

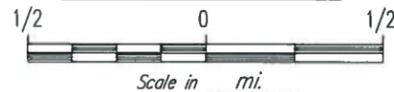
**Location in Michigan**

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

**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.

**SPECIFICATIONS**

SPEC NO.	TITLE
MI - 150	Site Preparation
MI - 152	Excavation
MI - 154	Earthfill
MI - 159	Plain Concrete
MI - 174	Timber Fabrication and Installation
MI - 166	Seeding

**Operations and Maintenance**

TITLE
Compost Facility

**TABLE OF ESTIMATED QUANTITIES**

ITEM	UNIT	AMOUNT
<u>Compost Facility</u>	SQft	285.6
Excavation	CY	7
Earthfill	CY	4
MDOT 2NS Sand	CY	4
Plain Concrete	CY	8
4 ft Post and Plank Wall sheet 8	No.	1
Roofs and Cover	No	1
<u>Heavy Use Area Protection Approach</u>	SQft	570
Excavation	CY	14
Earthfill	CY	7
MDOT 2NS Sand	CY	8
Plain Concrete	CY	9
Seeding	SQft	400

**INDEX OF SHEETS**

SHEET	TITLE	SHEET	TITLE
1	Cover Sheet	9	Construction Safety
2	Roles and Responsibilities		
3	Design Notes		
4	Site Layout		
5	Plan View		
6	Cross Section		
7	Approach Plan View & Cross Section		
8	4 Foot Post and Plank Wall		



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

*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: \_\_\_\_\_

Date	12/2019
Designed	AMChavez
Drawn	AMChavez
Checked	E. Beuschel
Approved	J. Blumhul

**Gun Lake Tribe Compost Facility**

Allegan Co., Michigan  
Hopkins Township, T. 3N-R. 12W, Sec. 32

ENGINEERING JOB CLASS IV



File Name	GunLakeTribeCompostfinal.dwg
Drawing Name	Coversheet
Sheet	1 of 9

# 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	12/2019
Designed	AMChavez
Drawn	AMChavez
Checked	E. Beuschel
Approved	----

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



File Name	GunLakeTribeCompostFinal
Drawing Name	Roles and Responsibilities
Date	1/8/2020 3:42 PM
Sheet	2 of 9





*Soil Borings:*  
 SB-1 Elevation 99.6  
 0-8" disturbed topsoil  
 8"-21" sm loamy fine sand brown  
 21"-38" sm fine sand light brown  
 bottom of boring elevation 96.4'

SB-2 Elevation 99.6  
 0-6" disturbed topsoil  
 6"-12" sm loamy fine sand brown  
 12"-38" sm fine sand light brown  
 bottom of boring elevation 96.4  
 no evidence of a seasonal high water table

*Construction Notes:*

1. Construction shall be in accordance with specifications listed on sheet 1.
2. The Compost Facility shall be a minimum of 50' from streams or other water features.
3. The Compost Facility shall be a minimum of 150' from the well identified on this map.
4. The floor of the Compost Facility shall be 2 feet or more above the seasonal high groundwater table.
5. Construction details for the Compost Facility are on sheets 3, 5, 6 and 8.
6. See sheet 3 for roof requirements.
7. Construction details for the Approach Apron are on sheet 7.
8. Construction details for the Access Road are a separate drawing set.
9. All disturbed areas will be seeded in accordance to the specification M-166 Seeding.

NOT TO SCALE

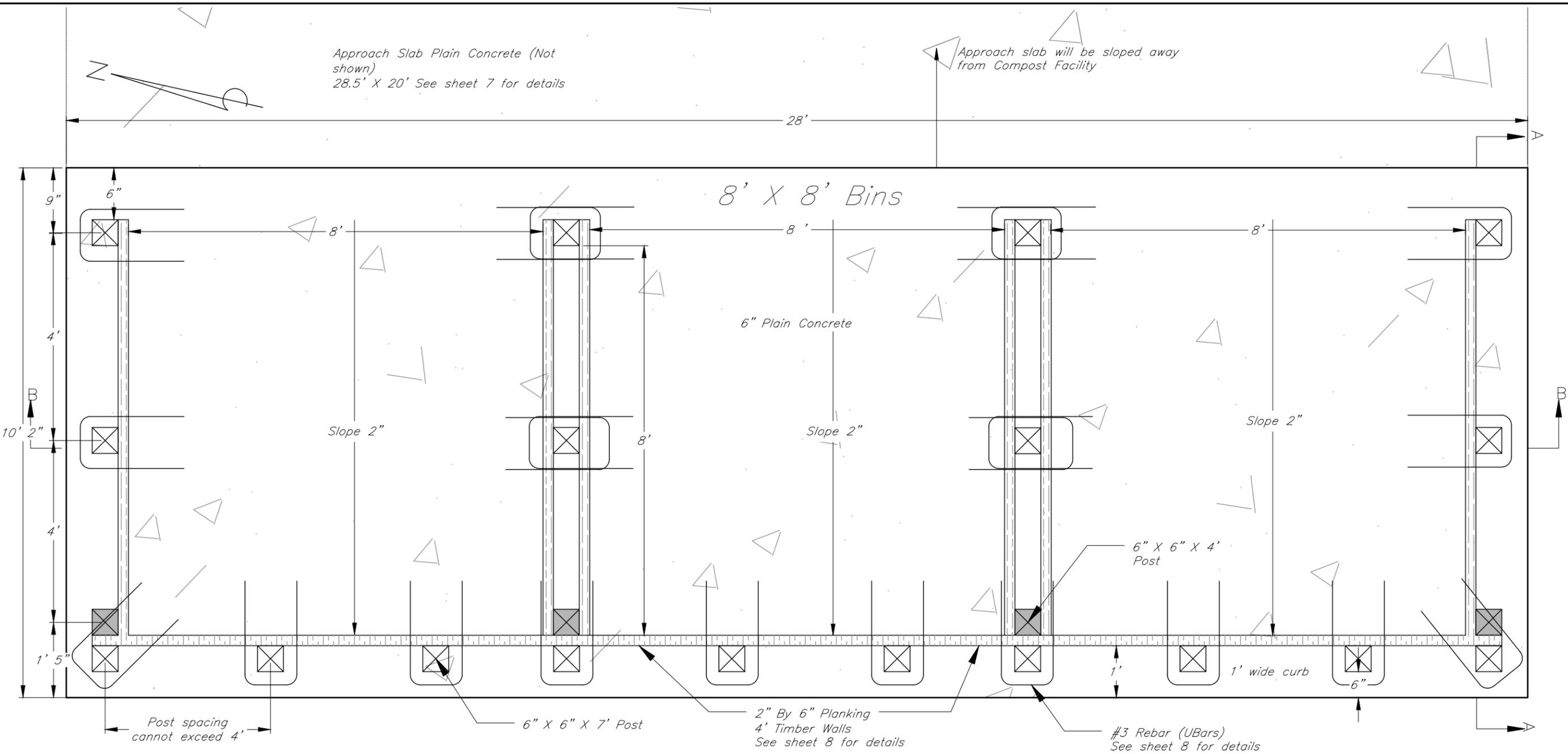
Designed	AMChavez	Date	12/2019
Drawn	AMChavez		12/2019
Checked	E. Beuschel		1/2020
Approved	---		---

