM A DISTURBED AREA TO A SEDIMENT TRAPPING FACILITY.

MAINTENANCE: WHEN THE TEMPORARY DIVERSION IS LOCATED WITHIN CLOSE PROXIMITY TO ON GOING CONSTRUCTION ACTIVITIES, INSPECT THE DIVERSION AT THE END OF EACH WORK DAY AND IMMEDIATELY REPAIR DAMAGE CAUSED BY CONSTRUCTION EQUIPMENT. OTHERWISE, INSPECT THE TEMPORARY DIVERSION AND ASSOCIATED MEASURES AT LEAST ONCE A WEEK AND WITHIN 24 HOURS OF THE END OF A STORM WITH A RAINFALL AMOUNT OF 0.5 INCHES OR GREATER TO DETERMINE MAINTENANCE NEEDS. REPAIR WITHIN 24 HOURS OF AN OBSERVED FAILURE.

TEMPORARY FILL BERM (TFB): WILL BE USED TO DIVERT RUNOFF FROM UNPROTECTED FILL SLOPES DURING CONSTRUCTION TO A STABILIZED OUTLET OR SEDIMENT TRAPPING FACILITY.

MAINTENANCE: INSPECT THE TEMPORARY FILL BERM AND ASSOCIATED CONTROLS AT THE END OF EACH WORK DAY TO ENSURE THE CRITERIA FOR INSTALLING THE MEASURES HAVE BEEN MET. DETERMINE IF REPAIR OR MODIFICATION IS NEEDED. THIS MEASURE IS TEMPORARY AND UNDER MOST SITUATIONS WILL BE COVERED THE NEXT WORK DAY. MAINTENANCE REQUIREMENTS SHOULD BE MINIMAL. THE CONTRACTOR SHOULD AVOID PLACING OTHER MATERIAL OVER THE BERM AND CONSTRUCTION

TRAFFIC SHOULD NOT BE ALLOWED TO CROSS.

TEMPORARY SEDIMENT TRAP (TST): WILL BE USED TO DETAIN SEDIMENT LADEN RUNOFF FROM SMALL DISTURBED AREAS LONG ENOUGH TO ALLOW THE MAJORITY OF SEDIMENT TO SETTLE OUT.

MAINTENANCE: INSPECT THE TEMPORARY SEDIMENT TRAP AND ASSOCIATED CONTROLS AT LEAST ONCE A WEEK AND WITHIN 24 HOURS OF THE END OF A STORM WITH A RAINFALL AMOUNT OF 0.5 INCHES OR GREATER TO DETERMINE MAINTENANCE NEEDS. CHECK THE OUTLET TO VERIFY THAT IT IS STRUCTURALLY SOUND AND HAS NOT BEEN DAMAGED BY EROSION OR CONSTRUCTION EQUIPMENT. THE HEIGHT OF THE STONE OUTLET SHOULD BE MAINTAINED AT LEAST 1 FOOT BELOW THE CREST OF THE EMBANKMENT. WHEN SEDIMENT HAS ACCUMULATED MORE THAN ONE QUARTER OF THE MINIMUM WET STORAGE VOLUME, DEWATER AND REMOVE SEDIMENT AS NECESSARY TO RESTORE THE TRAP TO ITS ORIGINAL DIMENSIONS.

CONSTRUCTION ENTRANCE (CE): WILL BE USED TO REDUCE TRACKING OF SEDIMENT OFF SITE TO PAVED AREAS.

MAINTENANCE: MAINTAIN THE ENTRANCE IN A CONDITION WHICH WILL PREVENT TRACKING AND WASHING OF SEDIMENT ONTO PAVED SURFACES. PROVIDE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR ADDITIONAL LENGTH AS REQUIRED. IMMEDIATELY REMOVE ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO

TREE PROTECTION (TP): WILL BE USED TO ENSURE THE SURVIVAL OF EXISTING DESIRABLE TREES FOR THEIR EFFECTIVENESS IN SOIL EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION.

MAINTENANCE: INSPECT TREE PROTECTION ZONES WEEKLY DURING SITE CONSTRUCTION FOR DAMAGE TO THE TREE CROWN, TRUNK AND ROOT SYSTEM. WHEN TREES HAVE BEEN DAMAGED OR THE PROTECTION ZONE HAS BEEN COMPROMISED, CONSULT AN ARBORIST LICENSED IN CT TO DETERMINE HOW DAMAGE SHOULD BE ADDRESSED.

TEMPORARY EROSION CONTROL BLANKETS (ECB): WILL BE USED TO PROVIDE TEMPORARY SURFACE PROTECTION TO DISTURBED SOILS TO ABSORB RAINDROP IMPACT AND TO REDUCE SHEET AND RILL EROSION.

MAINTENANCE: INSPECT TEMPORARY EROSION CONTROL BLANKETS AT LEAST ONCE A WEEK AND WITHIN 24 HOURS OF THE END OF A STORM WITH A RAINFALL AMOUNT OF 0.5 INCHES OR GREATER TO DETERMINE MAINTENANCE NEEDS. REPAIR ANY DISLODGED OR FAILED BLANKETS IMMEDIATELY.

### CONSTRUCTION SEQUENCE

1. FLAG THE LIMITS OF CONSTRUCTION, ROADWAY BASE-LINE, AND TREE PROTECTION ZONES.

2. CONDUCT PRECONSTRUCTION MEETING.

3. CONDUCT TREE CUTTING MEETING.

4. INSTALL THE CONSTRUCTION ENTRANCE.

5. INSTALL PERIMETER EROSION AND SEDIMENT CONTROLS AND TREE PROTECTION DEVICES IN ACCORDANCE WITH THE E&S PLAN.

6. CUT TREES WITHIN THE DEFINED CLEARING LIMITS AND REMOVE CUT WOOD. CHIP BRUSH AND SLASH, STOCKPILE CHIPS FOR FUTURE USE OR REMOVE OFF SITE

7. CONSTRUCT SEDIMENT TRAPS.

8. EXCAVATE ALL STUMPS LOCATED IN THE STRUCTURAL AREA AND REMOVE TO A DISPOSAL SITE OR STOCKPILE AREA TO BE CHIPPED, STUMPS IN NON-STRUCTURAL AREAS MAY BE GROUND IN PLACE OR CUT FLUSH WITH THE GROUND LEVEL AND LEFT IN PLACE IN ACCORDANCE WITH THE PLANS.

9. STRIP ALL TOPSOIL WITHIN THE ROADWAY BASE-LINE AND SLOPE LIMITS. STOCKPILE ALL TOPSOIL IN AN APPROVED AREA AND SECURE WITH EROSION AND SEDIMENT CONTROLS

10. CUT OR FILL THE PROPOSED ROADWAY TO ESTABLISH THE SUB-GRADE.

11. PLACE, GRADE AND COMPACT THE AGGREGATE IN THE ROADWAY BASE.

12. APPLY STABILIZATION MEASURES TO REMAINING DISTURBED AREAS IN ACCORDANCE WITH THE EROSION AND SEDIMENT CONTROL PLAN.

# EQUIPMENT LAY-DOWN AREAS

1. FLAG THE LIMITS OF CONSTRUCTION NECESSARY TO FACILITATE THE PRECONSTRUCTION MEETING.

2. HOLD PRECONSTRUCTION MEETING.

3. FLAG REMAINDER OF THE LIMITS OF CONSTRUCTION AND TREE PROTECTION

4. INSTALL PERIMETER EROSION AND SEDIMENT CONTROLS AND TREE PROTECTION

DEVICES IN ACCORDANCE WITH THE E&S PLAN. 5. CUT TREES WITHIN THE DEFINED CLEARING LIMITS AND REMOVE CUT WOOD. CHIP BRUSH AND LASH, STOCKPILE CHIPS FOR FUTURE USE OR REMOVE OFF SITE.

CONSTRUCT SEDIMENT TRAPS.

7. STRIP AND STOCKPILE ALL TOPSOIL THAT IS WITHIN THE FOOTPRINT OF THE CONSTRUCTION SITE AND REFERENCE STOCKPILE MANAGEMENT FOR EROSION AND SEDIMENT CONTROLS. EITHER REMOVE TREE STUMPS TO AN APPROVED DISPOSAL SITE OR CHIP IN PLACE AS INDICATED ON THE PLANS.

8. MAKE ALL CUTS AND FILLS REQUIRED. ESTABLISH THE SUB GRADE FOR THE EQUIPMENT LAY DOWN AREAS AS REQUIRED. ALLOW A REASONABLE AMOUNT OF AREA AROUND THE FOOTPRINT OF THE BUILDING FOR THE CONSTRUCTION ACTIVITIES.

### 9. BEGIN CONSTRUCTION OF THE TOWER.

10. PRIOR TO INSTALLING SURFACE WATER CONTROLS SUCH AS TEMPORARY DIVERSIONS AND STONE DIKES, INSPECT EXISTING CONDITIONS TO ENSURE DISCHARGE LOCATIONS ARE STABLE. IF NOT STABLE, REVIEW DISCHARGE CONDITIONS WITH THE DESIGN ENGINEER AND IMPLEMENT ADDITIONAL STABILIZATION MEASURES PRIOR TO INSTALLING WATER SURFACE CONTROLS.

11. UPON SUBSTANTIAL COMPLETION TOWERS, COMPLETE THE BALANCE OF SITE WORK AND STABILIZATION OF ALL OTHER DISTURBED AREAS.

12. AFTER SITE IS STABILIZED REMOVE TEMPORARY EROSION AND SEDIMENT CONTROLS.

## STANDARD EROSION AND SEDIMENT CONTROL NOTES

1. THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION AND LOCAL AGENCIES AS REQUIRED PRIOR TO COMMENCING ANY LAND DISTURBING ACTIVITY. UNLESS SPECIFICALLY WAIVED BY THE AGENCY A PRECONSTRUCTION CONFERENCE IS REQUIRED.

2. THE CONTRACTOR SHALL CONSTRUCT ALL EROSION AND SEDIMENT CONTROL MEASURES PER THE APPROVED PLANS AND CONSTRUCTION SEQUENCE AND SHALL HAVE THEM INSPECTED AND APPROVED BY THE AGENCY INSPECTOR AT THE BEGINNING OF ANY OTHER LAND DISTURBING ACTIVITY. MINOR SEDIMENT CONTROL DEVICE LOCATION ADJUSTMENTS MAY BE MADE IN THE FIELD WITH APPROVAL OF ENGINEER AND/OR INSPECTOR. THE CONTRACTOR SHALL ENSURE THAT ALL RUNOFF FROM DISTURBED AREA IS DIRECTED TO THE SEDIMENT CONTROL DEVICES AND SHALL NOT REMOVE ANY EROSION OR SEDIMENT CONTROL MEASURE WITHOUT PRIOR APPROVAL. THE CONTRACTOR MUST OBTAIN PRIOR AGENCY APPROVAL FOR CHANGES TO THE SEDIMENT CONTROL PLAN AND / OR SEQUENCE OF CONSTRUCTION.

3. THE CONTRACTOR SHALL PROTECT ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS TO PREVENT THE DEPOSITION OF MATERIALS ONTO PUBLIC ROADS. ALL MATERIAL DEPOSITED ONTO PUBLIC ROADS SHALL BE REMOVED IMMEDIATELY.

4. THE CONTRACTOR SHALL INSPECT DAILY AND MAINTAIN CONTINUOUSLY IN AN EFFECTIVE OPERATION CONDITION ALL EROSION AND SEDIMENT CONTROL MEASURES UNTIL SUCH TIME AS THEY ARE REMOVED. ALL SEDIMENT BASINS, TRAP EMBANKMENTS AND SLOPES, PERIMETER DIKES, SWALES, AND ALL DISTURBED SLOPES STEEPER OR EQUAL TO 3:1 SHALL BE STABILIZED WITH APPROVED STABILIZATION MEASURES AS SOON AS POSSIBLE BUT NO LATER THAN 7 DAYS AFTER ESTABLISHMENT. ALL AREAS DISTURBED OUTSIDE OF THE PERIMETER SEDIMENT CONTROL SYSTEM MUST BE MINIMIZED. MAINTENANCE MUST BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION.

