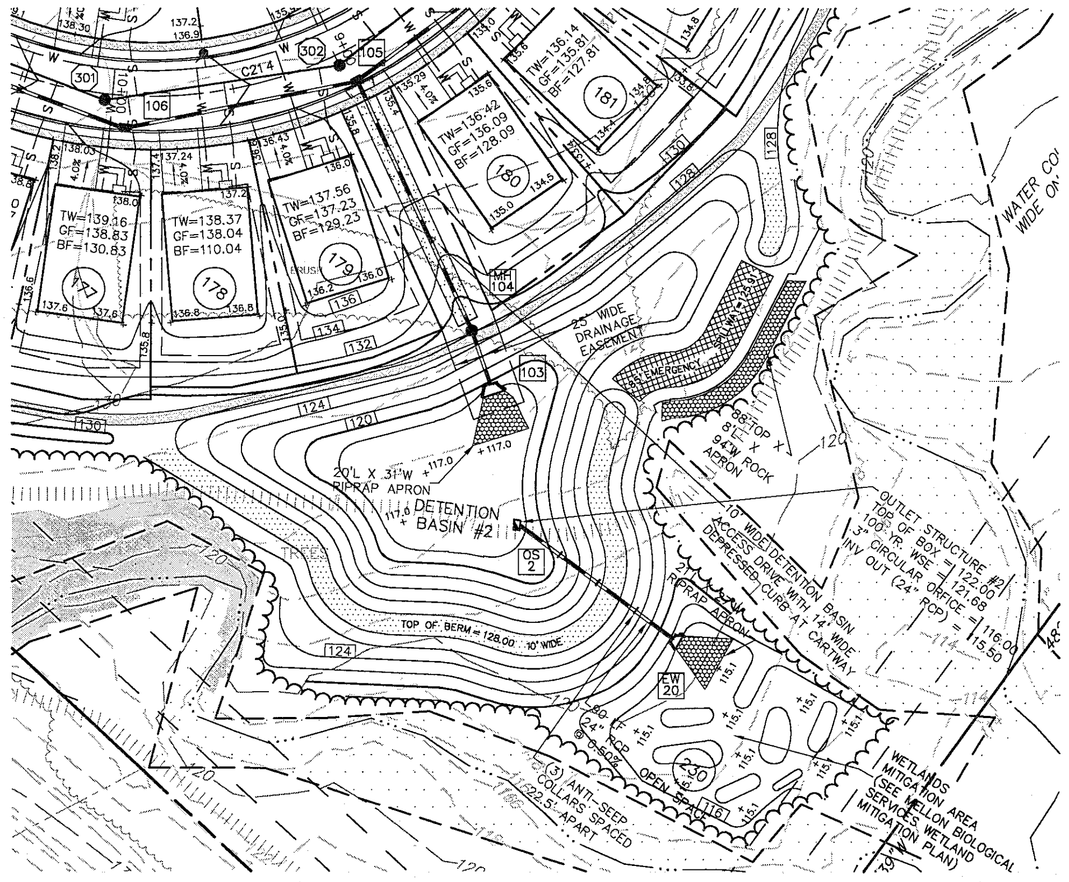
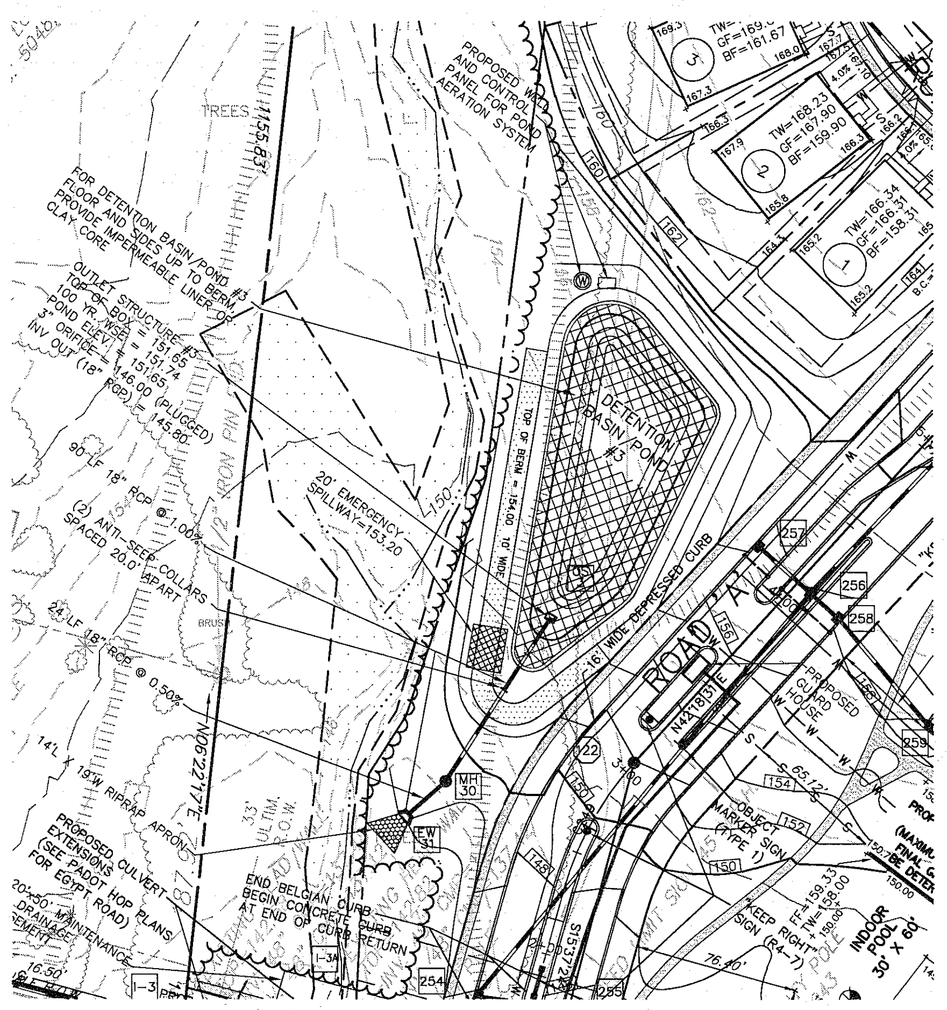