Site Layout  
 Gun Lake Tribe Compost Facility

Allegan Co., Michigan  
 Hopkins Township, T. 3N-R. 12W, Sec. 32



File Name	GunLakeTribeCompostfinal.dwg
Drawing Name	Site Layout
	1/8/20 3:42 PM
Sheet	4 of 9



Approach Slab Plain Concrete (Not shown)  
28.5' X 20' See sheet 7 for details

Approach slab will be sloped away from Compost Facility

8' X 8' Bins

6" Plain Concrete

6" X 6" X 4' Post

Slope 2"

Slope 2"

Slope 2"

2" By 6" Planking  
4' Timber Walls  
See sheet 8 for details

#3 Rebar (UBars)  
See sheet 8 for details

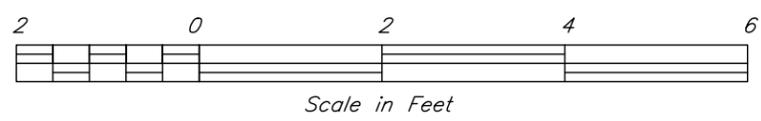
Post spacing cannot exceed 4'

Notes:

1. Construction shall be in accordance with specifications listed on sheet 1.
2. Topsoil and vegetation shall be removed and stockpiled before placing earthfill.
3. Compost Facility floor shall be 6" thick Plain Concrete (MI-159) over 4" compacted sand. Rebar for wall posts extend into the floor. See sheet 8 for details.
4. Slope concrete floor 2" towards the back of the compost bin to prevent runoff from leaving facility as shown in plan view and cross section.
5. The bottom 2" by 6" wooden plank for timber wall will be cut to accommodate floor slope leaving no gaps between wall and floor.
6. Wall post spacing will vary. Wall post spacing cannot exceed 4' apart on center. See sheet 8 for timber plank and post wall details.

7. There will be a 1' wide curb (fence posts can be installed in curb) around the sides and back wall of the Compost Facility.
8. See cross sections A-A and B-B on sheet 6.
9. See sheet 8 for 4' timber plank and post wall details.
10. This facility is designed to have a roof only and is not intended as a closed building.
11. Roof supports must be separate from the posts for timber plank wall.
12. Plain Concrete (M-159) approach slab (20' by 28.5') shall be 5" thick minimum over 4" of compacted sand. See sheet 4 for location and sheet 7 for details.
13. The plain concrete approach will be sloped away from the facility to reduce runoff from entering building.
14. All disturbed areas will be vegetated in accordance to specification MI-166 seeding.

Roof line and posts are not shown  
See building requirements on sheet 3.