5. THE CONTRACTOR SHALL APPLY SOD OR SEED AND ANCHORED STRAW MULCH OR OTHER STABILIZATION MEASURES TO ALL DISTURBED AREAS AND STOCKPILES WITHIN 14 CALENDAR DAYS AFTER STRIPPING AND GRADING ACTIVITIES HAVE CEASED IN THE AREA. MAINTENANCE MUST BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION.

6. PRIOR TO REMOVAL OF THE SEDIMENT CONTROL MEASURES, THE CONTRACTOR SHALL STABILIZE AND HAVE ESTABLISHED PERMANENT STABILIZATION FOR ALL CONTRIBUTORY DISTURBED AREAS USING APPROVED PERMANENT SEED MIXTURE WITH REQUIRED SOIL AMENDMENTS AND APPROVED ANCHORED MULCH. WOOD FIBER MULCH MAY ONLY BE USED IN SEEDING SEASON WHERE THE SLOPE DOES NOT EXCEED 10% AND GRADING HAS BEEN PERFORMED TO PROMOTE SHEET FLOW DRAINAGE. AREAS BROUGHT TO FINISHED GRADE DURING THE SEEDING SEASON SHALL BE PERMANENTLY STABILIZED AS SOON AS POSSIBLE BUT NO LATER THAN 14 DAYS AFTER ESTABLISHMENT. WHEN PROPERTY IS BROUGHT TO FINISH GRADE DURING THE MONTHS OF NOVEMBER TO FEBRUARY AND PERMANENT STABILIZATION IS IMPRACTICAL, TEMPORARY SEEDING AND ANCHORED MULCH SHALL BE APPLIED TO DISTURBED

7. THE FINAL PERMANENT STABILIZATION OF SUCH PROPERTY SHALL BE APPLIED BY MARCH 15 OR EARLIER IF GROUND AND WEATHER CONDITIONS ALLOW.

8. THE SITES APPROVAL LETTER, APPROVED EROSION CONTROL PLANS, DAILY LOG BOOKS, AND TEST REPORTS SHALL BE AVAILABLE AT THE SITE FOR INSPECTION BY DULY AUTHORIZED OFFICIALS.

9. SURFACE DRAINAGE FLOWS OVER UN-STABILIZED CUT AND FILL SLOPES SHALL BE CONTROLLED BY FITHER PREVENTING DRAINAGE FLOWS FROM TRAVERSING THE SLOPES OR BY INSTALLING PROTECTIVE DEVICES TO LOWER THE WATER DOWN THE SLOPE WITHOUT CAUSING EROSION, DIKES SHALL BE INSTALLED AND MAINTAINED AT THE TOP OF A CUT OR FILL SLOPE UNTIL THE SLOPE AND DRAINAGE AREA TO IT ARE FULLY STABILIZED. AT WHICH TIME THEY MUST BE REMOVED AND FINAL GRADING COMPLETED TO PROMOTE SHEET FLOW. PROTECTIVE MEASURES MUST BE EMPLOYED IN AREAS WHERE CONCENTRATE FLOW IS LIKELY TO OCCUR.

10. PERMANENT SWALES OR OTHER POINTS OF CONCENTRATED FLOW SHALL BE STABILIZED WITH SOD OR SEED WITH AN APPROVED EROSION CONTROL MATTING, RIP-RAP, OR BY OTHER APPROVED STABILIZATION MEASURES. TEMPORARY SEDIMENT CONTROL DEVICES MAY BE REMOVED UPON APPROVAL OF INSPECTOR, WITHIN 30 DAYS FOLLOWING ESTABLISHMENT OF PERMANENT STABILIZATION IN ALL CONTRIBUTING DRAINAGE AREAS. STORM WATER MANAGEMENT STRUCTURES USED TEMPORARILY FOR SEDIMENT CONTROL SHALL BE CONVERTED TO PERMANENT CONFIGURATION DURING THIS TIME PERIOD AS WELL.

11. NO PERMANENT CUT OR FILL SLOPE WITH A GRADIENT GREATER THAN 3:1 WILL BE PERMITTED IN LAWN MAINTENANCE AREAS. A SLOPE GRADIENT OF UP TO 2:1 WILL BE PERMITTED IN NON-MAINTENANCE AREAS PROVIDED THAT THOSE ARE INDICATED ON THE EROSION AND SEDIMENT CONTROL PLAN WITH A LOW MAINTENANCE GROUND COVER SPECIFIED FOR PERMANENT STABILIZATION. SLOPE GRADIENTS GREATER THAT 2:1 WILL NOT BE PERMITTED WITH VEGETATIVE STABILIZATION.

12. FOR FINISHED GRADING THE CONTRACTOR SHALL PROVIDE ADEQUATE GRADIENTS TO PREVENT WATER FROM PONDING FOR MORE THAN 24 HOURS AFTER THE END OF A RAINFALL EVENT. DRAINAGE COURSES AND SWALES MAY TAKE UP TO 48 HOURS AFTER THE END OF A RAINFALL EVENT TO DRAIN, AREAS DESIGNED TO HAVE STANDING WATER SHALL NOT BE REQUIRED TO MEET THIS REQUIREMENT.

13. SEDIMENT TRAPS OR BASINS ARE NOT PERMITTED WITHIN 20 FEET OF A FOUNDATION THAT EXISTS OR IS UNDER CONSTRUCTION. NO STRUCTURES SHALL BE CONSTRUCTED WITHIN 20 FEET OF AN ACTIVE SEDIMENT TRAP OR BASIN.

14. THE SEDIMENT AND EROSION CONTROL INSPECTOR HAS THE OPTION OF REQUIRING ADDITIONAL SAFETY OR SEDIMENT CONTROL MEASURES IF DEEMED

15. ALL TRAP DEPTHS DIMENSIONS ARE RELATIVE TO THE OUTLET ELEVATION. ALL TRAPS MUST HAVE A STABLE OUTFALL. ALL TRAPS AND BASINS MUST HAVE STABLE INFLOW POINTS.

16. VEGETATIVE STABILIZATION SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS FOR SOIL AND EROSION CONTROL. REFER TO APPROPRIATE SPECIFICATIONS FOR TEMPORARY SEEDING, PERMANENT SEEDING, MULCHING, SODDING, AND GROUND COVERS.

17. SEDIMENT SHALL BE REMOVED AND THE TRAP OR BASIN RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO ONE QUARTER OF THE TOTAL DEPTH OF THE TRAP OF BASIN. TOTAL DEPTH SHALL BE MEASURED FROM THE BOTTOM TO THE CREST OF THE OUTLET.

18. SEDIMENT REMOVED FROM THE TRAPS SHALL BE PLACED AND STABILIZED IN APPROVED AREAS, BUT NOT WITHIN A FLOODPLAIN, WETLAND, OR TREE SAVE AREA. WHEN PUMPING SEDIMENT LADEN WATER, THE DISCHARGE MUST BE DIRECTED TO A SEDIMENT TRAPPING DEVICE PRIOR TO RELEASE FORM THE SITE. A SUMP PIT MAY BE UTILIZED IF SEDIMENT TRAPS THEMSELVES ARE BEING PUMPED OUT. ALL WATER REMOVED FROM EXCAVATED AREAS SHALL BE PASSED THROUGH AN APPROVED DEWATERING PRACTICE OR PUMPED TO A SEDIMENT TRAP OR BASIN PRIOR TO DISCHARGE FROM THE SITE.

19. WHERE DEEMED NECESSARY BY THE ENGINEER OR INSPECTOR, SEDIMENT TRAPS AND BASINS MAY NEED TO BE SURROUNDED WITH AN APPROVED SAFETY FENCE. THE FENCE MUST CONFORM TO LOCAL ORDINANCES AND REGULATIONS.

20. ALL WASTE AND BORROW AREAS OFF-SITE MUST BE PROTECTED BY SEDIMENT CONTROL MEASURES AND STABILIZED.

21. SITES WHERE INFILTRATION DEVICES ARE USED FOR THE CONTROL OF STORM WATER, EXTREME CARE MUST BE TAKEN TO PREVENT RUNOFF FROM UN-STABILIZED AREAS FROM ENTERING THE STRUCTURE DURING CONSTRUCTION. SEDIMENT CONTROL DEVICES PLACED IN INFILTRATION AREAS MUST HAVE BOTTOM ELEVATIONS AT LEAST 2 FEET HIGHER THAN THE FINISHED GRADE BOTTOM ELEVATION OF THE INFILTRATION PRACTICE. WHEN CONVERTING A SEDIMENT TRAP TO AN INFILTRATION DEVICE, ALL ACCUMULATED SEDIMENT MUST BE REMOVED AND DISPOSED OF PRIOR TO FINAL GRADING OF THE INFILTRATION DEVICE.

## SITE INFORMATION:

TOTAL AREA: 79.74 ACRES TOTAL AREA OF PROJECT SITE: 79.74 ACRES AREA TO BE CLEARED: 622711 SQ FT / 14.30 ACRES AREA WITHIN 100' WETLAND OFFSET: 66853 SQ FT / 1.55 ACRES

CONSTRUCTION PHASE: TOTAL CUT: 31435 CUBIC YARDS TOTAL FILL: 25985 CUBIC YARDS

OFF-SITE WASTE / BORROW AREA LOCATION: NOT APPLICABLE

## THIRD PARTY INSPECTIONS

1. A THIRD PARTY ENVIRONMENTAL INSPECTOR SHALL INSPECT THE INSTALLATION OF EROSION AND SEDIMENTATION CONTROLS PRIOR TO THE START OF CONSTRUCTION ACTIVITIES AND THE CONNECTICUT WATER COMPANY SHALL BE CONTACTED A MINIMUM OF 48 HOURS PRIOR TO THE START OF EROSION AND SEDIMENTATION CONTROLS INSTALLATION. A PRE-CONSTRUCTION MEETING SHALL BE HELD WITH THE THIRD PARTY ENVIRONMENTAL INSPECTOR, CONNECTICUT WATER COMPANY AND GENERAL CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

2. A THIRD PARTY ENVIRONMENTAL INSPECTOR WILL MONITOR EROSION AND SEDIMENTATION CONTROLS THROUGHOUT THE CONSTRUCTION PERIOD TO ENSURE THAT CONTROLS ARE PROPERLY MAINTAINED AND ANY RECOMMENDATIONS TO REMEDIATE FAILING CONTROLS OR REMOVE ACCUMULATED SEDIMENT ARE IMPLEMENTED BY THE CONTRACTOR IN A TIMELY FASHION.

3. A THIRD PARTY ENVIRONMENTAL INSPECTOR SHALL MONITOR EROSION AND SEDIMENTATION CONTROLS ON A WEEKLY BASIS OR WITHIN 24 HOURS OF A RAINFALL EVENT OF 0.5 INCHES OR GREATER.

4. EROSION AND SEDIMENTATION CONTROL MONITORING REPORTS WILL BE PREPARED BY THE THIRD PARTY ENVIRONMENTAL INSPECTOR ON A BI-WEEKLY BASIS AND SUBMITTED TO THE CONNECTICUT SITING COUNCIL AND CONNECTICUT WATER COMPANY. IF SIGNIFICANT FAILURE OF EROSION AND SEDIMENTATION CONTROLS RESULT IN IMPACT TO WETLAND RESOURCES ON THE SUBJECT PROPERTY, THE CONNECTICUT SITING COUNCIL WILL BE NOTIFIED WITHIN 24 HOURS AND CONNECTICUT WATER COMPANY SHALL BE NOTIFIED IMMEDIATELY OF SUCH AN EVENT AND RECOMMENDED REMEDIATION MEASURES WILL BE IDENTIFIED.