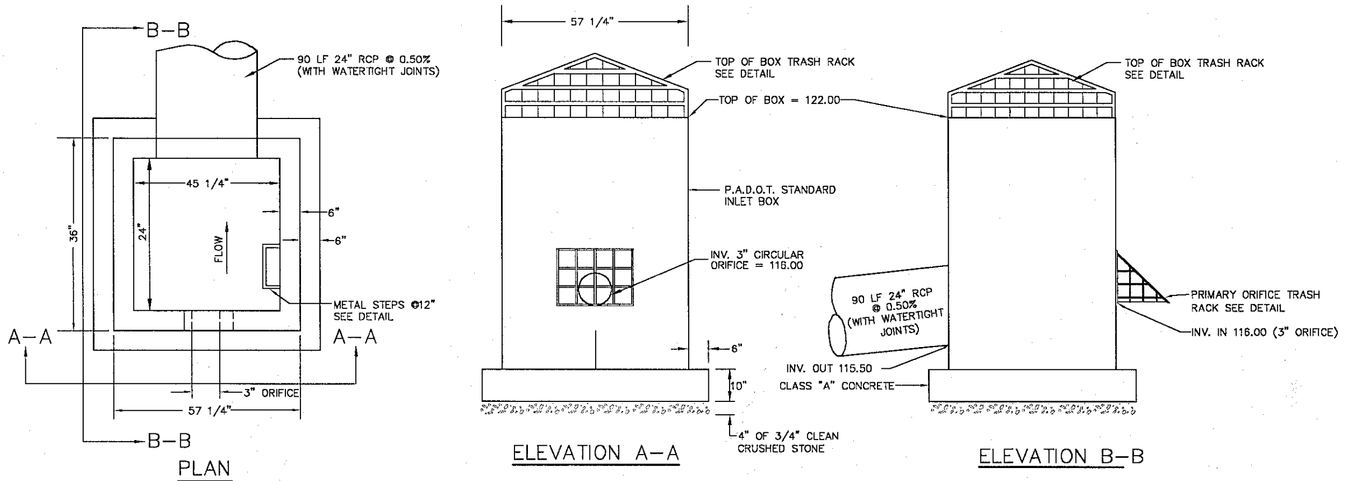
BASIN #2

SCALE: 1" = 50'



