

Location in Michigan

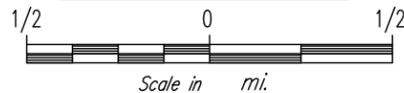
Site Address
2044 126th Avenue
Hopkins, MI 49328

BENCHMARK DESCRIPTION(S)

T.B.M.# 1 Top of concrete pad north side of barn on east end of concrete pad

Elev. 100

LOCATION MAP



NOTES

- The landowner/operator agrees to operate and maintain the practices shown in these plans in accordance with the attached operation and maintenance plan.
- The landowner/operator is responsible for obtaining and complying with all permits and easements. This includes all federal, state and local permits.
- The landowner/operator is responsible for checking and complying with all local ordinances that may affect the project.
- MISS DIG (1-800-482-7171) must be contacted at least 3 working days before construction begins if: (1) the construction equipment will not be able to maintain at least a 10 foot clearance from any overhead electric lines within the work area, or (2) the construction activities involve any excavation, drilling or boring operations, or discharge of explosives in or adjacent to a street, highway, other public place, in a private easement for a public utility, or near the location of utility facilities.
MISS DIG REFERENCE NUMBER: _____ DATE: _____
- For sites where MISS DIG must be contacted, the landowner/operator is responsible to ensure that the excavator/contractor contacts MISS DIG. The excavator/contractor must be able to provide the MISS DIG ticket number within 24 hours upon request by the NRCS inspector.
- The landowner/operator is responsible for locating any buried utilities (water lines, electric lines, telephone lines, gas lines, sewer lines, etc.) in the work area that are not covered by the MISS DIG program.
- NRCS makes no representation of the existence or nonexistence of utilities. The presence or absence of utilities on the construction drawings does not assure that there are or are not utilities in the work area.
- For sites where MISS DIG must be contacted, the landowner/operator is responsible to inform the excavator/contractor of their responsibilities by providing them a copy of the cover sheet. The excavator/contractor must sign the cover sheet acknowledging that they understand their responsibilities and the landowner/operator must return the signed cover sheet to the NRCS employee or office providing assistance. If requested by NRCS, the landowner/operator shall arrange for a meeting between the contractor and NRCS to review the construction drawings and specifications prior to construction.
- The excavator/contractor is responsible for knowing and following the appropriate safety standards required by the Michigan Occupational Safety and Health Act.
- Hard hats must be worn by anyone on the site who may be exposed to falling objects or flying debris, and anyone within the operating range of overhead construction equipment. Overhead construction equipment includes, but is not limited to backhoes, cranes, draglines and front-end loaders. Equipment operators within enclosed cabs and individuals in enclosed vehicles are not required to wear hard hats.
- The landowner/operator shall notify the local NRCS representative if cultural resources, such as archaeological or historical artifacts, are discovered during construction. All work that might affect the cultural resources will be stopped until advice for proceeding is received from the responsible NRCS official.
- If human remains are identified in the area of work during the installation of an NRCS-assisted conservation practice, all activities deemed likely to damage the remains will cease and the following steps will be taken:
 - NRCS field personnel will contact the Michigan State Police and/or the County Sheriff to determine whether the remains are part of an ongoing investigation.
 - NRCS field personnel will contact the Michigan NRCS Cultural Resources Coordinator (NRCS-CRC). The NRCS-CRC will contact the Michigan State Historic Preservation Officer (SHPO) and, where appropriate, request NRCS Archaeological Survey assistance. Consultation among the aforementioned shall determine the cultural affiliation and associated cultural features of the remains. If the remains are determined to be Native American, the NRCS-CRC will contact the Michigan Anishinaabek Cultural Preservation and Repatriation Alliance (MACPRA) to assist in the development of the appropriate treatment plan for the burial of remains and funerary objects.
 - NRCS field personnel and the cooperating landowner will take appropriate measures, such as erecting protective fences or barriers, to protect the remains until the plan for treating the remains is implemented. Construction activities at the site may recommence only after NRCS staff and the appropriate authorities agree that the plan for treating the remains has been properly implemented.
- The landowner/operator shall notify the local NRCS representative at least one week prior to when construction is to start, and at the times specified by NRCS. Telephone number 269-941-6164
- Any deviation from these construction drawings and specifications without written approval from NRCS may result in this practice not meeting NRCS standards and specifications and the withdrawal of technical and/or financial assistance for this practice.