Designed	AMChavez	Date	12/2019
Drawn	AMChavez		
Checked	E. Beuschel		
Approved			

**Gun Lake Tribe Compost Facility**  
Allegan Co., Michigan  
Hopkins Township, T. 3N-R. 12W, Sec. 32

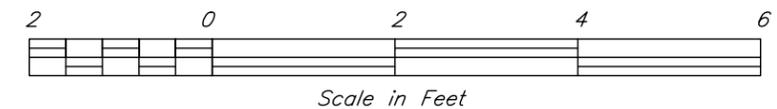
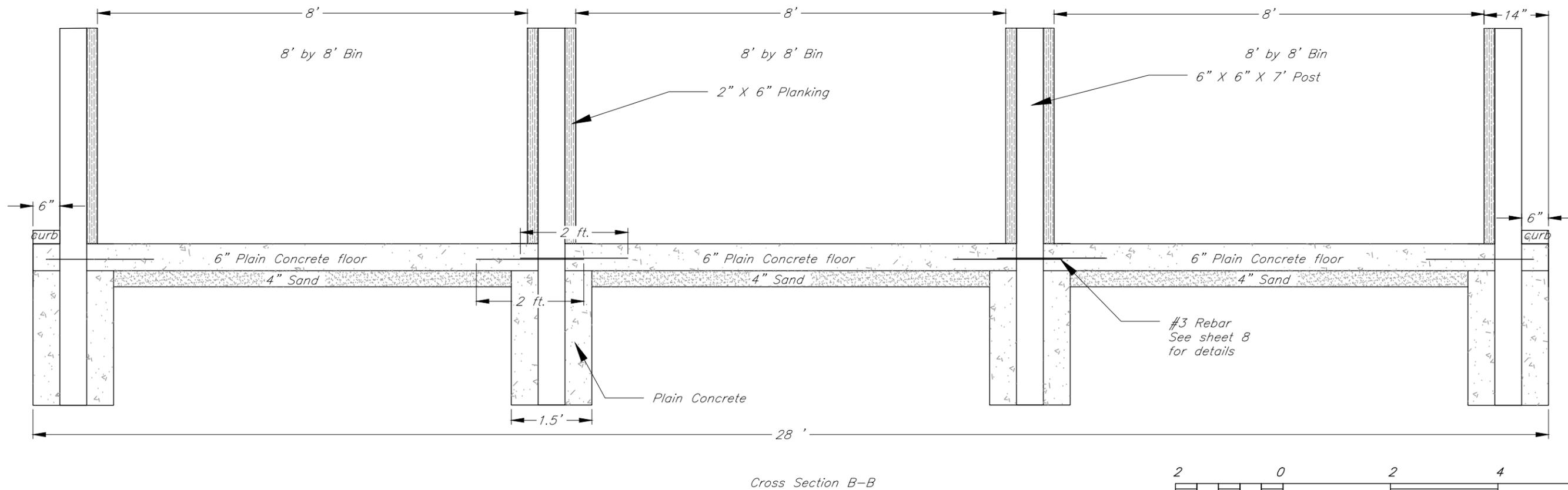
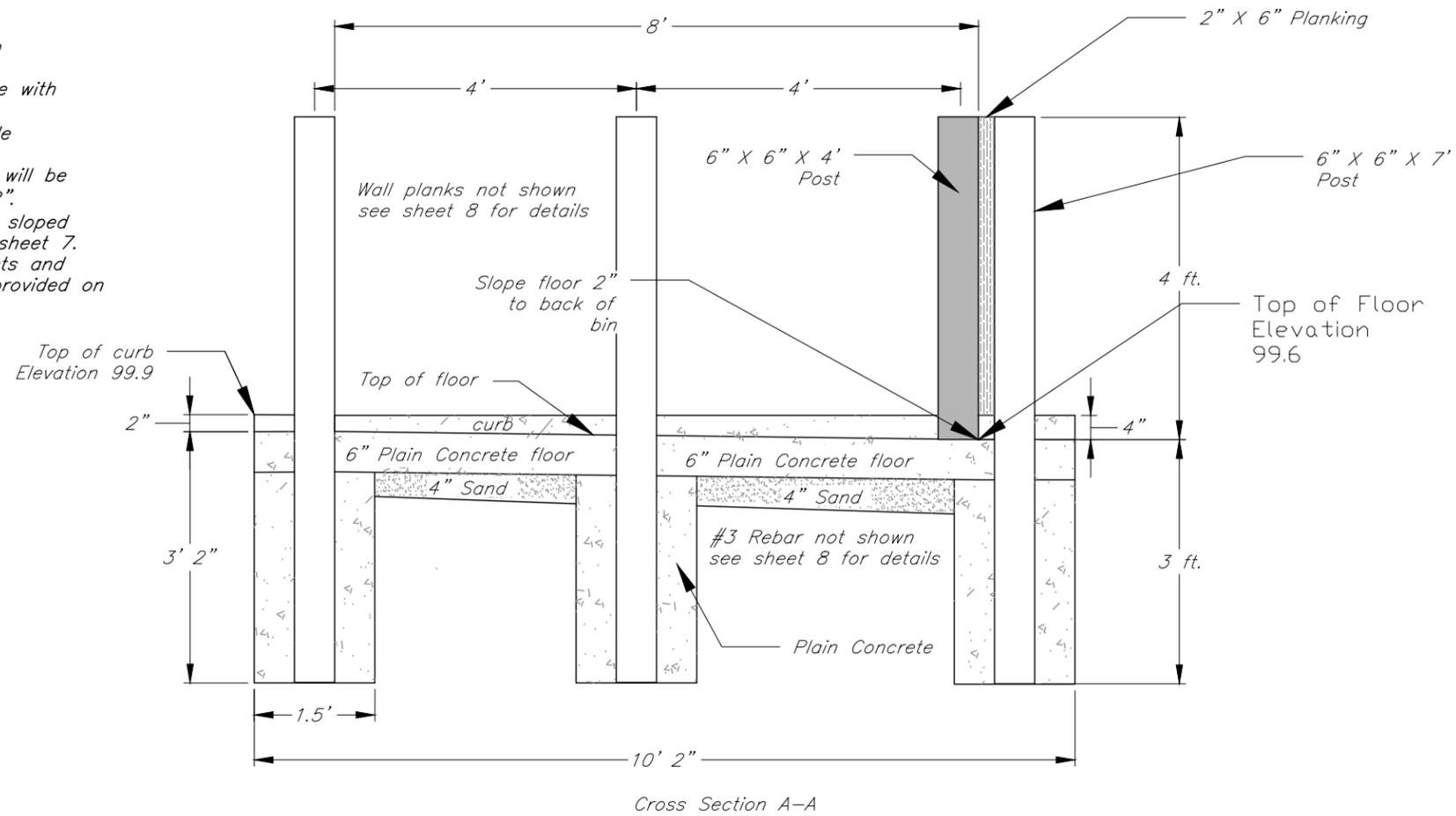