BASIN #3

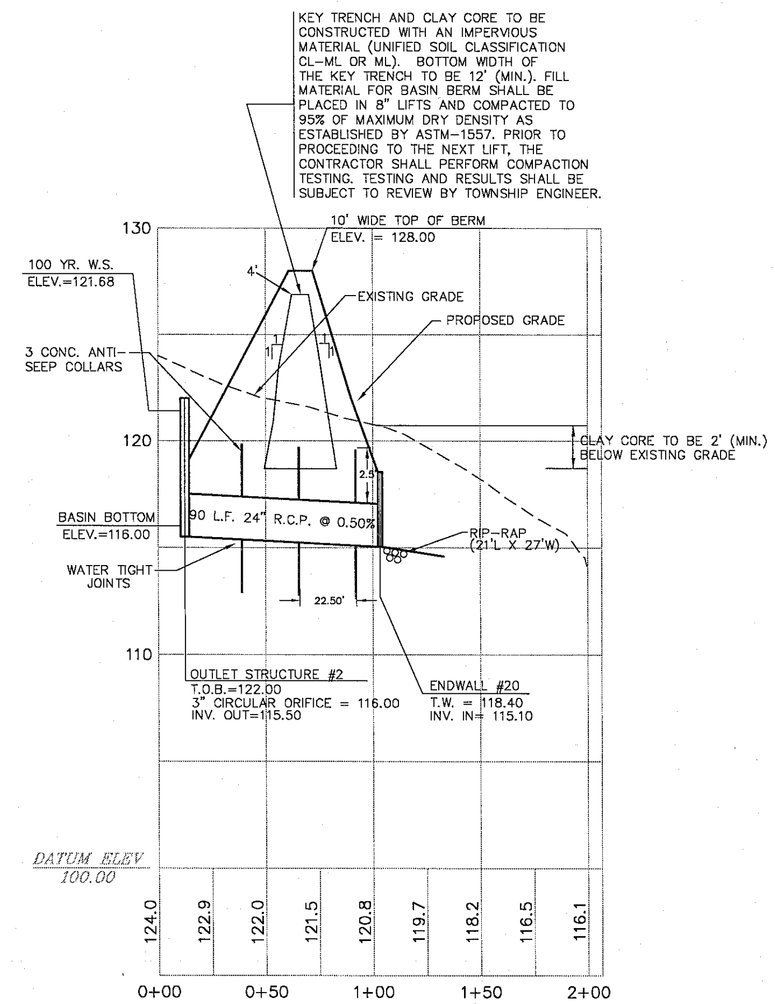
SCALE: 1" = 50'



NOTE
WATERTIGHT SEALS TO BE USED ON ALL JOINTS.

OUTLET STRUCTURE #2

N.T.S.



O.S. #2 TO E.W.#20

SCALE: HORIZ. 1"=50'
VERT. 1"=5'

WETLAND ELEMENTS

OVERVIEW

ESTABLISHING A WETLAND REQUIRES ESTABLISHING WETLAND HYDROLOGY THAT MAINTAINS APPROPRIATE VEGETATION AND MAKING SURE HEAVY RAIN EVENTS DO NOT DESTROY THE HABITAT PRIOR TO THE VEGETATION BECOMING ESTABLISHED