These construction drawings and specifications have been reviewed and all parties understand what is required. (signatures)

Landowner/Operator: _____
Excavator/Contractor: _____
Certified Storm Water Operator: _____
NRCS Representative: _____

"AS BUILT"

CPS: _____ CIN: _____
Inspected By: _____
Date: _____ Units Installed: _____
The above practice meets NRCS standards & specifications
Approved By: _____

SPECIFICATIONS

SPEC NO.	TITLE
MI - 150	Site Preparation
MI - 152	Excavation
MI - 154	Earthfill
MI - 165	Geotextile
MI - 166	Seeding

Operations and Maintenance

TITLE
Access Road

TABLE OF ESTIMATED QUANTITIES

ITEM	UNIT	AMOUNT
Access Road	Ln Ft	73.75
Excavation	CY	30
Earthfill	CY	25
Aggregate	CY	36
Nonwoven Class IV Geotextile	SQyd	145
Seeding	SQft	400

INDEX OF SHEETS

SHEET	TITLE
1	Cover Sheet
2	Roles and Responsibilities
3	Plan View and Cross Section



Three full working days before you dig, call the MISS DIG System at **811 or 800-482-7171**

MICHIGAN ENGINEERING STANDARD DRAWING			
FILE NAME	MI-000-B	06-05.dwg	
STANDARD DWG. NO.	MI-000-B		
DATE	06-05	SHEET 1	OF 1

Designed	AMChavez	Date	1/2020
Drawn	AMChavez		1/2020
Checked	BTalsma		1/14/2020
Approved	AMChavez		1/15/2020

Gun Lake Tribe Access Road
Allegan Co., Michigan
Hopkins Township, T. 3N-R. 12W, Sec. 32
ENGINEERING JOB CLASS 1



File Name	GunLakeTribeAccessRoadFinal.dwg
Drawing Name	Coversheet
Sheet	1 of 3

ROLES AND RESPONSIBILITIES DURING CONSTRUCTION

LANDOWNER RESPONSIBILITIES

- 1) Host a pre-construction conference (site showing).
- 2) May serve as general contractor.
- 3) Obtain all required permits.
- 4) Notify NRCS before starting construction. Keep agency informed of progress.
- 5) Notify utility companies about construction (MISS DIG). Notify contractor of utility location.
- 6) Follow all federal, state, and local laws, zoning regulations.
- 7) Be available for consultation and decision.
- 8) Hire competent contractors.
- 9) Authorize contractor to start work after obtaining NRCS approved drawings and specifications.
- 10) Protect cultural and historic resources.
- 11) Alert NRCS and contractor to any livestock disease issues requiring biosecurity measures to be followed. Provide guidance on required sanitation procedures.
- 12) Assure compliance with drawing and specification requirements.
- 13) Stop work of contractor, when justified for safety issues or where contractor is not meeting contract requirements.
- 14) Seed and fence as required.
- 15) Pay bills and submit copies of receipts to NRCS as required.

CONTRACTOR RESPONSIBILITIES

- 1) Participate in the pre-construction conference.
- 2) Inform landowner of planned construction schedule.
- 3) Provide adequate notice to NRCS before starting the job.
- 4) Protect all NRCS survey benchmarks from damage. Keep NRCS informed of progress.
- 5) Inform landowner and NRCS when unexpected site conditions are encountered.
- 6) Avoid unnecessary destruction of NRCS layout survey staking and flagging.
- 7) Perform necessary layout staking, flagging, and measurements beyond basics provided by NRCS.
- 8) It is the contractor's responsibility to maintain quality control.
- 9) Protect cultural and historic resources.
- 10) Follow appropriate biosecurity measures when working in and around livestock production areas and manure storage or treatment structures.
- 11) Protect surface water and groundwater from contamination during construction.
- 12) Read, know, and follow the construction plans and specifications.
- 13) Observe and verify utility locations.
- 14) Know and work safely within OSHA and MIOSHA requirements at all times.
- 15) Use materials specified in construction drawings and specifications. Obtain materials, equipment, and appropriately skilled people on-site as scheduled.
- 16) Contractor must have a foreman (responsible decision maker) and a set of plans and specifications on-site at all times during construction.
- 17) Build to dimensions, elevations, and quality workmanship specified in construction drawings and specifications. Perform quality control activities such as staking, material verifications, and concrete tests where required.
- 18) Understand construction inspection plan. Do not proceed with work until required inspections are made.
- 19) Repair construction not meeting plan or specification requirements.

NRCS RESPONSIBILITIES

- 1) Assist Landowner with pre-construction conference.
- 2) Inform landowner and contractor of safety responsibility.
- 3) Follow construction inspection plan.
- 4) Provide basic layout and staking, as needed.
- 5) Be available for quality assurance. Inform contractor and landowner of results of inspections – including compliance with drawings, specifications, and safety requirements.
- 6) Protect cultural and historic resources.
- 7) Follow appropriate biosecurity measures including disinfection of boots, vehicles, and equipment.
- 8) Observe construction and perform needed quality assurance testing and measurements in order to determine that work meets requirements of the plans and specifications.
- 9) Inform landowner of presence of unexpected site conditions, cultural or historic resources. Investigate and determine need for design changes and provide alternatives, as appropriate.
- 10) Ensure appropriate engineering approvals are obtained before making changes.
- 11) Certify completion of construction for individual components, and entire system where construction meets the requirements of the drawings and specifications.