File Name  
GunLakeTribeCompostfinal.dwg

Drawing Name  
Plan View  
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**Notes:**

1. Construction shall be in accordance with specifications listed on sheet 1
2. Concrete shall be installed in accordance with specification MI-159 Plain Concrete.
3. Each compost bin will be 8' by 8' inside dimensions.
4. The concrete floor of the compost bins will be sloped toward the back of the facility 2".
5. The Approach Apron (not shown) will be sloped away from the facility. Details are on sheet 7.
6. Details for setting timber plank wall posts and constructing the timber plank wall are provided on sheet 8.



Designed	AMChavez	Date	12/2019
Drawn	AMChavez		
Checked	E. Beuschel		
Approved			

**Gun Lake Tribe Compost Facility**  
 Cross-Sections  
 Allegan Co., Michigan  
 Hopkins Township, T. 3N-R. 12W, Sec. 32



File Name  
 GunLakeTribeCompostfinal.dwg  
 Drawing Name  
 Cross Section  
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Typical Cross Section  
Plain Concrete Approach



QUANTITY ESTIMATE	
ESTIMATED AREA	570 SQ. FT.
2NS Sand	8 CU. YD.
Plain Concrete	9 CU. YD.

Construction Notes:

1. Construction shall be in accordance with specifications listed on sheet 1.
2. Remove existing vegetation, organic soils, and roots providing a smooth uniform base in accordance to specification MI-150 Site Preparation and MI-152 Excavation.
3. Place compacted earthfill and sand in accordance to specification MI-154 Earthfill.
4. Concrete will be 5" thick Plain Concrete meeting specification MI-159 Plain Concrete.
5. The Concrete Approach will be sloped away from the Compost Facility to provide drainage away from structure.
6. All disturbed areas shall be seeded and mulched after construction in accordance to the NRCS specification MI-166 Seeding.

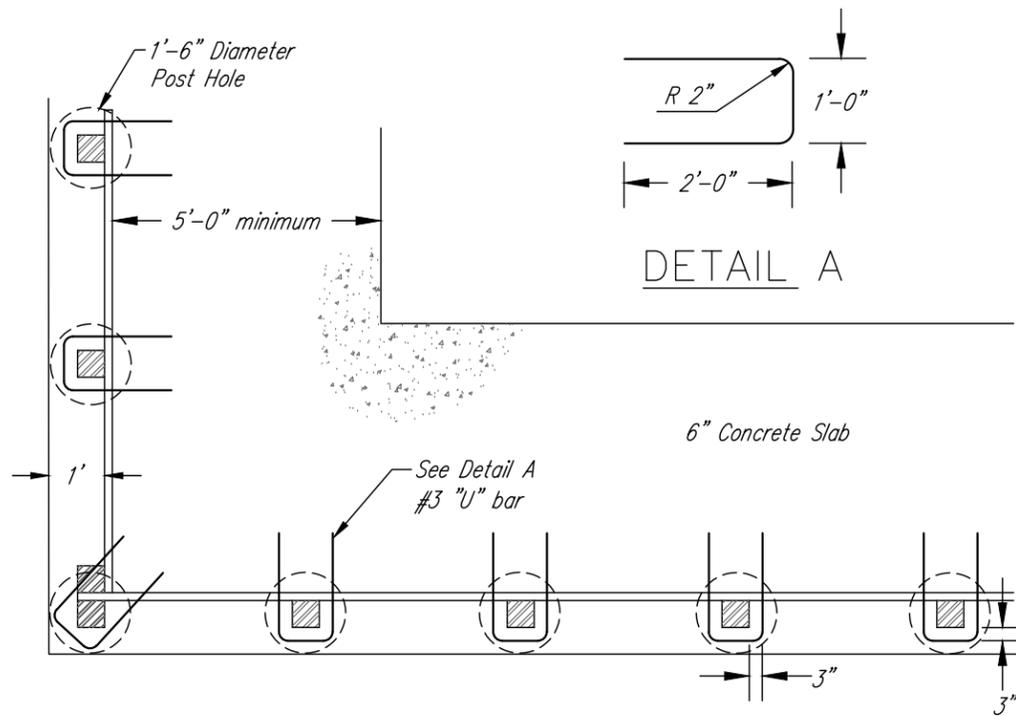
Not to Scale

Designed	AMChavez	Date	12/2019
Drawn	AMChavez		12/2019
Checked	E. Beuschel		1/2020
Approved	-----		-----