5. THE CONNECTICUT WATER COMPANY SHALL BE CONTACTED A MINIMUM OF 48 HOURS PRIOR TO THE START OF INSTALLATION OF EROSION AND SEDIMENTATION CONTROL MEASURES AND WILL HAVE ACCESS TO THE SITE AT ALL TIMES FOR

#### SPILL PREVENTION PLAN

THE PROPOSED PROJECT IS LOCATED IN THE NEW NAUGATUCK RESERVOIR PUBLIC DRINKING WATER SUPPLY WATERSHED. AS A RESULT, THE CONTRACTOR SHALL TAKE CERTAIN PRECAUTIONS NECESSARY TO CONTAIN AND PROPERLY CLEAN UP ANY INADVERTENT FUEL OR PETROLEUM (I.E., OIL, HYDRAULIC FLUID, ETC.) SPILLS. A SPILL CONTAINMENT KIT CONSISTING OF A SUFFICIENT SUPPLY OF ABSORBENT PADS AND ABSORBENT MATERIAL SHALL BE MAINTAINED ON SITE THROUGHOUT THE DURATION OF THE PROJECT. IN ADDITION, A WASTE DRUM SHALL BE KEPT ON SITE TO CONTAIN ANY USED ABSORBENT PADS/MATERIAL FOR PROPER DISPOSAL OFF SITE. REFUELING AND MAINTENANCE OF VEHICLES OR MACHINERY SHALL TAKE PLACE IN A DESIGNATED AREA WITHIN THE CRANE ASSEMBLY AREA. FUEL AND OTHER HAZARDOUS MATERIALS SHALL BE STORED WITHIN A DESIGNATED AREA WITHIN THE CRANE ASSEMBLY AREA AND UTILIZE APPROPRIATE SECONDARY CONTAINMENT.

THE FOLLOWING PROCEDURES SHALL BE ADHERED TO BY THE CONTRACTOR IN CASE OF A PETROLEUM RELEASE.

<u>INITIAL RESPONSE</u> • STOP OPERATIONS AND SHUT OFF EQUIPMENT.

REMOVE ANY SOURCES OF SPARK OR FLAME.

 CONTAIN THE SOURCE OF THE SPILL. DETERMINE THE APPROXIMATE VOLUME OF THE SPILL

• IDENTIFY THE LOCATION OF NATURAL FLOW PATHS TO PREVENT THE RELEASE OF THE SPILL TO SENSITIVE NEARBY WATERWAYS OR WETLANDS.

• ENSURE THAT FELLOW WORKERS ARE NOTIFIED OF THE SPILL.

## CLEAN UP & CONTAINMENT

• OBTAIN SPILL RESPONSE MATERIALS FROM THE ON-SITE SPILL RESPONSE KIT.

• LIMIT THE SPREAD OF THE SPILL BY PLACING ABSORBENT MATERIALS AROUND THE PERIMETER OF THE SPILL.

• CONTACT THE CONNECTICUT WATER COMPANY IMMEDIATELY AT (800) 428-3985 OR (860) 669-8630 ALONG WITH OTHER APPROPRIATE LOCAL, STATE AND/OR FEDERAL AGENCIES, AS NECESSARY.

 CONTACT A DISPOSAL COMPANY TO PROPERLY DISPOSE OF CONTAMINATED MATERIALS.

#### FOLLOW-UP • COMPLETE AN INCIDENT REPORT.

• SUBMIT A COMPLETED INCIDENT REPORT TO THE CONNECTICUT WATER

COMPANY.

CALL BEFORE YOU DIG: 1-800-922-4455

SEDIMENT AND EROSION CONTROL SHALL BE STRICTLY ENFORCED.

2002 Connecticut Guidelines for Soil Erosion and Sediment Control TREE PROTECTION Scale: NTS

4-Short Term Non-living Soil Protection

Definition A manufactured blanket composed of biodegraable / photodegradable natural or polymer liber and/or filaments that have been mechanically, structurally or chemically bound together to for

Purpose provide temporary surface protection to nev seeded and/or disturbed soils to absorb mindrop impact and to reduce sheet and rill exosion and

Applicability
• On disturbed soils where slopes are 2.1 or flatt . Where wind and traffic generated air flow ma dislodge standard, unarmored mulches.

May be used as a substitute for Temporary Soil Protection May be used as a substitute for Mulch for Seed.

Planning Considerations When considering the use of ECB keep in mind the blanket's capability to conform to ground surface irregularities. If the blanket is not capable of develop ing a continuous connect with the soil then it must be

lso, when the ground is frozen, proper anchoring can be difficult, if not impossible. Care must be taken to choose the type of blacker which is most appropriate for the specific need of the project. With the abundance of existen control blankers available, it is impossible to cover all of the advanages, disadvantages and specifications of all manufactured blankers. There is no substitute for a thorough understanding of the manufacturer's instrucvisit by the erosion and sedimentation plan designer prior to and during installation to verify a product's

The success of temporary erosion control blankets is dependent upon strict adherence to the manufac-turer's insullation recommendations. As such, a final inspection should be planned to ensure that the lap joints are secure, all edges are properly anchored and all staking/stapling patterns follow the manufacturer's

consultant to contain no containtinents that pollute the edr or

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recommendations;

Specifications

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Temporary erosion control blankets shall be com-

period of truended usage (five months maximum):

and when used with seedings allows vegetation to

stretching or movement by wind or water when installed in accordance with the manufaction

are biodegradable or photodegradable within two

posed of fibers and/or filaments that:

GEO-TEXTILE MAT Scale: NTS

5-Stabilization Structures

A flexible or rigid pipe used to conduct water from the top of a slope to the use of the slope . To convey water over excessive grade changes. . To convey concentrated starmwater runoff flows down the face of a slope without causing erosion problems

 On cut or fill slopes where the soil or existing vegetative cover will not withstand concentrated runoff flows. Where the contributing drainage area is 5 acres or less.

Planning Considerations Temporary pipe slope drains should be planned and installed along with, or as part of, other conservation practices in an overall surface water disposal system

This measure should be used only for the temporary conveyance of water and consideration should be given to the final stabilization of the area during the initial planning stages. Temporary pipe slope drains are com-monly used in conjunction with temporary diversions see Diversion Functional Group) which direct water to Source USDA-NRCS

Design Criteria The maximum allowable dramage area per dram is 5 Material used in the temporary pipe slope drain

1. Installal temporary pipe slope drain on a cut or a stable fill slope during or immediately after consumetton shall be heavy duty flexible (see Figure TSD-2) or rigid conduit (see Figure TSD-3) designed for the purpose

with hold down grounnets or rigid pipe supplied with arichors. Additionally, use only one size pipe for any sin
2. Stabilize the area from the top of the berm, around The bottom of the pipe slope drain shall be flush. vent erosion and piping failure at the inlet.

with the tree of the diversion berni (see Figure TSD-3).
The pipe slope drains shall be sized according to Figure TSD-1 and shall be provided with watertight.

3. Anchor the pipe slope drain securely. Space anchors a maximum of 10 fect on center. Water directed into the temporary slope drain shall 4. Securely faster, the sections of pipe together with be in accordance with temporary diversion measures

be in accordance with temporary diversion measures found in the Diversion Directional Group, where applicable. However, at a minimum, the height of the bern at the centerline of the inter shall be equal to the diameter of the pipe (D) plus 12 inches. Where the bern height is greater than 18 inches at the inlet, it shall be sloped 3:1 or flatter.

The area immediately below the outlet of the pipe slope drain shall be protected from crossive darbarges with appropriate energy dissipators. For drainage areas with appropriate energy dissipators. For drainage areas

5-5-23

Figure TSD-1 Size of Slope Drain

greater than 1 acre, hay bale check dams and geotextile ailt fences are not appropriate.

and under the entrance section of the drain to pre-

Installation Requirements

of diversion berms.

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Establishment of temporary stand of grass and/or legimes by seeding and molching soils that will be exposed To temporardy stabilize the soil and reduce damage from wind and/or water erosion and sedimentation until ermanent stabilization is accomplished.

Applicability Within the first 7 days of suspending work on a grading operation that exposes erodible soils where such suspension is expected to last for 1 to 12 months. Such areas include soil stockpiles, borrow pas, road banks and Not for use on areas that are to be left commut for more than 1 year. Use permanent vegetative measures in those situations.

Specifications

Seed Selection
Select grass species appropriate for the season and site conditions from Figure TS-2.

Apply ground limestone and termizer according to soil test recommendations (such as those offered by the University of Connecticut Soil Testing Laboratory or other reliable source). Soil ample mailers are available from Seed with a temporary seed mixture within 7 days after E contains a listing of the Cooperative Extension System the suspension of grading work in disturbed areas where

the suspension of granting works in disturbed, areas where the suspension of work is expected to be more than 30 days but less than 1 year. Seeding outside the optimum seeding dates given in Figure TS 2 may result in either insdequate germination or low plant survival rates, reducing erosion control effectiveness. Site Preparation Install needed crossion control measures such as diversions, grade stabilization structures, sediment basins and grassed waterways in accordance with the approved Grade according to plans and allow for the use of appropriate equipment for seedbed preparation, seed-ing, mulch application, and mulch anchoring. All grading should be done in accordance with the Land Grading

Seedbed Preparation
Loosen the soil to a depth of 3-4 inches with a slightly roughened surface. If the area has been recently loosened or disturbed, no further roughening is required. Soil preparation can be accomplished by tracking with a bull-dozer, clisting, harrowing, taking or dragging with a section of chain link fence. Avoid excessive compaction of the surface by equipment traveling back and forth.

Seeding

Apply seed uniformly by hand, cyclone seeder, drill, cul-tipacker type seeder or hydroseeder at a minimum rate for the selected seed identified in Pigure TS-2. Increase

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lime may be applied using rates given in Figure TS-1 Soll Texture Tons / Acre Lbs / 1000 / of Lime of Lime

over the surface. If the slope is tracked, the clear marks shall be perpendicular to the anticipated direction of the

If soil testing is not feasible on small or variable

flow of surface water (see Surface Roughening measure

SOIL COVER Scale: NTS

O provide either 80%-95% soil coverage when used as a substitute for Mulch for Seed or 100% initial soil coverage when used as a substitute for **Temporary Soil Protection** measure.

Materials shall be selected as appropriate for the specific site conditions in accordance with manufacturer's recommer dations. Use of any particular temporary erosion control blanket should be supported by manufacturer's test data that confirms the blanket meets these material specifications and will provide the short term erosion control capabilities necessary for the specific project.

Site Preparation and Installation see Figure ECB-1) Prepare the surface, remove protruding objects and install temporary erosion control blankets in accordance with

the manufacturer's recommendations. Ensure that the orientation and anchoring of the blanket is appropriate for landscape plantings are planned, lay the blanket first and then plant through the blanket in accordance with Landscape Planting measure. Inspect the installation to insure that all lap joints are secure, all edges are properly anchored and all staking or stapling patterns follow manufacturer's recommendations.

Maintenance Inspect temporary erosion contro blankets at least once a week and within 24 hours of the end of a storm with a rainfall amount of 0.5 inch or greater for failures. Blanket failure has occurred when (1) soils and/or seed have washed away from beneath the blanket and the soil surface can be expected to continue to erode at an accelerate rate, and/or (2) the blanket has become dislodged from the soil surface or is torn.

If washouts or breakouts

occur, re-install the blanket after regrading and re-seeding, ensuring that blanket installation still meets design specifications. When repeti-tive failures occur at the same location, review conditions and limitations for use and determine if diversions, stone check dams or other measures are needed to reduce failure rate.

Repair any dislodged or failed blankets immediately.

When used as a substitute for Mulch for Seed, continue to r Temporary Soil Protection,

by other erosion control measures or

until work resumes.