MICHIGAN ENGINEERING STANDARD DRAWING	
FILE NAME	MI-001-B 4-09
STANDARD DWG. NO.	MI-001-B
DATE	4-09
SHEET	1 OF 1

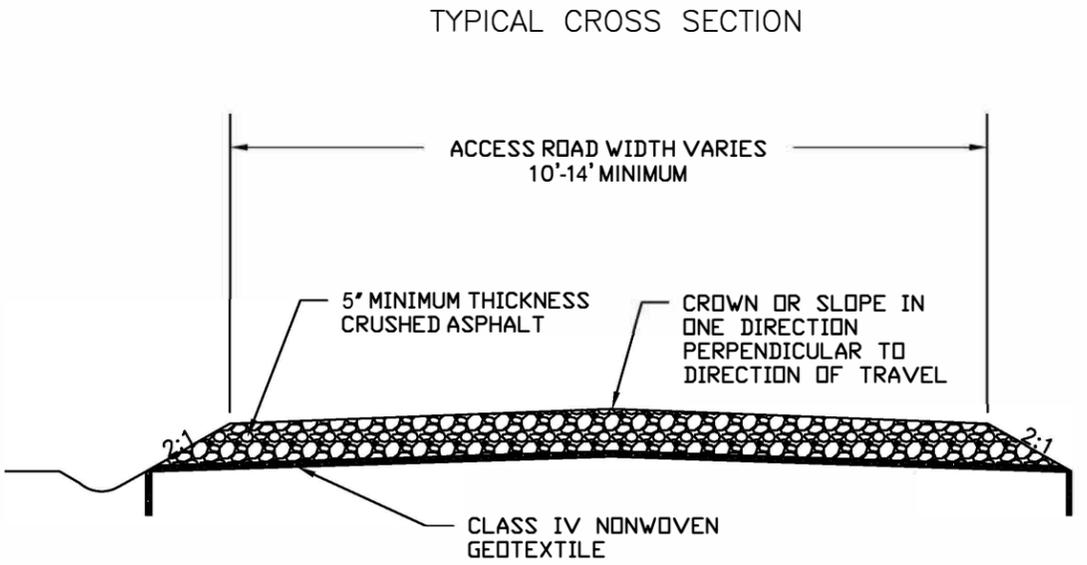
Dimensions in Inches or Feet

Not to Scale

Date	1/2/2020
Designed	AMChavez
Drawn	AMChavez
Checked	BTalsma
Approved	AMChavez

Roles and Responsibilities
Gun Lake Tribe Access Road
 Allegan Co., Michigan
 Hopkins Township, T. 3N -R. 12W, Sec. 32

 United States Department of Agriculture	Natural Resources Conservation Service
Drawing Name	Roles and Responsibilities
Date	1/10/2020 2:40 PM
Sheet	2 of 3



QUANTITY ESTIMATE	
ESTIMATED ROAD LENGTH -----	<u>73.75</u> FEET
CRUSHED ASPHALT -----	<u>36</u> CUBIC YARDS
CLASS IV GEOTEXTILE MATERIAL - MI-165 -----	<u>145</u> SQUARE YARDS

Construction Notes:

1. Construct road above natural ground for better drainage.
2. Remove existing vegetation, organic soils, and roots providing a smooth uniform base in accordance to NRCS specification MI-150 Site Preparation and MI-152 Excavation.
3. Non-Woven Geotextile Class IV will be placed over compacted earthfill/firm mineral soils in accordance to NRCS specification MI-165 Geotextiles.
4. Aggregate material can include: crushed limestone, or MDOT 22A/23A road gravel. Criteria 100% passing $\frac{3}{4}$ inch sieve and 10% maximum passing the #200 sieve.
5. Aggregate material will be placed and compacted to the finished thickness shown in the cross-section. Placement of aggregate shall meet NRCS specification MI-154 Earthfill. The finished surface may be higher than the existing ground level.
6. The center of the road will be crowned to promote drainage off of the road and/or away from buildings.
7. Grade road so that there is a smooth transition to existing driveway and concrete approach.
8. All disturbed areas shall be seeded and mulched after construction in accordance to the NRCS specification MI-166 Seeding.

Not to Scale

Date	Designed	Drawn	Checked	Approved
1/2020	AMChavez	AMChavez	BTalsma	AMChavez

Plan View and Cross Section Access Road
 Gun Lake Tribe Access Road
 Allegan Co., Michigan
 Hopkins Township, T. 3N-R. 12W, Sec.32



File Name	GunLakeTribeAccessRdFinal.dwg
Drawing Name	Plan View and Cross Section
	2:40 PM
Sheet	3 of 3

CONSTRUCTION SPECIFICATION

MI-150. SITE PREPARATION

1. SCOPE

Site preparation work shall consist of clearing and grubbing all woody growth from the construction area.

2. FOUNDATION PREPARATION AND GRUBBING

The construction areas shall be stripped of all materials not suitable for the foundation. Such materials shall include organic matter, grasses, weeds, sod, debris, and stones larger than 12 inches in diameter. Stumps and all roots 1 inch diameter or larger shall be grubbed out to a depth of at least 2 feet below subgrade for concrete structures and 1 foot below the ground surface at embankment sites and other designated areas..