BASIN TOPOGRAPHY

THE BOTTOM OF THE BASIN WILL MIMIC THE BOTTOM OF A NATURAL WETLAND, WHICH IS ROUGH, IRREGULAR AND FLAT. THE BOTTOM WILL NOT BE FINE GRADED AND SMOOTH. RATHER, IT WILL BE HUMMOCKY AND POORLY GRADED. IT WILL HAVE LOW POOL AREAS AND HIGH DRY ISLANDS, MEANING SMALL POOLS OF WATER 6 TO 10 INCHES DEEP AND HIGH DRY ISLANDS THAT ARE 6 TO 10 INCHES ABOVE THE WATER LEVEL IN ADDITION, BUTS AND DEPRESSIONS WILL RUN PERDENDICULAR TO THE DIRECTION OF WATER FLOW THROUGH THE WETLANDS (SEE OVERHEAD VIEW BELOW). SINCE THE WATER SOURCE IS LIMITED TO RUNOFF FROM THE SITE, EVERY EFFORT WILL BE MADE TO RETAIN THE WATER IN THE WETLANDS AS LONG AS POSSIBLE DURING DROUGHTS AND THE WAY TO DO THIS INVOLVES SLOWING RUNOFF DURING RAIN EVENTS. THE BOTTOM OF THE BASIN WILL BE FLAT. THERE WILL BE NO ELEVATIONAL CHANGES BETWEEN THE INFLOW AND OUTFLOW. THERE WILL NOT BE ANY LOW-FLOW CHANNELS. THE LACK OF CHANNELS FROM THE INFLOW TO THE OUTFLOW WILL HELP MAINTAIN THE WATER LEVEL.

BASIN BOTTOM

THE BOTTOM OF THE WETLAND WILL HAVE AT LEAST TWELVE INCHES OF A TOPSOIL/WOODCHIP MIX THAT IS ROUGH GRADED WITH A MINIMUM OF COMPACTION. THE TOPSOIL/WOODCHIP MIX WILL BE APPROXIMATELY 2 PARTS TOPSOIL TO 1 PART FRESH WOOD CHIPS–NOT WEATHERED WOOD CHIPS. THE WOOD CHIPS AND TOPSOIL WILL BE THOROUGHLY MIXED PRIOR TO PLACEMENT IN THE BASIN. ONCE THE TOPSOIL/WOOD CHIP MIX HAS BEEN ROUGH GRADED IN THE BASIN, THE BASIN WILL BE SEEDED AND COVERED WITH BIOMATTING TO MINIMIZE EROSION.

TOPSOIL

THE PROPER TOPSOIL FOR THE WETLANDS IS AN IMPORTANT ELEMENT IN THE PROCESS.THE SOIL USED FOR THE WETLAND WILL BE HIGH IN ORGANIC MATTER AND HAVE ADEQUATE NUTRIENTS, WITHOUT HAVING TOO MUCH CLAY. IN ADDITION, THE SOIL WILL NOT COME FROM A SOURCE THAT HAS POPULATIONS OF INVASIVE SPECIES, SINCE THESE SPECIES CAN QUICKLY OVER RUN THE NEW WETLAND. THEREFORE, THE PROPOSED "TOPSOIL" WILL BE TESTED FOR NUTRIENTS AND ORGANIC MATTER AND THE LOCATION FROM WHICH THE SOIL IS ACQUIRED WILL BE EXAMINED FOR INVASIVE SPECIES. IF THE SOIL CHEMISTRY IS INADEQUATE OF IF INVASIVE SPECIES ARE PRESENT, THEN A NEW SOURCE OF TOPSOIL WILL BE REQUIRED.

OUTFLOW

ELEVATION CONTROLS WILL BE IMPLEMENTED TO ADJUST THE OUTFLOW SINCE FINAL GRADING WILL BE ROUGH AND SLUMPING OF THE SOIL COULD RENDER THE PROPOSED WATER TABLE INCORRECT: EITHER TOO HIGH OR TOO LOW. SINCE ELEVATIONAL DIFFERENCES OF A FEW INCHES CAN CHANGE THEENTIRE PLANTING CONFIGURATION, THE OUTFLOW UNIT WILL HAVE THE CAPABILITY OF CHANGING THE WATER TABLE TO THE PRECISE ELEVATION NEEDED AFTER THE SYSTEM STABILIZES. THIS MEANS MAINTAINING THE ABILITY TO CHANGE THE WATER LEVEL BY INCREMENTS OF NO LARGER THAN ONE INCH.

