

**ITEM 870 - SEEDING AND MULCHING**

THE FOLLOWING QUANTITIES ARE PROVIDED TO PROMOTE GROWTH AND CARE OF PERMANENT SEEDED AREAS:

870, PLACING TOPSOIL	1000 CU. YD.	
870, REPAIR SEEDING AND MULCHING		1200 SQ. YD.
870, INTER-SEEDING	1200 SQ. YD.	
870, AGRICULTURAL LIME	10.00 TON	
870, COMMERCIAL FERTILIZER	3.31 TON	
870, SOIL ANALYSIS TEST	2 EACH	
870, WATER	66 MGAL	

SEEDING AND MULCHING SHALL BE APPLIED TO ALL AREAS OF EXPOSED SOIL BETWEEN THE RIGHT-OF-WAY LINES, AND WITHIN THE CONSTRUCTION LIMITS FOR AREAS OUTSIDE THE RIGHT-OF-WAY LINES COVERED BY WORK AGREEMENT OR SLOPE EASEMENT. QUANTITY CALCULATIONS FOR SEEDING AND MULCHING, ARE BASED ON THESE LIMITS.

THE CONTRACTOR IS REQUIRED TO ESTABLISH A GOOD STAND OF GRASS OF UNIFORM COLOR AND DENSITY TO THE SATISFACTION OF THE ENGINEER.

**ITEM 670 - DITCH EROSION PROTECTION, TYPE 1, AS PER PLAN**

DESCRIPTION. THE WORK SHALL CONSIST OF FURNISHING, PLACING AND MAINTAINING SEEDING AND EROSION CONTROL WITH TURF REINFORCING MAT ON AREAS SHOWN ON THE PLANS.

MATERIALS. EROSION CONTROL WITH TURF REINFORCING MAT TYPE 1 AND TYPE 2 SHALL BE A FLEXIBLE MAT OF PERMANENT, POLYMER MONOFILAMENTS BONDED TOGETHER TO FORM A STABLE THREE-DIMENSIONAL WEB. STRAW, COCONUT FIBER OR OTHER BIODEGRADABLE MATERIALS MAY BE INTERTWINED WITH THE PERMANENT COMPONENT OF THE MAT.

TYPE 3 SHALL BE A MAT COMPOSED OF A PERMANENT MATRIX OF POLYMER MONOFILAMENT YARNS WOVEN INTO A UNIFORM CONFIGURATION OF THREE-DIMENSIONAL PROJECTIONS, OR RANDOMLY ORIENTED MONOFILAMENT YARNS FUSED TOGETHER AT CROSSOVER POINTS, AND ENTANGLED WITH HIGH TENACITY GEOGRID OR STEEL WIRE MESH. THE MAT MUST EXHIBIT HIGH INTERLOCK AND REINFORCEMENT CAPACITY WITH BOTH THE SOIL AND ROOT SYSTEM. STRAW, COCONUT FIBER OR OTHER BIODEGRADABLE MATERIALS MAY BE INTERTWINED WITH THE PERMANENT COMPONENT OF THE MAT.

THE PERMANENT COMPONENT OF ALL MAT TYPES SHALL BE MANUFACTURED FROM 100% NON-BIODEGRADABLE MATERIALS, AND SHALL BE PERMEABLE, RESISTANT TO CHEMICAL, ENVIRONMENTAL AND ULTRAVIOLET DEGRADATION.

THE PERMANENT COMPONENT OF THE MAT SHALL HAVE THE FOLLOWING MINIMUM AVERAGE ROLL VALUES (MARV) FOR PHYSICAL PROPERTIES:

PROPERTY	TEST METHOD	TYPE 1	TYPE 2	TYPE 3
POROSITY (PERCENT, MAXIMUM)	CALCULATED	95	95	95
GROUND COVER FACTOR <sup>2</sup> (PERCENT, MINIMUM)	ECTC TEST METHOD 18	60	70	75
MASS PER UNIT AREA (G/M <sup>2</sup> )	ASTM D 5261	270	340	475
THICKNESS (MM, MINIMUM)	ASTM D 1777, AT 200 PA	3.05	12.7	12.7
WIDE WIDTH TENSILE STRENGTH <sup>1</sup> (KN/M, MINIMUM)	ASTM D 4595	N/A	N/A	46.0 X 33.0

WIDE WIDTH TENSILE STRENGTH<sup>1</sup> @ 10% ELONGATION (KN/M, MINIMUM)      ASTM D 4595      N/A      N/A      27.0 X 23.0

TENSILE STRENGTH<sup>1</sup> (KN/M, MINIMUM)      ASTM D 5035      2.1 X 1.6      2.4 X 1.8      N/A

TENSILE STRENGTH<sup>1</sup> @ 10% ELONGATION (KN/M, MINIMUM)      ASTM D 5035      1.4 X 1.1      1.5 X 1.3      N/A

ULTRAVIOLET RESISTANCE (PERCENT, MINIMUM)      ASTM D 4355, 1000 HOURS TOTAL EXPOSURE      80      80      80

1 MACHINE DIRECTION X CROSS DIRECTION  
2 IF PROVIDED, THE BIODEGRADABLE PORTION OF THE MAT SHALL BE INCLUDED IN THE TEST

TESTING FOR PHYSICAL PROPERTIES SHALL BE PERFORMED AT FREQUENCIES EXCEEDING ASTM D 4354, PROCEDURE B, WITH A LOT DEFINED AS THE LESSER OF THE MANUFACTURER'S PLANNED PRODUCTION QUANTITY AND ONE CALENDER DAY'S PRODUCTION.