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

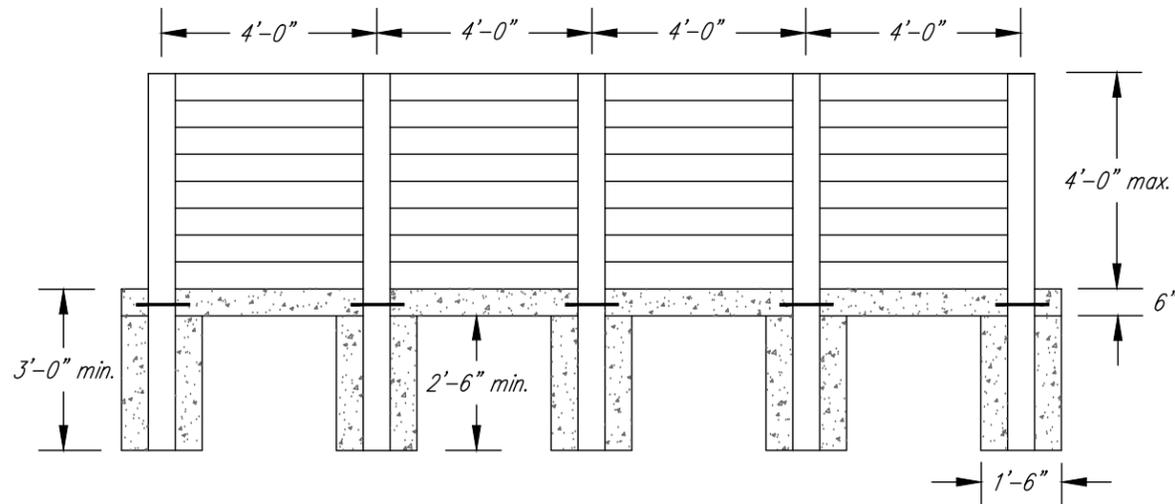


File Name	GunLakeTribeHUAP.dwg
Drawing Name	Plan View and Cross Section
	3:34 PM

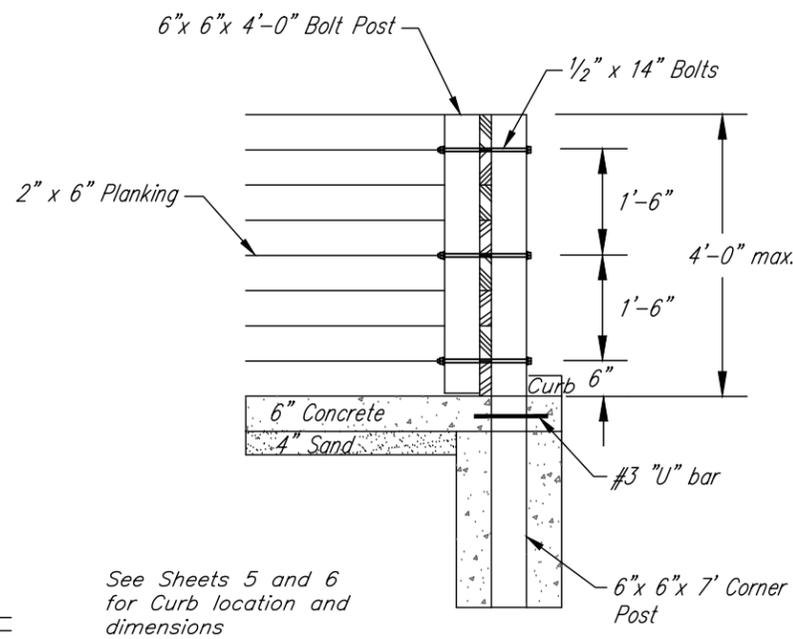


PLAN VIEW - HALF VIEW

Post spacing varies for timber wall in compost facility. 4' on center is maximum distance apart.

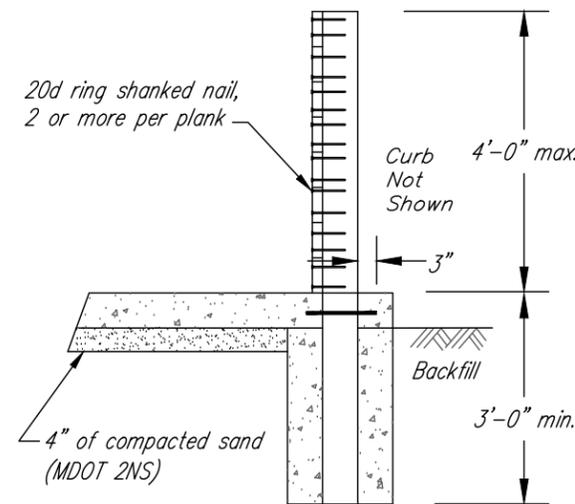


ELEVATION VIEW



CORNER DETAIL

See Sheets 5 and 6 for Curb location and dimensions



NAILING - POST DETAIL

DESIGN ASSUMPTIONS

Inside Wall Loading - 65 lb. - sq.ft./ft. of height  
 Allowable Timber Stress - 1200 p.s.i.  
 Allowable Steel Stress - 20,000 p.s.i.

BILL OF MATERIALS		
MATERIAL	UNIT	QUANTITY
6"x 6"x 7' Pressure-Treated Post	each	18
6"x 6"x 4'-0" Pressure-Treated Post	each	4
2"x 6" Pressure-Treated Wall Planking	feet	600
Post Hole Concrete	cu. yds.	3
#3 Bars	lin. ft.	110
1/2"x 14" Bolts with Washers	each	12
20d Ring-shanked Nails or 3" screws (approx. 0.04 lb. per sq. ft. of wall)	lbs.	15

SPECIFICATIONS AND CONSTRUCTION NOTES

- Wood materials used shall be pressure treated with a wood preservative. All wood construction shall meet the requirements of Construction Specification MI-174, Timber Fabrication and Installation.
- For all reinforcing steel, the minimum concrete cover shall be 2", and the minimum radius of bends shall be 2".
- Wall posts with wooden planks on two sides will have two #3 rebar Ubars as shown in plan view on sheet 5.
- Concrete shall meet the requirements of Construction Specification MI-159, Plain Concrete.
- Earth backfill against the outside of the plank wall shall not be more than 12" above the concrete floor
- Wall posts shall not be used to support roof. Roof posts are not shown.
- See Sheets 5 and 6 for curb location and dimensions.