CONSTRUCTION SEQUENCE

MID–WINTER

DETERMINE SOURCE, EVALUATE AND ACQUIRE TOPSOIL
THE PROJECT WILL UTILIZE TOPSOIL FROM THE SAME GEOLOGIC FORMATION THAT CURRENTLY EXISTS ON SITE IF POSSIBLE, OR A SOIL WITH SIMILAR PH VALUES. THE ENGINEER WILL DETERMINE THE TOPSOIL NEEDS FOR THE SITE AND INVESTIGATE SOURCES. WELLON BIOLOGICAL SERVICE WILL ASSIST, WHEN POSSIBLE, AND DETERMINE THE APPROPRIATENESS OF THE SELECTED TOPSOIL. NOTE: SOIL TESTING TAKES A FEW WEEKS, SO THIS STEP SHOULD BE GIVEN PRIORITY.

SPECIES SELECTION

SPECIES WILL BE SELECTED BASED ON PROVIDING AN INTERESTING AND AESTHETIC HABITAT THAT IS RELATIVELY SELF–SUSTAINING WITH A MINIMUM OF MAINTENANCE, THE SPECIES' HABITAT REQUIREMENTS, THE AVAILABILITY OF LOCAL GENOTYPES AND COST.

LOCAL GENOTYPE REFERS TO THE GENETICS OF LOCAL POPULATIONS THAT HAVE EVOLVED TO COMPETE IN LOCAL CLIMATIC, SOIL AND HYDROLOGICAL CONDITIONS. PRELIMINARY SCIENTIFIC STUDIES INDICATE THAT LOCAL GENOTYPES ARE BETTER ABLE TO COMPETE IN LOCAL CONDITIONS THAN PLANTS BROUGHT IN FROM DISTANCE LOCATIONS THAT EVOLVED IN DIFFERENT CONDITIONS.

ORDER PLANTS AND SEEDS

PLANTS AND / OR SEEDS WILL BE DETERMINED AND ORDERED BY WELLON BIOLOGICAL SERVICES FOR THE CLIENT. THE CLIENT, NOT WELLON BIOLOGICAL SERVICES, WILL PAY FOR THE PLANTS, SEEDS, SHIPPING AND HANDLING. PLANTS AND SEEDS WILL BE PURCHASE LOCALLY WHEN POSSIBLE TO ASSURE GENOTYPES ADAPTED TO LOCAL CONDITIONS. PLANTS AND SEED SOURCES WILL BE LIMITED TO PIEDMONT AND RIDGE AND VALLEY WITHIN 100 MILES UNLESS CLEARED BY BY WELLON BIOLOGICAL SERVICES.

ORDER BIOMATTING

WELLON BIOLOGICAL SERVICES, IN CONJUNCTION WITH THE ENGINEER, WILL DETERMINE THE APPROPRIATE BIOMATS FOR THE PROJECT AND MAKE ARRANGEMENT FOR THEIR PURCHASE. THE CLIENT, NOT WELLON BIOLOGICAL SERVICES, WILL PAY FOR THE BIOMATS, ASSOCIATED HARDWARE, SHIPPING AND HANDLING.

APRIL

SOIL STOCKPILING

ALLTOPSOIL IN THE CONSTRUCTION AREA WILL BE STOCKPILED FOR REGRADING DURING FINAL GRADE, PROVIDED IT IS FREE OF DEBRIS, POLLUTANTS AND INVASIVE WEEDS. WELLON BIOLOGICAL SERVICES WILL EXAMINE THE AREAS TO BE USED FOR STOCKPILED TOPSOIL FOR INVASIVE WEEDS PRIOR TO ANY DISTURBANCE. THE ENGINEER WILL KEEP WBS INFORMED AS TO THE AREAS TO BE UTILIZED AND THE SCHEDULE OF WORK.

RECEIVE AND STORE PLANTS AND SEEDS

ALL PLANTS AND SEEDS WILL BE DELIVERED TO THE SITE FOR STORAGE UNTIL PLANTING AND SEEDING TAKE PLACE.