THE MAT SHALL MEET THE FOLLOWING MAXIMUM PERMISSIBLE DESIGN VALUES, WITH A MAXIMUM OF 25 MM OF SOIL LOSS. TESTING SHALL BE BASED ON SHORT-TERM (0.5 HOUR), UNVEGETATED DATA OBTAINED IN AN INDEPENDENT HYDRAULICS TESTING FACILITY ON AN ERODIBLE SOIL BED OF SAND OR FIRM LOAM.

DESIGN PROPERTY	TYPE 1	TYPE 2	TYPE 3
VELOCITY RESISTANCE (M/SEC, MINIMUM)	2.5	4	5.5
SHEAR STRESS RESISTANCE (N/M <sup>2</sup> , MINIMUM)	140 N/M <sup>2</sup>	260 N/M <sup>2</sup>	380 N/M <sup>2</sup>

THE MAT SHALL BE FREE OF ANY TREATMENT WHICH MIGHT SIGNIFICANTLY ALTER ITS PHYSICAL PROPERTIES. DURING SHIPMENT AND STORAGE, THE MAT SHALL BE WRAPPED IN A HEAVY-DUTY COVERING TO PROTECT IT FROM DIRECT SUNLIGHT, DIRT, DUST AND OTHER DEBRIS.

FASTENERS SHALL BE AS PER 667.02. 450 MM PINS, 4.5 MM DIAMETER, WITH ATTACHED 38 MM WASHER MAY BE USED IN LIEU OF WIRE STAPLES. PINS SHALL BE DRIVEN ONLY UNTIL THE ATTACHED WASHER IS FLUSH WITH THE GROUND SURFACE.

THE MANUFACTURER SHALL SUBMIT CERTIFIED TEST DATA TO COVER EACH SHIPMENT OF MATERIAL DELIVERED TO THE JOB SITE.

THE MANUFACTURER SHALL SUPPLY RECOMMENDED INSTALLATION PROCEDURES WITH EACH ROLL OF MAT DELIVERED TO THE JOB SITE.

CONSTRUCTION. PRIOR TO PLACEMENT OF THE MAT, THE AREA TO BE COVERED SHALL BE PREPARED AND SEEDED IN ACCORDANCE WITH 659, WITH THE FOLLOWING EXCEPTIONS:

1. THE SURFACE SHALL BE FREE OF ROCK, CLODS AND FOREIGN MATERIAL 38 MM OR GREATER IN SIZE.
2. NO MULCH SHALL BE APPLIED PRIOR TO PLACEMENT OF THE MAT.

EROSION CONTROL WITH REVEGETATION MAT SHALL BE PLACED IN ACCORDANCE WITH 667.03, WITH THE FOLLOWING EXCEPTION:

1. BEGIN INSTALLATION AT THE DOWNSTREAM TERMINAL END TRENCH 300 MM DEEP BY 150 MM WIDE. PLACE MAT IN BOTTOM OF TRENCH WITH ROLL OF MATERIAL ON DOWNSTREAM SIDE OF THE TRENCH. AFTER PINNING MAT SECURELY IN BOTTOM OF TRENCH, BACKFILL THE TRENCH AND COMPACT FIRMLY. ROLL MAT ACROSS BACKFILL AND UPSTREAM.
2. UPSTREAM TERMINATION SHALL BE MADE BY ROLLING MAT THROUGH THE TERMINAL END TRENCH, 300 MM BY 150 MM, BEING SURE TO ALLOW SUFFICIENT AMOUNT OF MAT TO COVER BACKFILLED TRENCH. AFTER PINNING MAT IN BOTTOM OF TRENCH, BACKFILL THE TRENCH AND COMPACT FIRMLY. ROLL REMAINING MAT BACK DOWNSTREAM ACROSS BACKFILL AND PIN IN PLACE.
3. TOP CHANNEL BANK TERMINATION SHALL BE MADE BY ROLLING MAT THROUGH THE TOP ANCHOR TRENCH, 300 MM BY 150 MM, BEING SURE TO ALLOW SUFFICIENT AMOUNT OF MAT TO COVER BACKFILLED TRENCH. AFTER PINNING MAT IN BOTTOM OF TRENCH, BACKFILL THE TRENCH AND COMPACT FIRMLY.

FOR TYPE 2 AND TYPE 3 TURF REINFORCING MATS, AFTER INSTALLATION OF THE MAT, THE AREA SHALL BE RE-SEEDED WITH THE MIXTURE AND AT THE RATE AS SPECIFIED IN 659.09 OR ON THE PLANS. THE MAT SHALL THEN BE SOIL FILLED BY RAKING AND SMOOTHING FINE TOPSOIL INTO THE TURF REINFORCING MAT TO COMPLETELY FILL ITS THICKNESS. EXCESSIVE SOIL ABOVE THE MATTING SHALL NOT BE PERMITTED.

MAINTENANCE. THE AREA COVERED BY SEEDING AND EROSION CONTROL WITH TURF REINFORCING MAT SHALL BE MAINTAINED IN ACCORDANCE WITH 667.04.

METHOD OF MEASUREMENT. MEASUREMENT OF THE SEEDING AND EROSION CONTROL WITH TURF REINFORCING MAT SHALL BE THE NUMBER OF SQUARE YARDS OF AREA, COMPLETED AND ACCEPTED.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT UNIT PRICE FOR ITEM 670 - DITCH EROSION PROTECTION, TYPE 1, AS PER PLAN. THE LIMING AND FERTILIZING REQUIRED ON THE AREA COVERED BY SEEDING AND EROSION CONTROL WITH TURF REINFORCING MAT WILL BE PAID FOR UNDER 659.