CONSTRUCTION SEQUENCE

- Posts shall be placed in post holes, aligned and braced, prior to pouring concrete in the post holes.
- Compacted sand base shall be placed on undisturbed earth unless otherwise specified.
- Planks shall be spiked to the posts a minimum of 48 hours after concrete placement.
- Joints of wall planking shall be staggered.

Not to Scale

MICHIGAN ENGINEERING STANDARD DRAWING	
FILE NAME	MI-690-B 12-10.dwg
STANDARD DWG. NO.	MI-690-B
DATE	12-10
SHEET	1 OF 1

Dimensions in inches or feet-inches

Date	12/2019
Designed	AMChavez
Drawn	AMChavez
Checked	(name)
Approved	(name)

4 FOOT POST AND PLANK WALL

Gun Lake Tribe Compost Facility  
 Allegan Co., Michigan

Hopkins Township, T. 3N -R. 12W, Sec. 32



File Name	GunLakeTribeCompost4.dwg
Drawing Name	4 Foot Post Plank Wall
Sheet	8 of 9

Scaffolding and Walkways

Ladder jack scaffolds, top plate bracket scaffolds, roof bracket scaffolds, and pump jack scaffolds shall be at least 12 inches wide. All other scaffolds walkways, including form scaffolds, must be at least 18 inches wide. Fall protections must be provided.

Using top edge of wall forms as a walkway is not acceptable.

Impalement Protection

When workers are working around or at any height above exposed rebar, the ends must be capped. Rebar of any length must be guarded when there is the risk that an employee could fall onto the bar and be impaled.



**Steel Reinforced Impalement Prevention Caps:** Only rebar caps that are reinforced with a curved steel plate shall be used for protection against impalement. The rebar cap must withstand the drop of a 250-lb. sandbag from 7.5 feet. Square rebar caps must have at least a 4" x 4" surface area. Round caps must be at least 4.5" in diameter.



**Wood Rail Capping Systems** using fabricated rebar caps that meet OSHA standards for withstanding a 250 pound weight dropped from 7.5' without the rebar breaking through may be used. These are allowed for use with 2" x 4" and 2" x 6" lumber rails. A minimum of two caps are needed for each eight foot section.

Other Protection



**Mushroom rebar protection caps DO NOT provide impalement protection.** They only protect workers from cuts, abrasions, and other minor injuries. These may be used only where there is no danger of impalement. Site specific working conditions must be considered for impalement hazards.

Head Protection

Hard hats must be worn when overhead hazards are present. This includes work environments where objects might fall from above and strike a worker's head. Also in situations where workers might bump their heads against fixed objects such as exposed pipes or beams, a hard hat is required. Overhead hazards include cranes, lift trucks, fork lifts, telehandlers, boom lifts, backhoes, hydrahoers, skid steers, transit mix truck concrete chutes, concrete pump booms, dropped tools and materials.

Fall Protection

Fall protection must be provided any time a construction worker is at a height of six feet or more above a lower level.

Fall Protection Options:

- a) guardrail systems
- b) safety net systems
- c) personal fall arrest systems
- d) hole covers
- e) positioning device systems
- f) fences
- g) barricades
- h) warning line system
- i) safety monitoring system
- j) toeboards
- k) equipment guards
- l) screen
- m) hardhat

Working or walking on a horizontal surface near an unprotected edge:

- a, b or c

Working on a vertical surface:

- b or c

Working near holes (i.e. -reception pit tops):

- a, c or d

Working on formwork and reinforcing steel:

- b, c or e

Working near the edge of excavations 6 feet or more in depth when the excavations are not readily seen because of plant growth or other visual barriers:

- a, f or g

Working near the edge of a well, pit, shaft, and similar excavation 6 feet or more in depth:

- a, d, f or g

Working above dangerous equipment, machinery:

- a, b, c or k

Working on a low-slope roof:

- a, b, c, h&a, h&b, h&c, or h&i

Working on a steep roof:

- a&j, b or c

Protection from falling objects:

- a, j, l or m

Excavation Safety

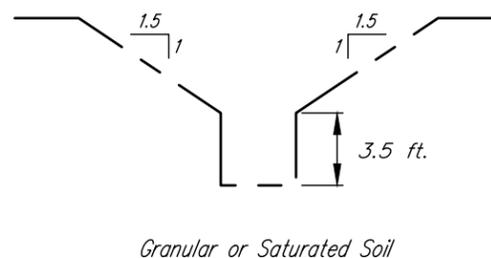
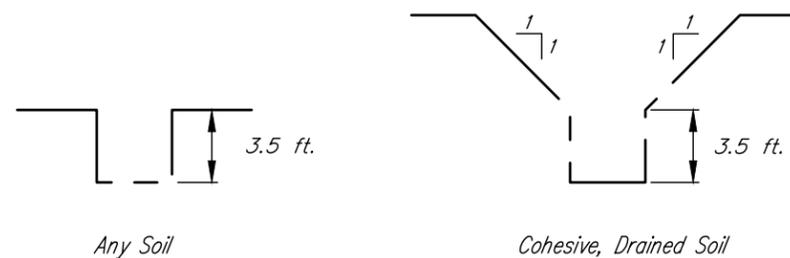
Where excavation to a depth greater than 3.5 feet will occur, and workers must enter the excavation, the contractor shall do the following:

1.) Excavate the side slopes as shown below; OR install shielding or shoring to support the excavation side slopes or walls in accordance with plans approved by the NRCS State Conservation Engineer. The contractor must submit plans for shielding or shoring for NRCS review and approval prior to their installation.