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Figure TSD-3 Example of Temporary Pipe Slope Drain -> D -RIPRAP APRON PLAN **3**D + 2'-----CONSTRUCTION SPECIFICATIONS 1. The pipe slope drain shall have a slope of 3% or steeper. 2. Top of the earth dike over the inject pipe and all dikes carrying water to the pipe shall be at Top of the earth dike over the inlet pipe and all dikes carrying water to the pipe shall be at leart 1 foot higher than the top of the pipe.
 Add 0.3 foot to dike height for settlement.
 Soil around and under the slope pipe shall be hard tempered in 4-inch lifts.
 The pipe shall be plastic or corrugated metal pipe with watertight 12-inch wide connecting bands or flange connections.
 Pipe anothors to be placed at 10-foot maximum spacing.
 Pipe are be 6 inches in a kyer at least 12 inches thickness and pressed into the soil.
 Periodic inspection and required maintenance must be provided after each rain event.

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seeding rates by 10% when hydroseeding.

Mulching
Temporary seedings made during optimum seeding
dates shall be mulched according to the Mulch for Seed
measure. Note when seeding outside of the optimum seeding dates, increase the application of mulch to pro vide 95%-100% coverage.

Inspect seeded area at least once a week and within 24 hours of the end of a storm with a manfall amount of 0.9 inch or greater for seed and mulch movement and rill

where seed his moved or where soil erosion his occurred, determine the cause of the failure. Bird feed-ing may be a problem if mulch was applied too thinly to-protect seed. Re-seed and re-imilch. If inovement was the result of wind, then repair crosson damage (if any), respely seed and multih and apply multih suchering. If failure was caused by concentrated runoff, install addi-tional measures to control water and sediment movement, repair crossion damage, re-seed and re-apply mulch with anchoring or use Temporary Erosion Control Blanket measure
Continue inspections until the grasses are further
established. Grasses shall not be considered established
until a ground cover is achieved which is mature enough
to control soil erosion and to survive severe weather

conditions (approximately 80% vegetative surface cover)

Definition temporary channel constructed with a non-crossve material, such as concrete, stominous concrete, upray, sacked concrete, gabians, half round pipes, reverent erosion control mats with cement grout or similar materials used to carry ocentrated runoff down a slope

To temporarily convey concentrated storm water runoff down a slope without causing erosion problems on or below the slope.

 For drainage areas less than or equal to 36 acres. Where the interded use to less than one year.
 For protection of disturbed out or fill slopes where planned vegetative cover is. not established and/or permanent duringe controls have not been completed. On slopes to steeper than 1.5.1 and no flatter than 5.1. For slopes flatter than 5.1 Use Femporary Lined Channel. Vegetated Waterway or Permanent

Planning Considerations nuicipated to be needed for more than 1 year use
Permanent lined Waterway measure, Permanent Stope
Drain measure, or consider revising the sequence of

Lined Waterway where appropriate

Design Criteria Slope Limitations

Sixing Limitations Design criteria are divided into two groups depending on the size of the drainage area. Group A is limited to a maximum area of 18 acres, and Group B may be used for drainage areas between 14 and 36 acres. Within each group the height of the bring at the entrance, depth of the chute down the slope, and length of the inlet and

Use Figure TC-1 to determine the sizing require-

the cluste down the stope, and length of the faces and could sections are constant (See Figure TC-D). These are determined by the selection of a bottom width. The bottom width of the chute is dependent upon the size of the designed are involved.

(e) Gabious shall be designed in accordance with the Gabious measure. drainage area involved. 5-5-70

Temporary lined chutes should be planned and installed along with, or as part of, other crosson control practices in an overall surface water control plan. If the chute is

ments for chute and associated group based on disinage area and proposed bottom width.

The selected size shall be identified in the E&S plan.

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Drain measure, or constant to the construction to eluminate the need for a temporary lined construction to eluminate the need for a temporary lined chute. For drainage areas less than 5 acres the chute. For drainage areas less than 5 acres the chute, and consist of nprap, bituminous concrete or the large shall consist of nprap, bituminous concrete or the large shall consist of nprap, bituminous concrete or the large shall consist of nprap bituminous concrete or the large shall consist of nprap bituminous concrete or the large shall consist of nprap bituminous concrete or the large shall consist of nprap bituminous concrete or the large shall consist of nprap bituminous concrete or the large shall be consistent or the are a exceeds 36 acres then either split the drainage area exceeds 36 acres then either split the drainage area or use alternate measures such as Permanent lived Waterway measure.

Waterway measure

Dealer Culturies

The drainage area of the medium of the proposed maintenance program. Provide for adequate filter blankers, geotextile, or both, for the proposed maintenance program. for these types of channel linings.

(a) Riprap shall be designed in accordance with the Temporary lined chuses shall be designed for placement on undisturbed or well compacted slopes that are not acceper than \$1.5 and not less than \$5.1.

Riprap measure.

(b) Bituminous concrete linings shall be designed with a minimum thickness of 2 inches and in accordance. dance with accepted engineering practices for

> structural adequacy (c) Portland Coment Concrete shall be 2500 PSI minimum with 2.5 inches minimum thickness. (d) Sacked concrete shall be designed for both struc-

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LINED CHUTE STABILIZATION Scale: NTS

A temporary channel with a berm of tampets or compacted soil placed in such a manne Purposes To divert sediment-tagen runoff from a disturbed area to a sediment-trapping facility such as a temporary sediment trap, sediment basin or vegetative filter.

. To direct water originating from undisturbed areas away from areas where construction To fragment disturbed areas thereby reducing the velocity and concentration of runoff. Where the drainage area at the point of discharge is 5 acres or less. For drainage areas

greater than 5 acres use Permaneut Diversion measure.

Where the intended use is 1 year or less. For uses greater than 1 year use Permaneut. Diversion measure Planning Considerations

Planning Considerations

A temporary diversion is used to diver sheet flow to a stabilized outlet or a sediment-trapping facility. It is also used during the establishment of permanent vegetative cover on sloping disturbed areas. When used at the top of a slope, the structure protects adjacent and downstream areas by diversing nortiff away from the disturbed areas. When used at the base of a disturbed slope, the structure protects adjacent and downstream areas by diversing sediment-tadpring facilities is the only associated matintenance costs are very low. Often, cleaning of sediment-trapping facilities is the only associated matintenance requirement.

Design Criteria.

No engineered design is required for a temporary diversion if the contributing drainage area is 1 area or less. If the contributing drainage area is 1 area or less and is 5 acres or less, design the temporary diversion to the Permanent Diversion measure standards using the 2-year frequency storm as the design storm.

sion exceed 2%, stabilization of the channel is necessary to prevent erosion of the temporary diversion itself (e.g., temporary seeding, temporary erosion control blankets, figural, etc.). The channel and berm must have a positive grade to assure drainage, but if the gradient is too great, precautions must be taken to prevent channel erosion, due to high-velocity flows behind the berm. The cross-section of the channel should be of a parabolic or trapezoidal shape to prevent a high velocity flows which could arise in the bottom of a "V" shaped ditch.

This practice is economical because it uses materials available on the site and can usually be constructed with equipment needed for site grading. The useful life of the practice can be extended by stabilizing the term with practice can be extended by stabilizing the berm with vegetation. Temporary diversions are durable, inexpensive, and require little maintenance when constructed property. When used in conjunction with a **Temporary** outside. The top width of the berm shall be 1 foot. Sediment Trap, temporary diversions become a logical

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choice for a control measure when the control limits for sult fences or hay bale barriers have been exceeded.

Grade and Stabilization
The flow line behind the bern shall have a positive

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Height at entrance (h) = 2 feet Depth of Chute (d) = 10 inches ength of inlet & outlet section (L) - 6 fee

Listed species may be used in combinations to obtain a breader time spectrum. If used in combinations, reduce each specie planeing rate by 20% of that listed.

(f) Erosion control blankets and turf reinforce Installation Requirements ment mats, when used, shall be designed in accordance with manufacture's recommendations. Inlet Design

(a) The top of the earth lining at the entrance to the chute shall not be lower at any point than the top of the lining at the entrance of the chute CH\* as shown in Figure TC-2). (b) The lining of the side slopes at the chure entrance

shall extend the distance H above the lining invert as shown in Figure TC-2;

Stabilize all areas distanted by construction immediately after work is completed. (c) The entrance floor at the upper end of the chute shall have a minimum slope toward the outlet of 0.25 inch per foot.

0.25 inch per foot Inspect the temporary lined chute at least once a week and within 24 hours of the end of a storm with a minfall amount of 0.5 inch or greater for crossion damage. Repair continuous with the lining.

cutoff wall at end of the discharge aprons so that it is continuous with the lining.

Maintenance

tations and installation requirements. Correct deficiencies Outlet Design

The minimum requirements for nutler protection are shown in Figure TC-2. Verify adequacy of outlet stabilization using Outlet Protection measure. Design the

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. Install the chute on undisturbed soil, if possible, or if not possible, on well compacted full.

2. Begin construction of the chute at its lower end.

Construct the cutoff walls at the entrance and at the end of the discharge aprons so that they are contin-

Characteristics

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and reasonably smooth.

uous with the lining.

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and any associated measures weekly or immediately after 0.5 inch of min falls within a 24-hour period to

TOP OF EARTH DIKE SLOPE VARIES, NOT STEEPER THAN 1.3.1 AND NOT FLATTER THAN 5:1 6" WIDE X 15' DEEP 6" WIDE X ).5' DEEP -MODIFIED RIPRAP MIN. SLOPE PLAN VIEW UNDISTURBED SOIL OR -PLACE 4" THICK LAYER OF PREE SECTION A-A
DRAINING FILTER BLANKET UNDER PAVEMENT (NET TO SOUR) CHUTE SIZE IS DESIGNATED WITH A LETTER AND A NUMBER, SUCH AS A-6, WHICH MEANS SIZE GROUP A WITH A 6 FT. BOTTOM WIDTH (b). FOR STRUCTURE DIMENSIONS, SEE TABLE Source: USDA/NRCS

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**IDENTIFICATION** C-501

grade. Channel grades flatter than 2% require no stab-lization. Channels with grades steeper than 2% require stabilization in accordance with stabilization specifica-tions found in the Pernament Diversion measure Temporary diversions shall be stabilized according to the duration of their insended use (see Short Term Non-lizing Soil Protection Protection Processional Group)

Maintenance

When the temporary diversion is located within close proximity to ongoing construction activities, inspect the temporary diversion at the end of each work day and immediately repair damages caused by construction equipment. Otherwise inspect the temporary diversion and any associated measures weekly or immediately and any associated measures weekly or immediately and the property diversion is located within close proximity to ongoing construction activities, inspect the temporary diversion is located within close proximity to ongoing construction activities, inspect the temporary diversion is located within close proximity to ongoing construction activities, inspect the temporary diversion is located within close proximity to ongoing construction activities. Inspect the temporary diversion is located within close proximity to ongoing construction activities, inspect the temporary diversion is located within close proximity to ongoing construction activities. Inspect the temporary diversion is located within close proximity to ongoing construction activities. Inspect the temporary diversion is located within close proximity to ongoing construction activities. Inspect the temporary diversion is located within close proximity to ongoing construction activities. Inspect the temporary diversion is located within close proximity to ongoing construction activities. Inspect the temporary diversion is located within close temporary diversion is located within cl Outlets

Regardless of design, release the diverted runoff to a stable outlet or chained. Where diverted runoff is expected to be carrying a sediment impoundments (see Sediment Impoundments and Barners Functional Group).

Repair the temporary diversion and any associated measures within 24 hours of observed failure. Failure of the temporary diversion has occurred when the diversion had been damaged by either construction equipment, erosion or siliation such that it no lengte meets the critical period to the temporary diversion had something and the second of the temporary diversion and any associated measures within 24 hours of observed failure. Failure of the temporary diversion and any associated measures within 24 hours of observed failure.

Apply stabilization measures (may include temporary or permanent seed and mulch) immediately

rary diversion.

seria established under the Specifications section of Construction

Install crossion controls at the outlet where sediment laden runoff is espected.