SEEDS WILL BE STORED IN A COOL DRY ENVIRONMENT THAT IS SAFE FROM RODENTS AND INSECTS.

PLANTS WILL BE WATERED REGULARLY, BUT NOT SOPPING WET FOR EXTENDED PERIODS THE SOIL WILL BE SLIGHTLY MOIST.

PREPARE NATURAL HABITATS

FINAL GRADE
WELLON BIOLOGICAL SERVICES WILL BE CALLED FOR FIELD MEETING PRIOR TO STARTING THE FINAL GRADE.
THE FINAL GRADE WILL BE CONSTRUCTED ALLOWING AT LEAST SIX INCHES FOR A LAYER OF TOPSOIL WHICH WILL BE SPREAD ON TOP OF THE SCARIFIED SUBSOIL AT FINAL GRADE (THIS DOES NOT INCLUDE THE STREAM BOTTOM). CARE WILL BE TAKEN TO AVOID UNNECESSARY COMPACTION OF THE SUBSOIL AND ESPECIALLY THE TOPSOIL. THE FINAL GRADE WILL NOT BE SMOOTHED OUT LIKE A LAWN. FINAL GRADE OF THE TOPSOIL WILL BE ROUGH AND MINIMALLY COMPACTED. THE USE OF RELATIVELY LIGHT SMALL EQUIPMENT IS PREFERABLE. TIRE MARKS AND RUTS WILL BE PERPENDICULAR TO THE GRADE TO DISCOURAGE EROSION.

FINAL GRADE WILL BE COMPLETED IN THE SECOND OR THIRD WEEK IN APRIL NOTE: THE DATES IN THIS REPORT REPRESENT THE IDEAL DATES, WHICH GENERALLY WILL RESULT IN THE BEST RESULTS. HOWEVER, SEEDING AND PLANTING CAN CONTINUE INTO THE SUMMER, WITH DIMINISHING SUCCESS. FALL SEEDING AND PLANTING IS ALSO POSSIBLE, BUT PREFERABLY AVOIDED.

SEEDING

PROCEDURE
SEEDING WILL BE COMPLETED BY WELLON BIOLOGICAL SERVICES, WHILE PLANTING, IF NEEDED, WILL BE SUPERVISED BY WELLON BIOLOGICAL SERVICES BUT COMPLETED BY THE CONTRACTOR OR OTHER ENTITY.
SEEDING WILL OCCUR SHORTLY BEFORE PLANTING, WHICH SHOULD BE AS SOON AFTER APRIL 20 AS POSSIBLE. SEED WILL BE HAND CAST, BEFORE THE BIOMAT IS INSTALLED. SEED WILL DISTRIBUTED IN 90 DEGREE DIRECTIONS FOR MORE EVEN DISTRIBUTION. THE AREA WILL BE "TRACKED" WITH A LAWN TRACTOR OR OTHER LIGHT VEHICLE. MAKING SURE ALL AREAS ARE HIT.

SPECIES COMPOSITION
SPECIES COMPOSITION, BASED ON INTEREST AND AESTHETICS WITH MINIMUM MAINTENANCE, WILL BE DETERMINED BY AVAILABILITY AND COST.

FERTILIZERS

NO FERTILIZERS SHALL BE USED ON ANY OF THE NATIVE PLANT HABITATS WITHOUT THE WRITTEN CONSENT OF WELLON BIOLOGICAL SERVICES.

INSTALL BIOMATTING

BIOMATTING WILL BE INSTALLED ON ALL AREAS IN THE BASIN IMMEDIATELY AFTER SEEDING.

PLANTING

PERENNIALS AND WOODY PLANTS WILL BE PLANTED DIRECTLY THROUGH THE BIOMAT.

INSTALL CONSTRUCTION FENCING

ONCE THE SEEDING AND / OR PLANTING HAS BEEN COMPLETED, CONSTRUCTION FENCE SHALL BE INSTALLED AROUND THE PERIMETER OF ALL CREATED NATURAL LANDSCAPES TO PREVENT INTRUSION BY EQUIPMENT.