In an earth embankment foundation area, all channel banks and sharp breaks shall be sloped to no steeper than 1:1.

3. STRIPPED MATERIAL DISPOSAL

Suitable stripped soil material shall be stockpiled for use as topsoil. The other stripped materials shall be buried, removed from the site or otherwise disposed of as indicated by the NRCS inspector.

Stockpiled materials around a construction site should not hinder subsequent construction operations. Where concrete is to be delivered to the site by ready-mix trucks, several openings at strategic points will be required so that concrete will not be required to flow an excessive distance.

Waste material excavated from channels shall be deposited and shaped into spoil banks as indicated on the drawings or as directed by the NRCS inspector.

4. SAFETY

All excavation work shall provide stable slopes to safeguard the work and the workers during construction operations. This can be accomplished by: (1) sloping all trench banks more than 3.5 feet high, 1:1 or flatter, or (2) installing shoring or bracing adequate to prevent banks from sloughing into the excavation.

Where excess water hinders excavation or other construction activities, pump drainage will be used.

CONSTRUCTION SPECIFICATION

MI-152. EXCAVATION

1. SCOPE

The work shall consist of the excavation required by the drawings and specifications and disposal of the excavated materials.

2. USE OF EXCAVATED MATERIALS

To the extent they are needed, all suitable materials from the specified excavations shall be used in the construction of required permanent earthfill. The suitability of materials for specific purposes shall be determined by the NRCS inspector. The contractor shall not waste or otherwise dispose of suitable excavated materials.

3. DISPOSAL OF WASTE MATERIALS

All surplus or unsuitable excavated materials will be designated as waste and shall be disposed of at the locations shown on the drawings or designated by NRCS inspector or landowner.

4. STRUCTURE AND TRENCH EXCAVATION

Structure or trench excavation shall be completed to the specified elevations and to sufficient length and width to include allowance for forms, bracing, and supports, as necessary, before any concrete or earthfill is placed within the limits of the excavation.

Excavations shall comply with OSHA Construction Industry Standards (29CFR Part 1926) Subpart P, Excavations, Trenching, and Shoring. All excavation work shall provide stable slopes to safeguard the work and the workers during construction operations. This can be accomplished by: (1) sloping all trench banks more than 3.5 feet high, 1:1 or flatter, or (2) installing shoring or bracing adequate to prevent banks from sloughing into the excavation. The contractor shall furnish, place and subsequently remove such supporting installations.

5. BORROW EXCAVATION

When the quantities of suitable materials obtained from specified excavations are insufficient to construct the specified fills, additional materials shall be obtained from the designated borrow areas. The extent and depth of borrow pits within the limits of the designated borrow areas shall be as directed by the NRCS inspector.

Borrow pits shall be excavated and finally dressed in a manner to eliminate steep or unstable side slopes or other hazardous or unsightly conditions. If required, during and/or immediately following construction, the borrow pit shall be prepared, fertilized, seeded and mulched in accordance with the Construction Specification 166, Seeding.

6. OVER-EXCAVATION

Excavation beyond the specified lines and grades shall be corrected by filling the resulting voids with approved compacted earthfill, except that if the earth is to become the subgrade for riprap, rockfill, sand or gravel bedding, or drainfill, the voids may be filled with material conforming to the specifications for the riprap, rockfill, bedding or drainfill.

CONSTRUCTION SPECIFICATION

MI-154. EARTHFILL

1. SCOPE

The work shall consist of placing the earthfill required by the drawings and specifications.

2. TIMING

Construction work covered by this specification shall not be performed between November 15 and the following April 15 unless the site conditions and/or the construction methods to be used have been reviewed and approved in writing by the NRCS inspector.

3. MATERIALS

All fill materials shall be obtained from required excavations and designated borrow areas. The selection of fill materials shall be subject to approval by the NRCS inspector.

Fill materials shall not contain sod, roots, frozen soil, snow or ice, or other perishable materials. Stones larger than 6 inches (150 mm) in diameter shall be removed prior to compaction of the fill.

The type of materials that are acceptable shall be as listed and described in the drawings.

4. FOUNDATION PREPARATION

Foundations for earthfill shall be stripped to remove vegetation and other unsuitable materials. Earth foundation surfaces shall be graded to remove surface irregularities and scarified to a depth of not less than 2 inches (50 mm).

5. PLACEMENT

Fill shall not be placed upon a frozen surface.

Earthfill in dams, dikes and other structures designed to restrain the movement of water shall be placed so as to meet the following additional requirements:

- a. The distribution of materials throughout each zone shall be essentially uniform, and the fill shall be free from lenses, pockets, streaks or layers of material differing substantially in texture, moisture content or gradation from the surrounding material.
- b. If the surface of any layer becomes too hard and smooth to achieve a suitable bond with the succeeding layer, it shall be scarified parallel to the axis of the fill to a depth of not less than 2 inches (50 mm) before the next layer is placed.
- c. The top surfaces of embankments shall be maintained approximately level during construction, except that a crown or cross-slope of approximately 2 percent shall be maintained to ensure effective drainage.
- d. Dam and dike embankments shall be constructed in continuous layers from abutment to abutment, except where openings to facilitate construction or to allow passage of stream flow during construction are specified.