Construct libr tempority diversion (see Figure TD-1)

After grading the berns, tamp or compact it to prevent laber are needed to reduce faulture rates or if alternate measures are indicated to reptice libr temporary.

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A channel constructed across a slope with a supporting earthen ridge on the lower side.

. To intercept and divert storm water runoff to a stabilized outlet. To protect downgradient areas from erosion and sedimentation.

 Where the contributing watershed is 25 acres or less. For watersheds with a drainage area greater than 25 acres, either use Permanent Lined Waterway or Vegetated Waterway. Where the diversion is to be included as an integral part of a permanent water management system.
 Where the diversion is to be included as an integral part of a permanent water management system.
 Where runniff from areas of higher elevation may change property; tause erosion, or interfere with the Where surface and/or shallow subsurface flow is damaging sloping uplands.

Where the slope length needs to be reduced to control excessive overland flow velocities and minimize

Planning Considerations

Planning Considerations
Diversions are useful teols for managing aurface water flows and preventing soil crosson. On moderately sloping areas, they may be placed at intervals to trap and diver sheet flow before it has a chance to concentrate and cause rill and gully erosion. They may be placed at the top of cut or full slopes to keep runoff from updand datinage areas off the slope. They can also be used to protect structures, parking lots, adjacent properties, and other special areas from fleeding. When property conducted into the landscape design of a site, permanent diversions can be visually pleasing as well as functional, (see Figure IP)-2)

The supporting ridge of the permanent diversion may be conscructed from soil excavated from the channel if the soil excavated meets the installation requirements, then plan or longering soil which is adequate to meet the installation requirements.

Location

Determine the permanent diversion location by considering conductions, to possibly, land use, soil type, length of slope, seepage planes (i.e., seepage breakout locations where seepage is expected to be a problem) and the development layout

Capacity

Design the minimum capacity to safely early the peak flow expected from a Toy-year frequency, 24-thou duration storm with a freeboard of at least 0.3 feet. (see Figure IP) 1.

Diversions designed to protect homes, without planting stores, and comparable high-risk areas, and those designed to function in considering the properties of which is adequate to meet the installation requirements. Diversions are useful tools for managing surface water Location

installation requirements.

with a freeboard of at least 0.5 feet.

With stone) of the top and outside of the ridge be

designed to a standard greater than the 10-year free

designed to a standard greater than the 10-year free planned for ridge stabilization, then plan on requiring the use of topsoil and seed bed preparation in accordance with the Topsoiling and Permanent Seeding lems exist or if the consequences of flooding are seven then consider increasing the capacity beyond the 10-year Maintenance requirements should be planned in frequency storm. If drainage systems which convelarger storms converge with the diversion in question design the diversion to the same design storm as the conributing draininge system.

Design Criteria Design the permanent diversion according to generally accepted engineering standards (e.g., NRCS National

5-7-12 2002 Connecticut Guidelines for Soil Erosion and Sediment Control PERMANENT DIVERSION SWALES

Definition To reduce the velocity of concentrated storm water flows, thereby reducing erosion of the drainageway.

ever, stone check dams may be used in conjunction with those measures.

Applicability For temporary drainageways which, because of their short length of service, will not receive a non-erodible lining but still need protection to reduce erosion. For permanent drainageways which, for some reason, will not receive a permanent non erodible lining for an This measure is not a substitute for a Temporary Sediment Trap or a Temporary Sediment Basin, how

Design Criteria

No engineered design is required for a stone theck dam if the contributing datingse area is 2 acres or less and its

If the contributing drainage area is greater than 2

or engineered stone check dams, construct the stoi.

heck dam in accordance with the design standards and

Planning Considerations A stone check dam is considered to be temporary if it is used less than 1 year. It is considered to be permanent if is used more than 1 year. Its length of use and the size intended use is shorter than 6 months. of the watershed determine if an engineered design is

of the watershed determine if an engineered design is required (see Figure SCD-1).

When planning the location of the stone check dam(a) consider the subvater effects, domains of ponding, stone size, the contributing watershed and, if placed in a watercourse, the effects on fish habitat and fish passage. Ahn assess if the first use of the area wall require the stone check dam(or to be removed. Give consideration to moving requirements and aesthetics. For stone check dams to be located in a vernal, intermittent or permanent watercourse, thek, with regulatory watercourse, thek, with regulatory watercourse. Lock with regulatory watercourse, thek, with regulatory watercourse, thek, with regulatory watercourse, thek, with regulatory watercourse. he stone check damin to be removed. Give considera ton to moving requirements and aesthetics. For stone check dams to be located in a vernal, intermittent or permanent wherecourse, check with regulatory auditribles expected from a 2-year frequency storm without structure. regarding permits. tural failure and adverse tailwater effects.

For use of a stone check dam exceeding 1 year, design the stone check dam to safely pass the peak flor expected from a 25-year frequency storm without structural failure of the check dam and adverse tailwater effects.

no engineered 1 2 acros <6 months design 2-yr frequency >2 acros >6 months, <1 year 25-yr frequency any drainage size >1 year storm

STONE CHECK DAM

Errata Corrections 1/08

specifications. For all non-engineered some check dams, comply with the following specifications. Materials Specifications Section M OLO), #3 aggregate. The strong abilities sound, trough, durable, angular, not subject to distingenation on exposure to water or weathering, be chemically stable, and shall be suitable in all other

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1 - Sediment Impoundments, Barriers and Filters Hay Bale Barrier (HB)

A temporary sectiment partier consisting of a row of entrenched and anchored bales To intercept and detain small amounts of sediment from small disturbed areas To decrease the selucity of sheet flows.
To redirect small volumes of water away from erodible soils. To selle and assist in filening watery declarated from pumping operations (see Pumping Settling Basin message, Type I and Type I).

· Below small disturbed areas where the desirage area (disturbed and undisturbed) is less than 1 acre in size

Above disturbed slopes to direct surface water away from crodible areas where the Where protection and effectiveness is required for less than 3 months. measures (see Geotextile Silt Fence and Stone Check Dams Special Cases).

Planning Considerations

Specifications Hay Bales, shall be made of hay or straw with 40 pounds minimum weight and 120 pounds maximum weight held regether by twine or wire Stakes for Anchoring Hay Bales; shall be a minimum of 36 inches long and made of either hardwood with dimensions of at least 1.5 inches juare or steel posts with a minimum weight of 0.5 pound per linear foot.

Placement on the Landscape Contributing drainage area is no greater than 1 acre. Maximum slope length is as shown in Figure HB-1. of slope (see Figure IIB-2), generally on the contour. When the contour can not be followed, stagger the bale

Trench excavation: Excavate a trench as wide as the bales and at least 4 inches deep. Each end of the trench should be winged upslope so that the bottom of installation and install perpendicular wings spaced as shown in Figure HB-1 to break the velocity of water flow-ing behind the bales. The barrier should be located with

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sufficient distance from the toe of the slope to allow access

Swales: Not recommended. See Georextile Silt Fence

Catch Basins in Swales on Slopes: Not recommended.

Catch Basins in Depressions or Low Spots (yard

Sediment Trap and/or Stone Check Dam measures.

Pumping Settling Basin: See Pumping Settling

by equipment for removal of accumulated sediments

or Stone Check Dam measure

Channel Design
The diversion channel may be parabolic, trapezoidal or
"V" shaped and shall be designed in accordance with the
Vegetured Waterway measure or Permanent Lined
Waterway measure

Parabolic trapezoidal or
"V" shaped and shall be designed in accordance with the
Vegetured Waterway measure or Permanent Lined
Waterway measure

Special or dispose of all earth removed and not needed in construction.

minimum of a feet.

The supporting ridge cross section shall meet the fol-lowing criteria (see Figure PD-1): Stabilize the diversion in accordance with the design plans. 1. The side stopes shall be no steeper than 2:1 Install Sediment Controls for Contributing Areas 2. The width at the design water elevation shall be a install sediment controls to trap sediment before it enter the diversion. Field experience has demonstrated that

4. The design shall include a 10% settlement factor. Provide for soil stabilization of the top and outside por-

d. The minimum freeboard shall be 0.3 feet.

Installation Requirements

Inspect the permanent diversion at least once a week and within 24 hours of the end of a storm with a rainfall Provide the permanent diversion with a stable outlet which will reduce the energy of concentrated discharge on as not to cause downstream erosion.

See demand of 0.5 and or greater during construction of the which will reduce the energy of concentrated discharge and willing 28 bours of the end of a storm with a rainful amount of 0.5 and or greater during construction of the which will reduce the energy of concentrated discharge around the discharge and willing 28 bours of the end of a storm with a rainful amount of 0.5 and or greater during construction of the which will reduce the end of a storm with a rainful amount of 0.5 and or greater during construction of the which will reduce the end of a storm with a rainful amount of 0.5 and or greater during construction of the which will reduce the end of a storm with a rainful amount of 0.5 and or greater during construction of the which will reduce the energy of concentrated discharge and will reduce the end of a storm with a rainful amount of 0.5 and or greater during construction of the which will reduce the energy of concentrated discharge and will reduce the end of a storm with a rainful amount of 0.5 and or greater during construction of the which will reduce the end of a storm with a rainful amount of 0.5 and or greater during construction of the end of a storm with a rainful amount of 0.5 and or greater during construction of the end of a storm with a rainful amount of 0.5 and measure Maintenance Section for matial establishme and first mowing requirements. Check for seed an mulch movement and/or rill erosion. For sodded char nels, see Sodding measure Maintenance Section Site Preparation

Remove and dispose of all trees, stumps, obstructions, and after objectionized the material to as not to interfere with the proper functioning of the diversion.

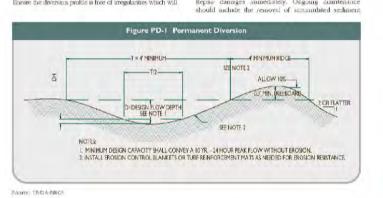
Becavate or shape the diversion to line, grade, and cross section as required to meet the criteris specified berein.

Ensure the diversion profile is free of irregularities which will be called the removal of accumulated sediment.

5-7-19

many newly constructed vegetated channels become

epairs as a result of improper up alope protection and



A channel constructed across a slope with a supporting earthen ridge on the lower side.

Where the contributing waterfined is 25 acres or less. For watersheds with a drainage area greater than 25 acres, either use Permanent Lined Waterway or Vegetated Waterway.

Where the diversion is to be included as an integral part of a permanent water management system.

. Where ranoff from areas of higher elevation may damage property, mose eroston, or interfere with the where surface and/or shallow subsurface flow is changing sloping uplands.

 Where the slope length needs to be reduced to control excessive overland flow velocities and minimize.

To increase slope length and reduce grosive relocities
 To intercept and divert storm water runoff to a stabilized outlet.

To protect downgradient areas from erosion and sedimentation

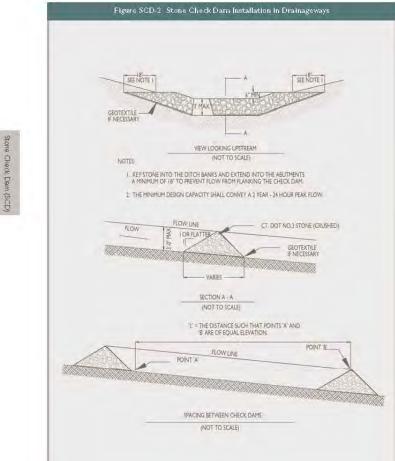
Design Criteria

Design the permanent diversion according to generally accepted engineering sandarda (e.g., NRCS Retainnal Engineering Handbook Part 650 the NRCS Retainnal Technical Guade — Section IV, DOT Drainage Manual).