SUMMER AND FALL

MAINTENANCE

WATERING
WATERING IS CRITICAL TO THE SURVIVAL OF SEEDLINGS AND YOUNG PLANTS. THEREFORE, SOMEONE WILL BE RESPONSIBLE, ON A DAILY BASIS, FOR DETERMINING WHEN WATERING IS NECESSARY AND ASSURING THAT APPROPRIATE WATERING IS COMPLETED. SOILS IN THE PROJECT AREA WILL NOT BE PERMITTED TO DRY OUT IN THE TOP TWO INCHES, ESPECIALLY DURING SEED GERMINATION. REGULAR WATERING DURING THE FIRST THREE MONTHS (IF NEEDED) WILL GREATLY INCREASE THE SUCCESS RATE OF THE PLANTS.

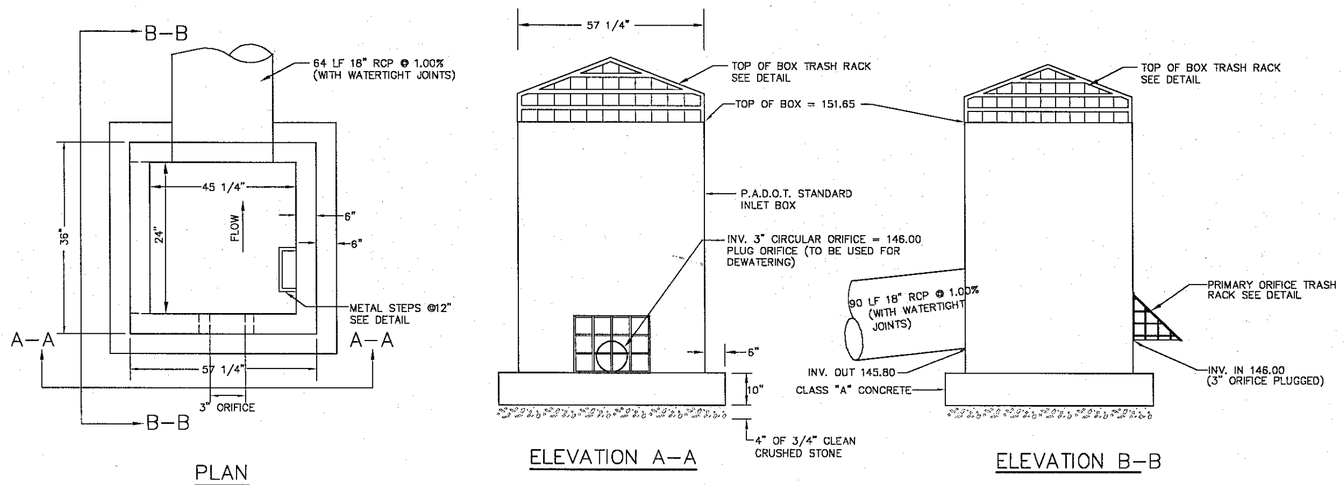
HERBIVORY PREVENTION (ANIMALS EATING PLANTS)
HERBIVORES CAN BE A MAJOR PROBLEM DURING THE EARLY STAGES OF ESTABLISHING A NATURE HABITAT. GEESE, RABBITS, WOODCHUCKS AND DEER CAN CREATE CONSIDERABLE DAMAGE TO NEWLY PLANTED OR SEEDED VEGETATION. THEREFORE, CONSTANT MONITORING OF THE VEGETATION AND THE HABITATS WILL BE REQUIRED TO QUICKLY ADDRESS ANY HERBIVORY PROBLEMS. WELLON BIOLOGICAL SERVICES SHOULD BE CONTACTED IMMEDIATELY CONCERNING ANY HERBIVORY PROBLEMS.

SUCCESSIVE YEARS

MONITORING

SEMIANNUAL MONITORING IS REQUIRED FOR THE FIRST TWO YEARS AND ANNUAL MONITORING FOR THE NEXT THREE YEARS. FINAL CLEARANCE FROM MONITORING IS DEPENDENT ON ESTABLISHING A SUCCESSFUL WETLANDS, WHICH TYPICALLY IS DEPENDENT ON ESTABLISHING ADEQUATE HYDROLOGY FOR THE WETLANDS.