6. CONTROL OF WATER CONTENT

The fill material shall have a water content sufficient to secure compaction. *For cohesive fill material, the water content shall be such that a 1/8 inch diameter thread can be rolled without the thread cracking.*

If the top surface of the preceding layer of compacted fill or a foundation or abutment surface in the zone of contact with the fill becomes too dry to permit suitable bond, it shall

either be removed or scarified and wetted by sprinkling to an acceptable water content prior to placement of the next layer of fill.

If the top surface of the preceding layer of compacted fill or a foundation or abutment surface in the zone of contact with the fill becomes too slick or saturated, it shall be allowed to dry and shall be thoroughly scarified to a depth of not less than 2 inches (5 cm) before placing additional layers of fill.

7. COMPACTION

Fill materials adjacent to structures shall be placed and spread in layers not over 4 inches (100 mm) thick before compaction. Fill materials adjacent to structures shall be manually tamped in a manner which will prevent damage to the structures.

The methods of compaction listed below are intended to achieve at least 90 percent of the maximum density as determined by the Standard Proctor Test, ASTM D 698. All fill materials, not placed adjacent to structures, shall be placed and spread in layers not over 9 inches (230 mm) thick before compaction, *except for method "e. Track Type Tractor" below*. Each layer shall be compacted by traversing the entire surface using one of the methods *listed*:

For compacted earth liners for waste storage facilities (practice standard code 313) the only compaction method acceptable (without dry unit weight or permeability control) is as follows:

Tamping (Sheepsfoot) Roller - Minimum of 4 passes with contact pressure of at least 200 pounds per square inch (700 kPa), towed at speeds not exceeding 5 miles per hour (8 km/h). Continuous inspection is required.

For all other earthfill installations, use one of the following compaction methods:

- a. Tamping (Sheepsfoot) Roller - Minimum of 4 passes with contact pressure of at least 100 pounds per square inch (700 kPa), towed at speeds not exceeding 5 miles per hour (8 km/h).
- b. Pneumatic (Rubber Tire) Roller - Minimum of 4 passes with a wheel load of at least 18,000 pounds and a tire pressure of 80 psi (560 kPa), towed at speeds not exceeding 5 mph (8 km/h).
- c. Loaded Earth Moving Equipment - Minimum of 4 passes with a wheel load of at least 10 psi (70 kPa), towed at speeds not exceeding 5 mph (8 km/h). The following limitations apply to this method:
 - (1) Fill height shall be less than 6 feet (1.8 m).
 - (2) Fill shall not have more than a 3 foot depth of permanent water stored against it, or the effective width of the fill at the elevation of the permanent water shall be a minimum of 100 feet.
- d. Wheel Type Tractor (Farm Tractor) - Minimum of 4 passes with a wheel type tractor (minimum 100 horsepower (75 kW) exerting a pressure of not less than 10 psi (70 kPa). Tractor speeds shall not exceed 5 mph (8 km/h) during compaction process. The following limitations apply to this method:
 - (1) Fill height shall be less than 6 feet (1.8 m).
 - (2) Fill shall not have more than a 3 foot depth of permanent water stored against it, or the effective width of the fill at the elevation of the permanent water shall be a minimum of 100 feet.

- e. Track Type Tractor (Crawler, Bulldozer) - Minimum of 4 passes with a track type tractor exerting a pressure of not less than 8 psi (56 kPa). Tractor speeds shall not exceed 5 mph (8 km/h) during compaction process. The following limitations apply to this method:
- (1) Maximum loose lift thickness of 6 inches (150 mm). Stones larger than 3 inches (75 mm) in diameter shall be removed prior to compaction.
 - (2) Fill height shall be less than 6 feet (1.8 m).
 - (3) Fill shall not have more than a 3 foot depth of permanent water stored against it, or the effective width of the fill at the elevation of the permanent water shall be a minimum of 100 feet.

CONSTRUCTION SPECIFICATION

MI-165. GEOTEXTILES

1. SCOPE

This work shall consist of furnishing all materials, equipment and labor necessary for the installation of geotextiles for slope protection, subsurface drains, road stabilization, stream crossings, and surface water livestock access watering facilities.