2.) Deposit excavated materials as far as practical away from the excavation, preferably a distance greater than the anticipated excavation depth, but no closer than 4 feet from the top perimeter.

3.) Provide safe ingress/egress.

Under no circumstance is anyone allowed to enter excavations greater than 3.5 feet deep unless the side slopes are stabilized as required above.



Caution:

This information sheet identifies safety concerns common to many NRCS construction projects. It makes no attempt to include all possible safety concerns that may arise. The contractor is responsible for knowing and following the appropriate safety standards required by the Michigan Occupational Safety and Health Act. Where MIOSHA and NRCS requirements differ, the most restrictive standard shall be followed. Failure to comply with safety requirements may result in NRCS withdrawal of technical and financial assistance.

MICHIGAN ENGINEERING STANDARD DRAWING			
FILE NAME	MI-024-B 2-14.dwg		
STANDARD DWG. NO.	MI-024-B		
DATE	2-14	SHEET	1 OF 1

Designed	AMChavez	Date	12/2019
Drawn	AMChavez		12/2019
Checked	E. Beuschel		1/2020
Approved	---		---

Construction Safety  
Gun Lake Tribe Compost Facility

Allegan Co., Michigan  
Hopkins Township, T. 3N-R. 12W, Sec. 32



File Name	GunLakeTribeCompostinal
Drawing Name	Construction Safety
Date	1/8/2020 3:42 PM
Sheet	9 of 9

## 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-159. PLAIN CONCRETE

### 1. SCOPE

This specification covers plain (unreinforced) concrete construction. This specification only covers construction performed the anticipated atmospheric daily low temperature is 40° F or higher for a minimum of three days after placement unless the site conditions and/or the construction methods to be used have been reviewed and approved in writing by the NRCS engineer or their designated representative.

### 2. PREPARATION OF FORMS AND SUBGRADE

Place concrete on a smoothly graded soil or sand subgrade compacted as necessary, to a uniform density throughout, unless otherwise indicated on the construction drawings. Correct over-excavation with a procedure approved by the NRCS inspector.

Ensure forms and subgrade are free of wood chips, sawdust, debris, standing water, ice, snow, extraneous form release agent, mortar, or other harmful substances or coatings prior to the placement of concrete.

Place concrete on firm and damp surfaces. Placement of concrete on plastic, mud, dried earth, uncompacted fill or frozen subgrade will not be permitted.

### 3. FORMS

Use forms of wood, plywood, steel or other approved material which are mortar tight. If using constructed forms, fabricate substantial and unyielding forms so that finished concrete will conform to the specified dimensions and contours. Use form release agents appropriate for the form materials and concrete admixtures. Apply form release agents prior to putting the forms up. Form ties may be metal, plastic or fiberglass.

Embed items in the concrete accurately and anchor firmly.

Tolerance on formed concrete is  $\pm 3/8$  inch. Tolerance on concrete formed in earth is -1 inch to +6 inches.

### 4. CONCRETE MIX

Provide the NRCS inspector a batch ticket showing the following information as a minimum:

- name of redi-mix company;
- date;
- truck number;
- name and location of job;
- amount of concrete in cubic yards;
- time of loading;
- type, brand, and amount of cement;
- grade or class and amount of pozzolan if applicable;
- type, brand, and amount of admixtures;
- Michigan Department of Transportation (MDOT) type and amount of aggregates;
- free water of all aggregates;
- amount of batch water;
- water to cement ratio;
- signature or initials of concrete producer or producer's representative

**Any concrete load delivered without a batch ticket containing the above information is to be rejected by the contractor or landowner.**

Portland cement shall be Type I or II (Type II is preferred). Type III cement may be used as part of a cold weather concreting plan. Use of cement that is partially hydrated (hardened), or otherwise damaged, is not permitted. Fly ash meeting the requirements of ASTM C618, Class F or C, may be used. Cement may be replaced with fly ash in quantities of up to 25% by weight of the total required cement. Ground granulated blast-furnace slag may be used as a substitution for Portland cement in amounts between 25 and 70 percent by weight of total required cement. Cementitious materials must be within  $\pm 1\%$  of the design mix weight.

Air entrainment is required for concrete exposed to freeze-thaw cycles and in contact with the ground or frequent exposure to moisture. For a maximum aggregate size of 3/8 inch to 1 inch the allowable air content at the time of placement is 5-7%. For a maximum aggregate size of over 1 inch, the allowable air content at the time of placement is 4-6%. Concrete protected from moisture by an impervious material or cover, or from freezing during its design life may have a total air content as specified above based on maximum aggregate size.

Aggregates shall consist of clean, hard, strong and durable particles that are free of silt, clay or any other material that may affect bonding of the cement paste. Tolerance for the batched aggregate weight from the mix design is  $\pm 2\%$ . Fine aggregate shall meet the requirements of ASTM C 33 fine aggregate or Michigan Department of Transportation Aggregate Number 2NS. Coarse aggregate shall meet the requirements of ASTM C 33, size numbers 57 or Michigan Department of Transportation Michigan Series and Classes 6A. Use of other aggregate sizes is not permitted without prior approval from the NRCS inspector.