5-7-12

2002 Connecticut Guidelines for Soil Erosion and Sediment Control

2002 Connecticut Guidelines for Soil Erosion and Sediment Control



Planning Considerations
Diversions are useful teels for managing surface water flows and percenting seal crosson. On modestely sloping areas, they may be placed at intervals to trap and diversions they may be placed at intervals to trap and diversions the specific problem. The placed at the top of cut or fill slopes to keep runniff from upland duttings a crass off the slope. They may be placed at the top of cut or fill slopes to keep runniff from upland dutings a crass off the slope. They can also be used to protect structures, parking lots, adjacent properties, and other special areas from fleeding. When properly councillated into the landscape design of a site, permanent diversions can be visually pleasing as well as functional, (see Figure PD-2)

The supporting ridge of the permanent diversion may be constructed from sell-excusted from the channel if the seal excusted from the long through the seal excusted from the channel if the seal excusted from the least 0.3 feet. (see Figure PD 1.)

Diversions designed to protect homes, whole the figure PD 1.

If a contributing of a feet tributing draininge system. 2002 Connecticut Guidelines for Soil Erosion and Sediment Control 2002 Connecticut Guidelines for Soil Erosion and Sediment Control

11 - Sediment Impoundments, Barriers and Filters

Liemporary sediment parrier consisting of a geotextile labric pulled taut and stracked to supporting posts and entrenched. To decrease the selecity of sheet flows and low volume concentrated flows. Applicability

• Below small disturbed areas where the contributing drainage area (disturbed and undisturbed) is less than I aere in size At storm water drainage inlets and catch basins where sedimentation will reduce the capacity of storm chainage systems or adversely affect adjacent areas, water-courses and other sensitive areas. Not for use in areas where rock, frozen ground or other hard surface presents proper installation of the barrier (see Special Gase Combinations in Stone Problems from use in drainageways whose flow is supported by ground water discharge.

See Flanning Considerations for Sediment Impound-ments, Estricts and Filters Functional Group. When used it a culvert outlet, plan to install the geotextile silt fence minimum strength of 0.5 pound per linear foot. before the start of construction and complete the instal lation of the required outlet protection before the culvert s made functional. It is preferable to control sediment at the interseather than at the outlet. Use at outlets should be limited to situations where inter-controls are not possible or to act as a backup to inter-controls.

Solve to controls of the control of the control

Specifications Geotextile fabric: shall be a pervious sheet of Figure GSF-2 for spacing requirements.

Supporting posts shall be at least 42 inches long made of either 1.5 inch square hardwood stakes or steel posts Contributing drainage area 1 acre or less. Maximum

For toe of slope (Figure GSF-3). Locate 5-10 feet down gradient from the toe of slope, generally on the contour with maintenance and sediment removal requirements in mind. When the contour can not be followed install the tence such that perpendicular wings are created to break the velocity of water flowing along the fence. See

Placement on the Landscape

Determination of Needs

The need for conduit outlet procession shall be determined by comparing the allowable velocity which the soil will withband to the ext velocity of the thor from the conduit. The allowable velocity for water over the soil shall be dat given in Figure OP-1. The cast velocity of the water in the conduit shall be calculated using the of the water in the conduit shall be calculated using the approximated.

There shall be no vertical drop from the end of the aproximated.

5-10-6

2002 Connecticut Guidelines for Soil Erosion and Sediment Control **OUTLET PROTECTION** 

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Structurally lined aprons or other acceptable energy dissipating devices placed between the outlets of pipes of

To prevent scour at stome drain, culvert or drainageway outlets and to minimize the potential for downstream

Appricability
At the outfall of all storm drain outless, road culvers, paved channel outlets, new channels constructed as outless for culvers and conduits, ere discharging into natural or constructed channels, which in turn discharge into

Planning Considerations
Analysis and appropriate treatment shall be done along the entire length of the flow path from the end of the conduit exceeds the sillowable velocity for the soil, outlet

existing stream or publicly maintained drainage system. Where flow is excessive for the economical use of an appear, excavated stilling basins may be used. Acceptable designs for stilling basins may be found in the following

Soil Texture Allowable Velocity (It./sec.)

Sand and sandy loam 2.5

Silt Loam

Clay, fine gravel, graded loam to gravel

oson by reducing the velocity of concentrated storm water flows

Applicability

existing streams or drainage systems.

Sources

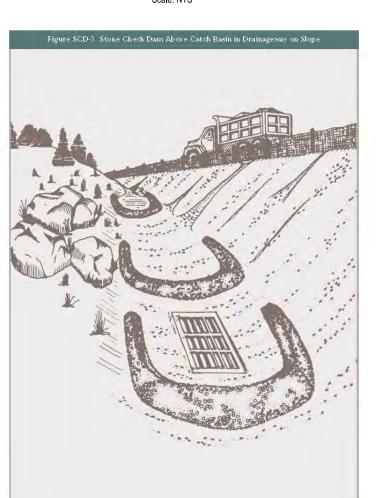
(i) Hydraulic Design of Evergy Dissinators for Culivers and Channels, Hydraulic Engineering Circular No. 14, U.S. Department of Transportation, Federal Highway Administration: December 1975.

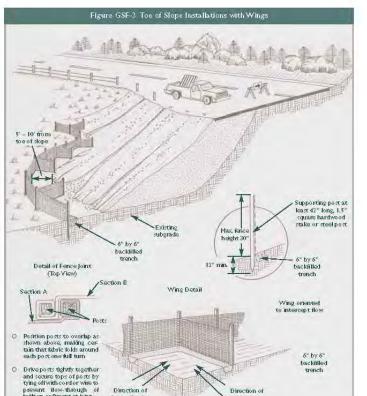
Hydrautic Destan of Stilling Bashs and Energy <u>Disdicators</u> Engineering Managraph No. 25, U.S Department of the Interior, Eureau of Restamation

O Scour at Cantillevered Pipe Quilets - Plunge Pool Energy Disulpator Design Griteria, Agricultural Service Research Publication ARS-76, 1589 (All of the above are available from the U.S. Government

Piumon Peol Daston as Submarged Pipe, Spillmay Challes, American Society of Agricultural Engineers, Volume 37(2):1167-1173, 1904.

Design Criteria





2004 Connecticut Stormwater Quality Manual **BIORETENTION POND** 

6-Drainage VVavs and Watercourses

causing turbidity. To keep sediment generated by construction traffic out of the stream. Applicability For streams with drainage areas less than one square mile. For draining areas exceeding one square mile use generally accepted engineering standards (e.g. NRCS Field Office Technical Guide Section IV, the SCS National Engineering Handbook - Pan (64).

Hydraulic Engineering, DCP <u>Drainage Manual</u>) which more accurately define the actual hydrologic and hydraulic parameters which will affect the functioning of the structure. Planning Considerations

Planning Considerations
Temporary stream crossings are necessary to prevent construction vehicles from damaging stream banks and continually tracking sediment and other pollutants into the stream. However, these structures are also undeauble in that they represent a channel constitution which can cause flow backups or wishouts during periods of high flow. For this reason, the temporary nature of suream crossings is stressed. They should be in place for the shortest practical period of time and be removed as soon as their function is completed.

The opecifications contained in this measure pertain primarily to flow capacity and resistance to washout of the structure. From a starty and utility standpoint, the designer mass also be sure that the crossing is supplied of withstanding the expected leads from heavy construction equipment. Additionally, the design plans and installamigration when compared to the other temporary access on shall comply with applicable federal, state and local

equipment. Additionally, the design plans and install disturbance in the stream bed and banks when com-pared to the other types of crossings. They can also be quickly removed and reused. In addition, temporal bridges pose the least chance for interference with fish

Levs and regulations

A temporary bridge crossing is a structure made of wood, metal, or other materials which provides access across a stream or waterway. A temporary culvert crossing that will remain in Fortendary sulvert crossings that will remain in the form of level of a formal hydraulic.

wood, metal, or other materials which provides access across a stream or waterway. A temporary culvert crossing that will premain in fig. is a structure consisting of stone and a section(s) of circular pine, pine arches, or oval pipes of reinforced renewed, convey flowing water through the crossings.

Bridges are preferred over culvert installations. Normally, bridge construction causes the least amount of distructions to the stream hed and bards when consistency or the stream had an access the construction causes the least amount of distructions to the stream hed and bards when com-

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From CT DOT <u>Drainage Manual</u>." Using the form "Design Prequency Risk Analysis' determine all factors in the tropist Rating Table as described except "Property Damage." Property damage is assessed by predicing the areas that can be damaged should the crossing capacity be exceeded. This includes an evaluation of potential flood minimum thickness of 6 inches of well guided, free duringe upstream or indipoent to the channel and duringe during gravel or crushed some equal to the width of downstream to properties and water resources that might the navel way. receive sediment should the stream crossing fail. The property damage value shall be chosen as follows: Temporary Bridge Crossing Criteria

Femporary Bridge Crossing Criteria

5 points

cropland, parking lots recreational aceasundeveloped land, forest land

10 points

private or public structures, appurenancessuch as aceaage resiment systems and water
supply areas (public and private well heads
and reservoirs), utility structures either
allowe or below ground, room management
areas, streams stocked by DEP, ponds
located immediately downstream before the
confluence with other watercourses, wetlands greater than 5 acres in size.

Temporary Bridge Crossing Criteria

Design the elevation of the temporary bridge structure at
or above top of bank elevation to prevent the entrapment of floating maternals and debra. Additionally, the
summent stall be parallel to and temporary bridge structure at
or above top of bank elevation to prevent the entrapment of floating maternals and debra. Additionally the
banks and begrated into spatie structure at
or above top of bank elevation to prevent the entrapment of floating maternals and debra. Additionally, the
banks and testing maternals and debra. Additionally the
banks and reservoirs, utility structures either
allowed prevent the entrapment of floating maternals and debra. Additionally the
banks and reservoirs, utility structures either
allowed prevent the entrapment of floating maternals and debra. Additionally to apparelle to apparelle to apparelle to a parelle to a parell

When the assigned task fulls between two design frequency defineations choose the higher of the two design frequencies. For example, a design risk of 30% for 18 months fulls between the 3-year and 5-year Therefore choose the 5-year design frequency.

The structure shall be designed to pass the design atom without encision. If the structure must temain in place over 3 years, it must be designed as a permanent measure in accordance with accepted engineering standards and practices. The installation of the temperary stream crossing shall not impact structures in close proximity to the crossing by causing a rise in the water surface elevation for the chosen design storm.

Crossing Load Unitetions

Temporary Culvert Crossing Criteria
Culvert Size Multiple railverts may be used in place of one large culvert if they have the equivalent examine of the larger one. The minimum-sized culvert danaster that may be used is 18 inches.

Culvert Lengths In no case shall the culvert exceed 40 leet in length. If the crossing approach grades require extensive fills then consider using a bridge rather than a culvert for the crossing structure. Crossing Load Limitations to withstand the unumpated loading of the construction | Culvert Slope: The slope of the culvert shall match the

Crossing Width

the stream flow. Crossing Approaches

cide with the centedine of the crossing with sufficient

Crossing Width
The crossing shall be designed for single lane maffer only, with a minimum width of 12 feet and a minimum of 20 feet. For culver crossings the length of the cultivation shall include the width needed for single lane traffic plus the side slopes.

Crossing Alignment
The temporary stream crossing shall be at right angles to the stream. Where approach conditions dicase; the contention of the stream crossing may be aligned so that it is no greater than 15% from a line drawn perpendicular to the stream flow.