2. MATERIALS

Geotextiles shall be manufactured from synthetic long chain or continuous polymeric filaments or yarns, having a composition of at least 95 percent, by weight, of polypropylene, polyester or polyvinylidene-chloride. The geotextile shall be formed into a stable network of filaments or yarns that retain their relative position to each other, are inert to commonly encountered chemicals and are resistant to ultraviolet light, heat, hydrocarbons, mildew, rodents and insects. The geotextile shall be free of any chemical treatment or coating that might significantly reduce its permeability and shall have no flaws or defects that significantly alter its physical properties. Unless otherwise specified, the class and type of geotextile shall be as shown on the drawings and shall meet the requirements for materials that follow:

a. Woven Geotextile

The woven geotextile shall conform to the physical properties listed in Table 1. The woven geotextile shall be manufactured from monofilament yarns that are woven into a uniform pattern with distinct and measurable openings. The geotextile shall be manufactured so that the yarns will retain their relative position with regard to each other. The yarns shall contain stabilizers and/or inhibitors to enhance their resistance to ultraviolet light or heat exposure. The edges of the material shall be selvaged or otherwise finished to prevent the outer yarn from unraveling.

b. Nonwoven Geotextile

Nonwoven geotextiles shall conform to the physical properties listed in Table 2. Nonwoven geotextiles shall be manufactured from randomly oriented fibers that have been mechanically bonded together by the needle-punched process. In addition, one side may be slightly heat bonded. Thermally bonded, nonwoven geotextiles, in addition to mechanically bonded, nonwoven geotextiles, may be used for road stabilization, stream crossings, and surface water livestock access watering facilities. The filaments shall contain stabilizers and/or inhibitors to enhance their resistance to ultraviolet light or heat exposure.

c. Shipping, Product Identification, Certification and Test Data

The geotextile shall be shipped in rolls wrapped with a protective covering to keep out mud, dirt, dust, debris and direct sunlight. Each roll of geotextile shall be clearly marked to identify the brand, type and production run.

The geotextile shall meet the specified requirements (Table 1 or 2) for the product style or type shown on the label. The manufacturer or distributor will provide a letter of certification to the NRCS inspector stating the compliance of the delivered product to the requirements of Table 1 or Table 2, whichever is applicable. Test data pertaining to the production run of the product must be submitted to the NRCS inspector if requested to do so, in writing, by the NRCS inspector.

All geotextile materials will be subject to sampling and testing by an independent testing laboratory at any time until final inspection and acceptance.

3. STORAGE

Prior to use, the geotextile shall be stored in a clean, dry place, out of direct sunlight, not subject to extremes of either hot or cold, and with the manufacturer's protective cover in place.

4. SURFACE PREPARATION

The surface on which the geotextile is to be placed shall be graded to the neat lines and grades as shown on the drawings. The surface shall be reasonably smooth and free of holes, sharp objects and projections. The surface preparation will be inspected and approved by the NRCS inspector prior to placing the geotextile.

5. PLACEMENT

a. General

The geotextile shall be placed on the approved, prepared surface at the locations and in accordance with the details shown on the drawings. The geotextile shall be unrolled along the placement area and loosely laid (not stretched) in such a manner that it will conform to the surface irregularities when stone or other material is placed on or against it. No cuts or punctures will be permitted in the geotextile. The geotextile may be folded and overlapped to permit proper placement in the designated area.

Where seaming is required or desired, the geotextile shall be joined by machine sewing using thread material meeting the chemical requirements for the geotextile fibers or yarn. The sewn overlap shall be 6 inches, and the sewing shall consist of two parallel stitched rows at a spacing of about 1 inch and shall not cross (except for any required re-stitching). The stitching shall be a lock-type stitch. Each row of stitching shall be located a minimum of 2 inches from the geotextile edge. The seam type and sewing machine to be used shall produce a seam strength, in the specified geotextile, that provides a minimum of 90 percent of the tensile strength in the weakest principal direction of the geotextile being used, when tested in accordance with ASTM D 4884. The seams may be factory or field sewn.

b. Slope Protection

The roll or panel length shall be placed parallel to the direction of water flow unless otherwise indicated on the drawings. The geotextile's terminal end details shall be as shown on the drawings. The minimum overlap shall be 18 inches, in any direction, unless adjacent panels are sewn together.

The geotextile shall not be placed until it can be anchored and protected with the intended covering within 48 hours. If the geotextile will not be covered within 48 hours, a temporary covering will be used for protection from ultraviolet light.

Securing pins, approved by the NRCS inspector and provided by the geotextile manufacturer, shall be placed along the edge of the panel to adequately secure it during placement. At vertical laps, securing pins shall be inserted through both layers along a line through the approximate midpoint of the overlap. At horizontal laps and laps across slopes, securing pins shall be inserted through the bottom layer only. Securing pins shall be placed along a line approximately 2 inches in from the edge of the outer limits of the placed geotextile at intervals not greater than 12 feet, unless otherwise specified. Additional pins shall be installed as necessary to prevent any slippage of the fabric, regardless of locations. The use of securing pins will be held to the minimum necessary. The fabric may be secured with other methods when specified or allowed by the NRCS inspector. Pins shall be steel or fiberglass, formed as a "U", "L", or "T" shape or with "ears" to prevent total penetration. Steel washers shall be provided on all but the "U"-shaped pins.

c. Subsurface Drains

The geotextile shall be covered by drainfill or other material within the same working day. Drainfill material shall be placed in a manner that prevents damage to the geotextile. In no case will material be dropped on uncovered fabric from a height greater than 5 feet. The minimum overlap of adjacent geotextile panels for unsewn fabric shall be as follows:

- 1) Trench drain - 12 inches
- 2) Blanket drain - 18 inches

d. Road Stabilization

The geotextile shall be unrolled parallel to the roadway centerline. The minimum overlap of adjacent geotextile panels shall be 24 inches for unsewn fabric. Alternately, adjacent panels may be sewn together per item 5a. above.