EQUIPMENT, SKILLS AND PERSONNEL NEEDED
1. FACILITIES TO RECEIVE AND HOLD DELIVERED PLANTS – SHADED AREA PROTECTED FROM WIND AND FROST AND CAPABLE OF BEING WATERED.
2. MANUAL LABOR AS NEEDED.
3. MAY NEED REGISTERED SPRAYERS FOR ROUNDUP.
4. NEED TRACTOR FOR "TRACKING" THE SEED.
5. PLANTING PLANTS AS DIRECTED.
6. ABILITY TO SIFT TOPSOIL FOR COVERING SEED.
7. ABILITY TO WATER AS NEEDED.



NOTE
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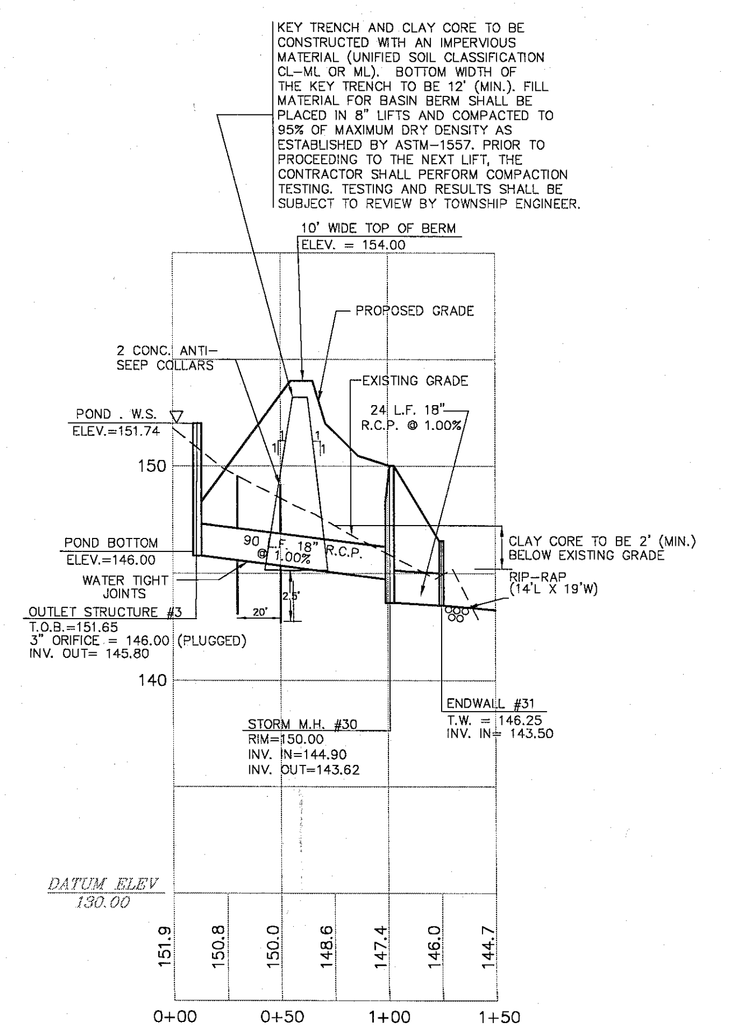
OUTLET STRUCTURE #3

N.T.S.



O.S. #3 TO E.W.#31

SCALE: HORIZ. 1"=50'
VERT. 1"=5'

EASTERN STATES ENGINEERING
CIVIL ENGINEERS · LAND SURVEYORS · LANDSCAPE ARCHITECTS · LAND PLANNERS
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HORSHAM, PA 19044
TEL: (215) 914-2050
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JAMES D. TAKACS

REV.	DATE.	DRAWN
4	1/31/05	FINAL CONSTRUCTION DRAWINGS
3	9/04/04	AGENCY REVIEW LETTER DATED 7/29/04
2	6/23/04	AGENCY REVIEW LETTERS, TOWNSHIP COMMENTS
1	4/20/04	AGENCY REVIEW LETTERS