Cultvert Backfill. Cultvert backfill acquires the use of well graded, free degrating graved or crossing graved or crossing and a genterable, if necessary, specifically intended for road stabilization between the fill and the native soil. Provide appearations for the genterable to the native soil. Provide separation between the fall and the native soil. See Construction Entrance measure for required physical qualities of the general loads require the use of over over the cultvert shall be an innimum of 25 inches and may be increased if anticipated loads require the use of well graded, free degrating graved or crossing stability and a grade provide separation between the fill and the native soil. Provide specifications for the general fill and the native soil. See Construction Entrance measure for required physical qualities of the general for over the cultvert shall be an innimum of 25 inches and may be increased if anticipated loads require well graded, free degrating graved or crossing stability and a grade of crossing graved or crossing stability and the native soil. Provide specifications for the general fill and the native soil. See Construction Entrance measure for required physical qualities of the general fill and the native soil. See Construction Entrance measure for required physical qualities of the general fill and the native soil. See Construction Entrance measure for required physical qualities of the general fill and the native soil. See Construction Entrance measure for required ph

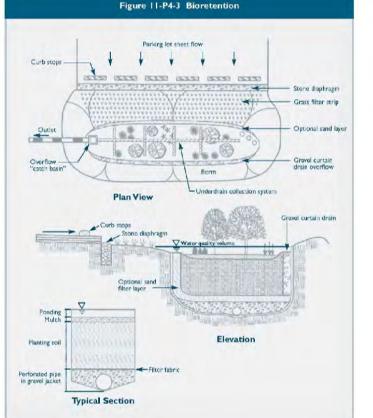
temporary stream crossing expected to be used in excess of 14 days, the backfill shall be protected from crossen with uprap designed in accordance with the centerline of both roadway approaches shall coin- Riprap measure:

culvert for the crossing structure

Culvert Backfills Culvert backfill requires the use of

2002 Connecticus Guidelines for Soil Troston and Sedimens Control

WETLAND CROSSING Figure | I-P4-3 Bioretention Parking lot sheet flow Curb stops ----



Source: Adapted from Center for Watershed Procection, 2000-

2002 Connecticut Guidelines for Soil Erosion and Sediment Control

lace hay bales on contour and wing last hay bales up slope of that top of last several hay bales are higher then line of

SILT FENCE

5-11-35

2002 Connecticut Guidelines for Soil Erosion and Sediment Control

Geotextile fabric: shall be a pervious sheet of polypropelme, nylon, opperate, ethylene or similar filaments and shall be certified by the manufacturer or supplier as conforming to the requirements shown in Figure GSF-1. The geotextile shall be non-rotting, and and alkali constant and have sufficient strength and permeability for the purpose intended, including handling and backfilling, operations. Filaments in the geotextile shall be resistant to absorption. The filament network must be dimensionally stable and resultant to declaminamust be dimensionally stable and resutant to de-lamina-tion. The geotexule shall be free of any chemical treatment or cooling that will reduce its permeability. The geotexule shall also be free of any flaws or defects which will after its physical properties. Torn or pointured geo-texultes shall not be used.

Culvert inless: Locate in a "U" shape approximately 6 feet from the culvert in the direction of the incoming flow

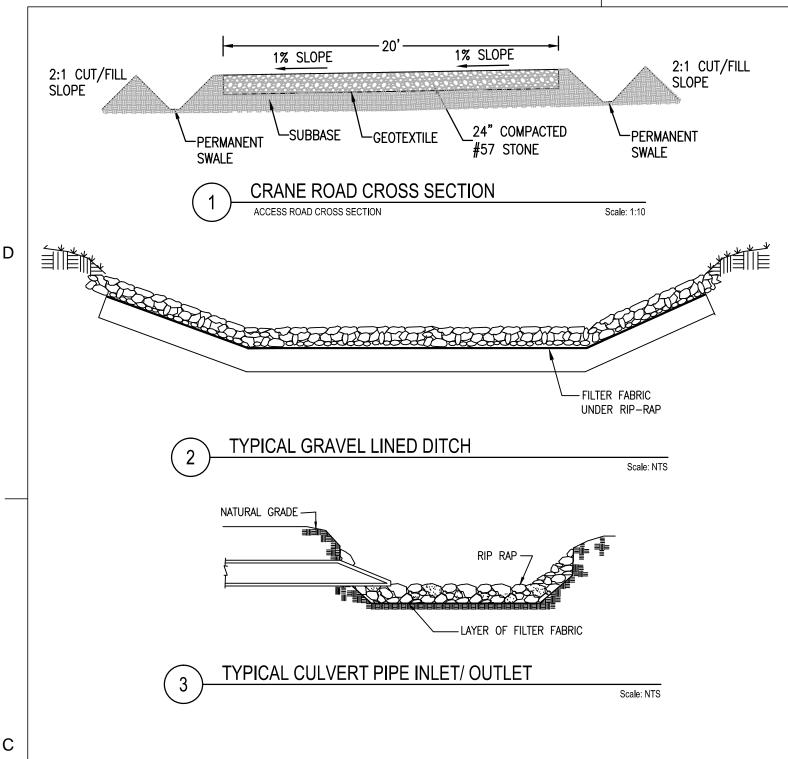
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**IDENTIFICATION** 

HAY BALE BARRIER

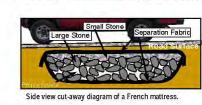
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C-502



French Mattress

FRENCH MATTRESS -A structure under a road consisting of coarse rock wrapped in fabric through which water can freely pass. A French mattress is basically a French drain that is used similar to a



**PURPOSES**: The primary function of a *French mattress* is to provide load support and to establish, maintain, or equalize the subsurface water on both sides of the road. The use of *French mattresses* in road maintenance is a relatively new concept. Please contact the Center for Dirt & Gravel Road Studies with any questions or concerns.

Support strength is provided by large rocks in the lower portions and by spreading the weight load with layers of progressively smaller rock near the top. Water moves into the French mattress from any direction through the protective geo-textile fabric, which functions to prevent migration of fine material. The water collects in the voids provided by the larger rock and moves by gravity either into the soil or subsurface drainpipes, if provided, or exits as a gentle seep on the downhill end of the structure.

BENEFITS OF A FRENCH MATTRESS:

• Corrects road support problems in areas where the road base has been weakened by water saturation caused when the road acts as a dam to natural water flow. Allows for natural equalization of subsurface water on both sides of a road. Requires little, if any, maintenance compared to cross-drainage culverts.

 Allows a gentle, non-erosive water discharge rather than concentrated flow Provides an indefinite service life if not compromised by heavy flows of sediment.

WHERE TO USE A FRENCH MATTRESS:

 Areas where concentrated outlet flow through a pipe may be undesirable, impractical, or regulated. Low-lying areas near streams or wetlands where installing cross drains would be difficult. Areas where a road is acting as an impoundment or dam to the natural water flow by isolating subsurface water on one side of the road from the other. • Areas where placement of a pipe at the depth necessary to provide structural cover would lower the



Scale: NTS

IMPORTANT CONSIDERATIONS <u>Materials</u>: The core material for the mattress should be large clean stone, typically referred to as R4<sup>1</sup>. A general rule is that the depth of the mattress needs to be at least three times the diameter of the largest stone used. Smaller stone, such as #3's' should be placed on top of the large stone. Progressively smaller stone should be place on top to prevent tearing of the fabric. The structure should be wrapped in heavy-duty, non-woven separation fabric.

Dimensions: The length of the mattress must, at a minimum, equal the width of the road, but can extend out of the road area to equalize drainage. Mattress width and stone size depend on the amount of water that needs to pass through. In wetland settings, the mattress should be as wide as possible to allow slow lateral flow and avoid concentrating the outlet drainage. Mattress depth depends on stone size, depth

available, and desired drainage patterns.

• <u>Equipment</u>: Most mattresses can be installed easily with a backhoe and a truck to haul stone. CONSTRUCTION: Refer to numbered pictures on right. 1. Excavate the section of the road where the mattress will be located to desired depth. Lay heavy-duty separation fabric in the bottom of the area after excavation and leveling. Use bedding material if necessary to protect fabric. Leave enough fabric on the ends to wrap around and overlap with top fabric later. 2. Place large stone, typically R41, on top of the fabric and spread out into a uniform bed. Place a layer of smaller stone such as #3's on top of the R41. Be careful not to intermix the two stone sizes. The empty space between the large stones, and therefore flow capacity, will be reduced if the small stone is intermixed. Spread increasingly smaller stone on top to create layer that will not puncture fabric.

4. Wrap ends of lower fabric up on top of structure. Place a piece of fabric on the top if existing fabric does not completely cover mattress. All fabric "joints" should overlap by at least 18". 5. Place bedding material and fill over the mattress if necessary. Place driving surface aggregate (DSA) over the structure

according to normal program specifications and procedures. TYPICAL REQUIREMENTS: While these figures will vary with the size of structure and individual site conditions, here is what was required for the 20 x 12' x 1.5' mattress illustrated on the right:

3 Hours of work with a Case 580 Backhoe 20 tons of clean R4<sup>1</sup> rock (large rock)
 8 tons of clean #3<sup>1</sup> rock (small rock on top) 85 Square yards of heavy-duty geo-textile (fabric)
 Sufficient fill and driving surface aggregate over fabric

WETLAND CROSSING

FRENCH MATTRESS

(minimum of 6 inches recommended after compaction)

This publication is a salable in alternative media upon request. The Pennsylvaria State University is committed to the policy that all persons shall have equal access to programs, facilities, advisation, and employment without regard to personal characteristics and related to ability, performance, or qualification is determined by University policy or yet after offered in a personal pers



An underground water conseyance system consisting of a perforated conduit, such as page, judging the or a stone filled trench installed (seneath the ground to intercept and convey ground water (see Figure SD-1) To prevent sloping soils from becoming excessively wet causing sloughing. To improve the bearing capacity of soils.
 To reduce frost heaving of fine grained soils. . To prevent hydrostatic pressures from developing behind retaining walls, foundations or floor slabs and to . To lower water tables in vegetated waterways and diversions in order to maintain stable vegetative conditions Applicability Used in areas having a high water table where benefits of lowering or controlling groundwater or surface runoff are desired. . Where soil permeability is sufficient to permit installation of an effective and economically feasible system. West sort perfections is surricate to permit installation of an encure and economically restore system.
 Not infended for use within septic system setbacks, in areas of ground water pollution, or to drain inland wet lands or tidal wedlands without prior authorization.

Planning Considerations Subsurface drains are generally installed within a slope to lower the water table (see Figure SD-2).

Subsurface drainage systems are either relief drains or interceptor-drains (sometimes called currain drains) or a combination of both. Relief drains are used either to lower the water table in order to keep structures (e.g. basementa) dry or to improve the growth of vegetation. They are generally installed along a slope, drauming in the direction of the slope and are provided with a stable outlet. They can be installed in a parallel pattern, a hermigbone pattern, or a random pattern (see Figure en.3).

known ground water pollution. Design Criteria

The design and installation of subsurface drains shall be based on detailed surveys and investigations. Where fail the could cause damage to structures such as roadways,

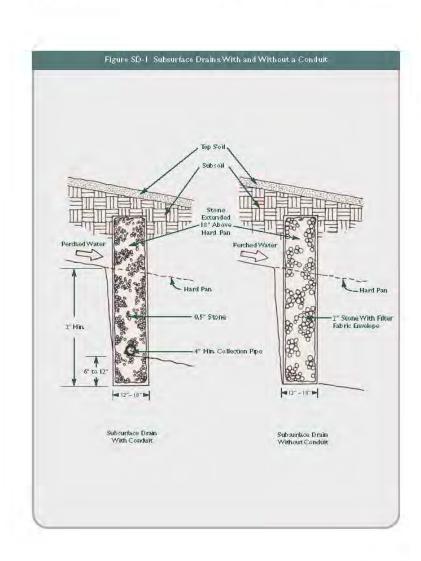
SD-3).

Interceptors are used to remove water as it seeps down a slope, to prevent the soil from becoming saturated and subject to slippage. They are installed across a slope and are provided with a stable outlet.

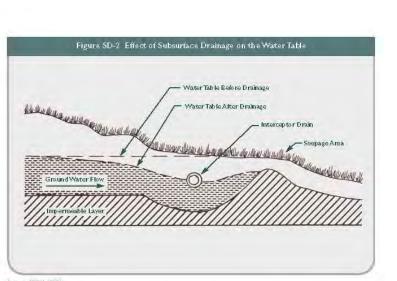
A lowering of the groundwater table through the installation of a subsurface drain may have legal implications in that it may devoter adjacent wetlands as well as affect the consent with consent when a provided with a conduct, the minimum size shall be 4" diameter. It a strong filled genetic without a conduct, the minimum size of the voids in the strong of the generating of the voids in the strong of the data shall be engineered. cations in that it may devote adjacent wellands as well as affect the property zights of adjacent owners. Damage may also occur at or near the point of discharge. Also, consolidation of soils and settlement of the soils and the structures they support can occur in some cases.