Securing pins, approved by the NRCS inspector and provided by the geotextile manufacturer, may be used when necessary to ensure temporary anchoring of the geotextile during the installation process. The pins shall be removed prior to permanent backfilling.

Backfill will be dumped and spread in a uniform thickness generally not to exceed 9 inches after compaction. The first 2 or 3 lifts may be used to seal and consolidate with only light compaction. Over-stressing the soil and severe rutting should be avoided by utilizing spreading and dumping equipment that exerts only moderate pressures on the soil. Granular backfill depths may have to be increased and equipment loads reduced to control soil stress if determined necessary by the NRCS inspector. Ruts developed during spreading and compacting will be filled with additional backfill material so that backfill thickness can be maintained. In no case will blading or backblading of a rutted surface be allowed to reduce rut depth.

Gravel and other coarse-grained backfill will be compacted with vibratory rollers. Vibration will not be used for coarse-grained backfill when the resulting dynamic forces will cause a loss in subgrade or backfill soil strength; e.g., fine sand backfill over a sand or silt subgrade having a high water table. If such conditions exist, moderate to heavy static rollers (steel drum or rubber tired) will be used. Fine-grained backfill will be compacted with sheepsfoot or rubber tired rollers.

TABLE 1 - REQUIREMENTS FOR WOVEN GEOTEXTILES BY USE			
Property	Test Method	<u>Slope Protection</u>	<u>Road Stabilization</u>
		Unprotected Class I and Protected Class II	Class IV
Tensile Strength - Lbs _{1/}	ASTM D 4632	250 min.	200 min.
Bursting Strength - psi _{1/}	ASTM D 3786	450 min.	450 min.
Elongation - % _{1/}	ASTM D 4632	35 max.	35 max.
Puncture - lbs. _{1/}	ASTM D 4833	100 min.	100 min.
Ultraviolet Light Resistance - % _{1/}	ASTM D 4355 150 hrs. exposure	70% min. tensile strength retained	70% min. tensile strength retained
Apparent Opening Size (AOS) - mm	ASTM D 4751	Less than or equal to 0.212 (#70) _{2/}	Less than or equal to 0.600 (#30) _{2/}
Percent Open Area	CORPS AD-745- 085 _{3/}	4.0% min.	1.0% min.

1/ Minimum roll value (weakest principal direction): average minus two standard deviations (only 2 ½ percent will be lower).

2/ U.S. standard sieve size.

3/ Test methods prepared by U.S. Army Corps of Engineers.

TABLE 2 - REQUIREMENTS FOR NONWOVEN GEOTEXTILES BY USE

Property	Test Method	Slope_Protection		Subsurface Drainage Class III	Road Stabilization Class IV	Stream Crossing & Surface Water Livestock Access Watering Facility
		Unprotected Class I	Protected/Bedding Class II			
Tensile Strength - lbs ^{1/}	ASTM D 4632	200 min.	100 min.	100 min.	150 min.	250 min.
Bursting Strength - psi ^{1/}	ASTM D 3786	350 min.	210 min.	210 min.	300 min.	450 min.
Elongation - % ^{1/}	ASTM D 4632	100 max.	100 max.	100 max.	100 max.	50 max.
Puncture - lbs. ^{1/}	ASTM D 4833	90 min.	50 min.	50 min.	80 min.	100 min.
Ultraviolet Light Resistance - % ^{1/}	ASTM D 4355 150 hrs. exposure	70% min. tensile strength retained	70% min. tensile strength retained	70% min. tensile strength retained	70% min. tensile strength retained	70% min. tensile strength retained
Apparent Opening Size (AOS) - mm	ASTM D 4751	Less than or equal to 0.212 (70#) ^{2/}	Less than or equal to 0.212 (70#) ^{2/}	Less than or equal to 0.212 (70#) ^{2/}	Less than or equal to 0.212 (70#) ^{2/}	Less than or equal to 0.212 (#70) ^{2/}
Permittivity - sec.-1 ^{1/}	ASTM D 4491	0.70	0.70	0.70	0.70	0.70

^{1/} Minimum roll value (weakest principal direction): average minus two standard deviations (only 2 ½ percent will be lower).

^{2/} U.S. standard sieve size.

CONSTRUCTION SPECIFICATION

MI-166. SEEDING

1. SCOPE

The work shall consist of furnishing all labor, equipment and materials for seeding a permanent grass mixture on the areas shown on the drawings and/or all disturbed areas unless otherwise specified or approved.