The design drawings and installation shall comply with applicable federal, state and local laws and regulations. The landowner or developer is responsible for

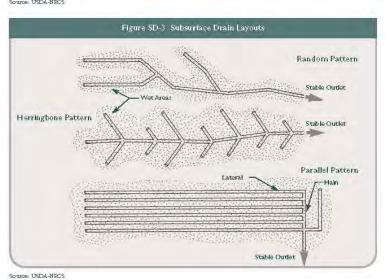
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(5-8-3)



5-8-4 2002 Connecticut Guidelines for Soil Erosion and Sediment Control SUB-SURFACE DRAIN

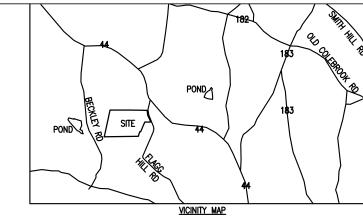
	POST-CON	STRUCTION BIORETE	NTION PONDS		
POND TYPE	POND NUMBER	"BOTTOM SIZE (FT)"	"DEPTH (FT)"	"TOP SIZE (FT)"	SIDE SLOPES
ATTENUATION POND	AP2	10 x 50	5.0000	30 x 70	2:1
ATTENUATION POND	AP2C	10 x 60	5.0000	30 x 80	2:1
BIORETENTION POND	BP1	10 x 35	5.0000	30 x 55	2:1
BIORETENTION POND	BP2	10 x 30	5.0000	30 x 50	2:1
BIORETENTION POND	BP2C	10 x 40	5.0000	30 x 60	2:1
BIORETENTION POND	BP3	10 x 40	5.0000	30 x 60	2:1
BIORETENTION POND	BP4	10 x 45	5.0000	30 x 65	2:1
BIORETENTION POND	BP5	10 x 40	5.0000	30 x 60	2:1
BIORETENTION POND	BP6	10 x 45	5.0000	30 x 65	2:1
FOREBAY POND	FB1	4 x 4	2.0000	12 x 12	2:1
FOREBAY POND	FB2	7 x 20	2.0000	15 x 28	2:1
FOREBAY POND	FB2C	4 x 8	2.0000	12 x 16	2:1
FOREBAY POND	FB3	4 x 8	2.0000	12 x 16	2:1
FOREBAY POND	FB4	4 x 4	2.0000	12 x 12	2:1
FOREBAY POND	FB5	4 x 8	2.0000	12 x 16	2:1
FOREBAY POND	FB6	4 x 8	2.0000	12 x 16	2:1

1. FINAL GRADING DETAILS FOR THE BIO-RETENTION PONDS WILL BE PROVIDED IN THE DEVELOPMENT AND MANAGEMENT PHASE OF THE PROJECT AND AFTER TOPOGRAPHIC SURVEY AND GEO-TECHNICAL INFORMATION IS AVAILABLE.

2. SIZES OF POST CONSTRUCTION BIO-RETENTION PONDS ARE SHOWN ABOVE.

3. FINAL DESIGN FOR THE CRANE ROAD AND ACCESS ROAD CROSS SECTIONS WILL BE COMPLETED DURING THE DEVELOPMENT AND MANAGEMENT PHASE OF THE PROJECT AND AFTER TOPOGRAPHIC SURVEY AND GEO-TECHNICAL INFORMATION IS AVAILABLE.

4. THE FRENCH MATTRESS FINAL DESIGN WILL BE COMPLETED DURING THE DEVELOPMENT AND MANAGEMENT PHASE OF THE PROJECT AND AFTER TOPOGRAPHIC SURVEY AND GEO-TECHNICAL INFORMATION IS AVAILABLE.



Energy

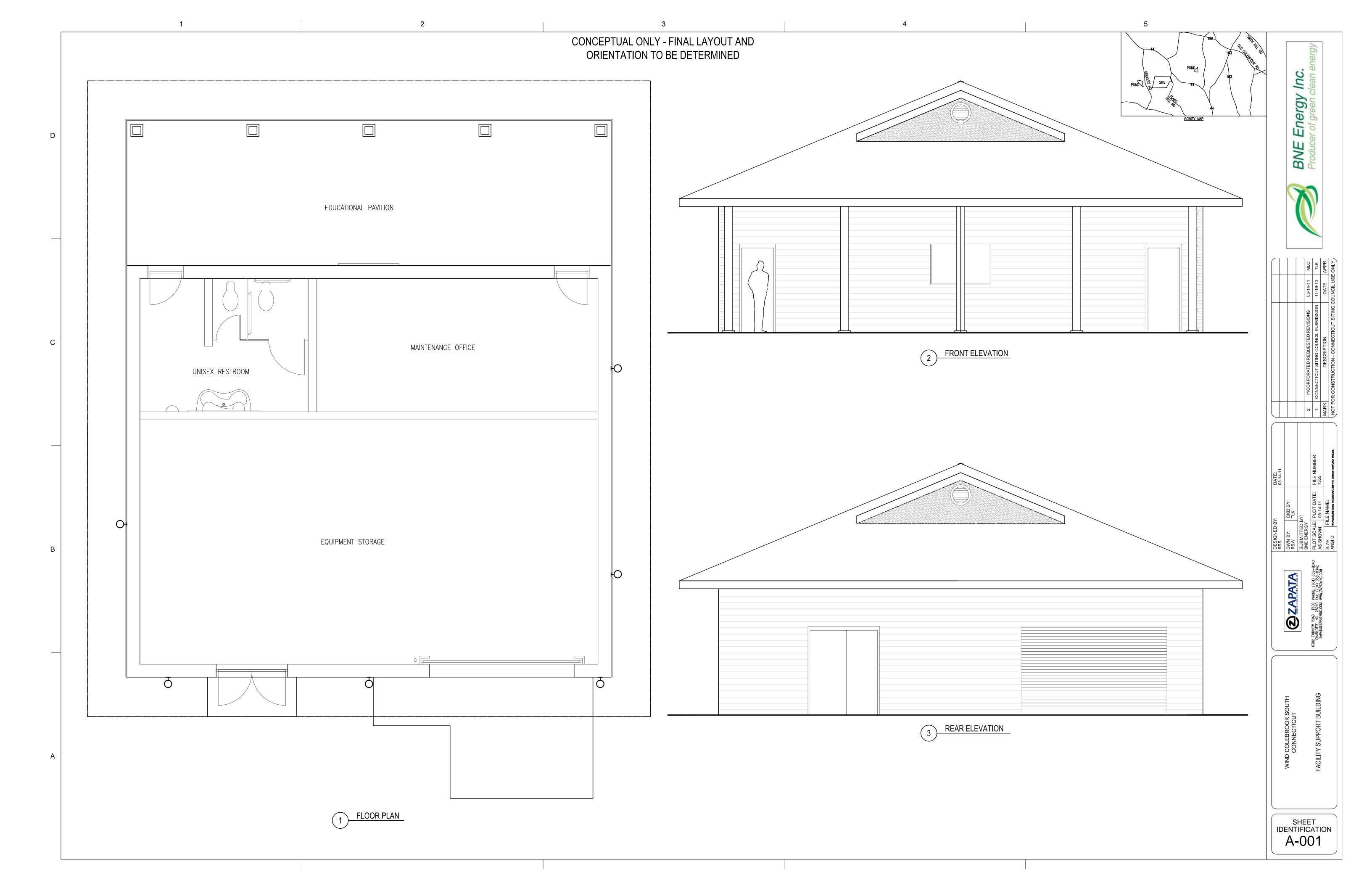


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MLC	03-14-11	INCORPORATED REQUESTED REVISIONS	2	

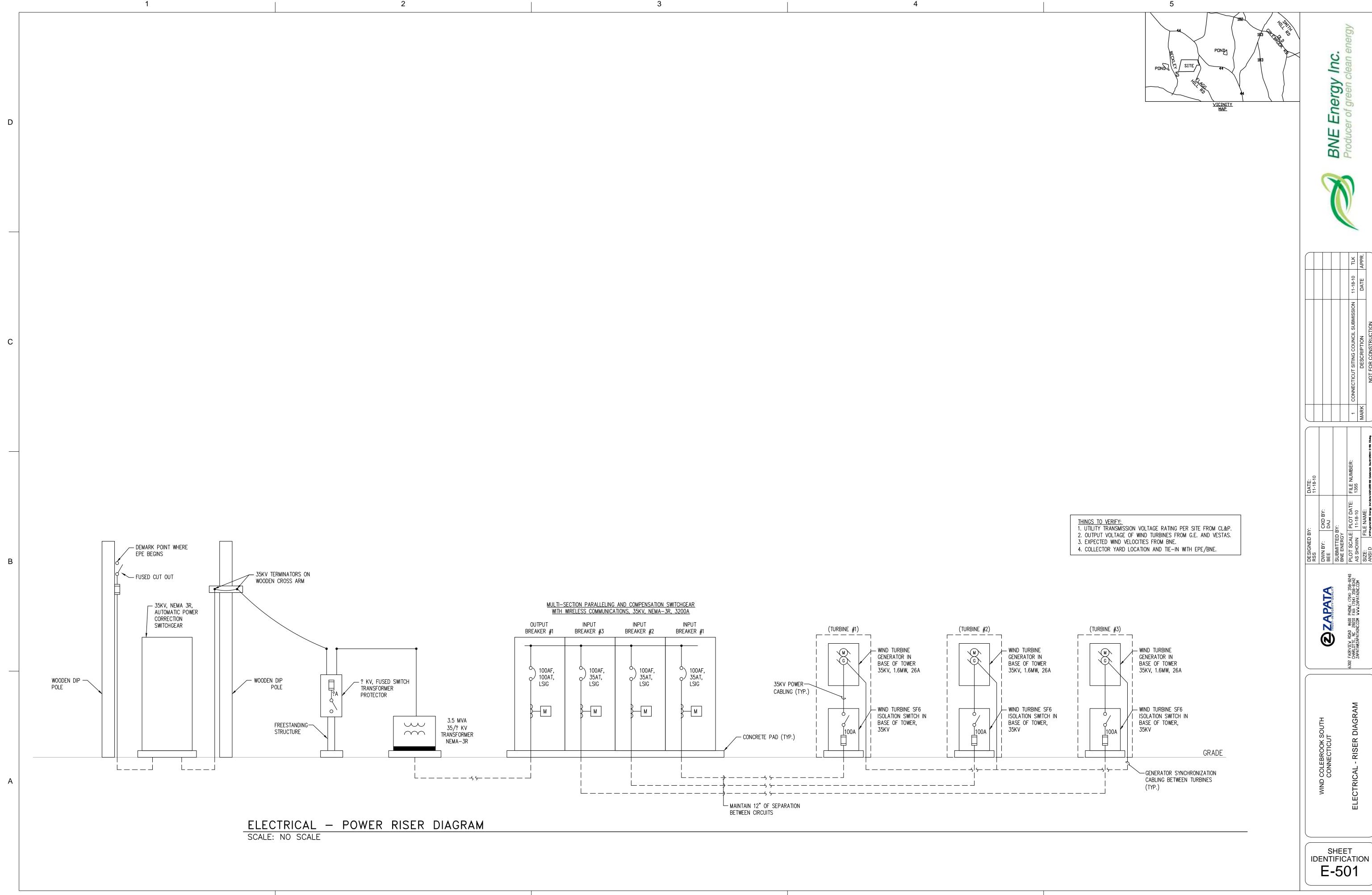
DATE: 03-14-

COLEBROOK CONNECTICU

SHEET **IDENTIFICATION** C-503







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