2. GENERAL

Liming, fertilizing, seeding and mulching shall be performed within 20 days from disturbance any time during the year except during the period October 1 to November 1 South of US 10, September 20 to October 25 North of US 10 and any other time of the year that the seedbed cannot be properly prepared due to wetness, snow or frozen soil.

3. FERTILIZER AND LIME

Lime shall be standard agricultural ground limestone. Fertilizer shall meet the requirements of the applicable Michigan state laws, and shall be in such physical condition to insure uniform application over the area to be fertilized. Rates of application shall be as specified on the drawings or as shown in Section 8 of this specification.

4. SEED

The seed shall conform to the latest seed laws of the United States and of Michigan. Species, the source of production if native grasses are used, and rate of seeding shall be as specified on the drawings or as shown in Section 8 of this specification.

Inoculate all legume seed in accordance with the manufacturer's recommendations. The inoculate for treating legume seeds shall be a pure culture of nitrogen-fixing bacteria specific for the species and shall not be used later than the date indicated on the container or as otherwise specified. A mixing medium, as recommended by the manufacturer, shall be used to bond inoculate to the seed. All legumes not inoculated will be inoculated within 12 hours of seeding with inoculate specific to the species being seeded. If seed was inoculated more than 60 days prior to seeding, add new inoculation. When the area is seeded with a hydro-seeder or a site where a new legume is seeded for the first time ever, use 5 times the recommended rate of inoculate.

5. PREPARATION OF SEEDBED

The entire area to be seeded shall be reasonably smooth and all washes and gullies shall be filled to conform to the desired cross-section before actual seedbed preparation is begun. Scarify subsoil areas perpendicular to water flow before they are filled. After final grading, the required fertilizer (except that applied with a hydraulic seeding) and/or lime shall be applied uniformly and incorporated into the top 3 inches of the soil. The seedbed preparation operation shall be suspended when the soil is too wet or too dry.

On side slopes steeper than 3:1, the 3 inch minimum depth of seedbed preparation is not required, but the soil shall be worked enough to insure sufficient loose soil to provide adequate seed cover.

6. SOWING THE SEED

Seed immediately after preparation of the seedbed. Uniform seed distribution shall be accomplished by drilling, broadcasting or hydraulically seeding. If a hydraulic seeder is used, the seed, fertilizer and mulch may be applied together with water.

Immediately after seeding, except in the case of hydraulic seeding, the soil shall be firmed with a cultipacker or other equipment approved by the NRCS Inspector to give the seed a cover of not more than 1/2 inch. Where broadcast seeding, the seed will be covered by use of hand rake or by dragging harrows, chains, or other suitable equipment over the surface or mulch to cover the seed.

On slopes steeper than 3:1, the seed may be covered by hand without cultipacking.

7. MULCHING

The required mulching shall be performed with hydraulic seeding or immediately after seeding. The mulch shall be applied uniformly over the area. The type and rate shall be as specified on the drawings or as shown on an attachment to this specification.

The mulch, except for hydraulically placed mulch, shall be anchored.. Anchoring of the mulch shall be performed by application of a commercially available tackifier at the rate recommended by the manufacturer, a mulch anchoring tool, tandem disk weighted and set nearly straight, track type tractor, or by installation of mulch netting. Mechanical anchoring shall be performed in a manner that creates ridges perpendicular to flow of water. Where mulch netting is used, follow Construction Specification 167, Mulch Netting.

8. QUANTITIES

The estimated area to be seeded = .4 (acres) (1000 square feet)

a. Lime

The following minimum amount of lime shall be applied:

 pounds per (acre) (1000 square feet) *per msue recommendation + soil test*
 pounds total

b. Fertilizer

Without soil tests, apply a minimum of 500 pounds per acre or 12 pounds per 1000 square feet of a commercial fertilizer having an analysis of 12-12-12 or equivalent. (Equivalent 19-19-19 is 315 pounds per acre or 7.5 pounds per 1000 square feet.)

With a soil test, apply the Michigan State University recommended rate of fertilizer for establishment of the seeding specified.

5 pounds of (12-~~12~~⁰-12) fertilizer total
~~pounds of (19-19-19) fertilizer total~~

c. **Seed**

The following kinds and rates of seed shall be sown:

<u>Kind of Seed</u>	<u>(lbs./acre) (lbs./1000 ft.²)</u>	<u>Total Seed (lbs.)(kg)</u>
Creeping red fescue	0.5 lbs/1000ft ²	0.2 lbs
Kentucky bluegrass	0.5 lbs/1000ft ²	0.2 lbs

d. **Mulch**

Straw mulch shall be spread ~~at the rate of 1.5 to 2 tons per acre or 2 to 3 bales per 1000 square feet.~~

Hay mulch shall be dry and spread at the rate of 2 to 2.5 tons per acre or 3 to 4 bales per 1000 square feet.

0.5-1 (Tons) (Bales) total mulch (Hay) (Straw)
 square yards total of netting