The maximum water/cement ratio (W/C Ratio) is 0.47 or less. Water shall be clean and Use of water that is clean and free of injurious amounts of oil, salt, acid, alkali, organic matter or other deleterious substances is required. Include aggregate moisture (both fine and coarse) in the total water quantity calculations.

Water reducing admixtures conforming to ASTM C 494, Types A, D, F, or G may be used. Types D or G may be used at the discretion of the contractor/supplier when the air temperature is over 70° F.

The slump of the concrete without water reducers shall be 0 to 4 inches. Maximum slump of concrete prior to adding Type A or D water reducers shall be 3 inches. Maximum slump after adding Type A or D water reducers shall be 6 ½ inches. Maximum slump of concrete prior to adding Type F or G (high range) water reducers shall be 2 ½ inches. Maximum slump after adding Type F or G water reducers shall be 7 ½ inches.

Where design concrete strength shown on the drawings is 3500 psi or less, a mix containing the materials and properties referenced above, and the following cementitious material and water quantities, may be accepted without strength tests:

Min. Cementitious Material	Max. W/C Ratio	(Water Amounts)
lb./cu. yd.		lb./cu.yd.
517	0.47	243

Where the design concrete compressive strength is greater than 3500 psi or where the cementitious material quantities are less than shown above the minimum 28-day compressive strength is 3,500 psi or the minimum specified in the drawings, as shown by strength tests. Perform compressive strength tests as a minimum, once each day concrete is placed; once for each 150 cubic yards of concrete placed; or once for each 5000 sq. ft. of surface area of slabs and walls. Strength will be determined by the average of at least 2 test cylinders made from the same sample of concrete. Water may not be added to the load after the sample is taken.

## 5. MIXING AND PLACING CONCRETE

Thoroughly mix all concrete when delivered to the job site. Do not exceed the rated capacity of revolving drum truck mixers for the quantity of concrete delivered. Deliver a maximum load no greater than the truck manufacturer's recommendation for truck-mixed concrete or 63% of the gross volume of the drum, whichever is less.

Do not exceed the maximum w/c ratios listed above. Water to compensate for up to a 1-inch loss in slump (up to 1 gallon/cu. yd.) may be added, not to exceed the design maximum w/c ratio. Withholding some of the mixing water until the concrete arrives on the job, then adding the remaining water and turning the mixer 30 revolutions at mixing speed is allowed if the truck has a functioning sight gauge or meter, and the before and after readings are recorded on the batch ticket and initialed by the purchaser or their representative. Adding water on-site to the truck can only be done once per load and should be done before any significant quantity of concrete is discharged.

When adding admixtures on the job, turn the mixer a minimum of 30 revolutions at mixing speed before discharging the concrete.

Do not place concrete until the subgrade, forms and steel reinforcement have been inspected and approved by the NRCS inspector. Notify the inspector a minimum of 72 hours in advance to provide time for inspection.

Discharge concrete into the forms, vibrate and spade within 90 minutes after the cementitious materials have been introduced into the aggregates. When air temperatures are above 85°F, this time is reduced to 45 minutes. The inspector may allow a longer time if an approved set retarding admixture is used.

Deposit concrete as close as possible to its final position. Concrete without Type F or G water reducers will not be allowed to drop more than 5 feet from a chute or "elephant trunk". Concrete with Type F or G water reducers will not be allowed to drop more than 12 feet from the chute or "elephant trunk". If concrete must be dropped more than allowed above, use hoppers and chutes, "elephant trunks", etc., to prevent segregation.

Do not allow concrete to flow laterally more than 8 feet. If required to move concrete laterally more than 8 feet, use of shoveling, chutes, conveyors, wheelbarrows or similar equipment is required.

Place concrete in slabs at design thickness in one layer. Place concrete in walls at essentially horizontal layers not more than 24 inches high. Place successive layers and consolidate fast enough to ensure a good bond between layers and to prevent "cold joints". If the surface of a layer in place will develop its initial set before more concrete is placed on it, use of a construction joint (of the type shown in the plan) is required.

Immediately after placement, consolidate concrete by spading and vibrating, or spading and hand tamping. Consolidate wall concrete with internal type mechanical vibrators. Work concrete into corners and angles of the forms and around all reinforcement and embedded items in a manner which prevents segregation or the formation of "honeycomb". Vibration is not to be used to make concrete flow in the forms.

Ensure concrete surfaces are smooth and even. Careful screeding (striking-off) and/or wood or magnesium float finishing are required. If an impervious, protective coating will be applied to the surface of the concrete, follow the coating manufacturer's recommendations for surface preparation.

The addition of dry cement or water to the surface of screeded concrete to expedite finishing is not allowed.

## 6. FORM REMOVAL AND CONCRETE REPAIR

Do not remove forms for curbs and edges until 24 hours or more after concrete placement. When forms are removed in less than 7 days, spray the concrete with a curing compound or keep continuously wet by methods allowed in Section 7 of this specification.

Remove forms in such a way as to prevent damage to the concrete. Remove forms before walls are backfilled.

Remove form ties flush with or below the concrete surface. Patch form ties that are removed to a depth of 1/2 inch or greater with dry-pack mortar. Dry-pack mortar is one part Portland cement and three parts sand, with just enough water to produce a workable consistency.

Remove areas of the concrete surface where the concrete is "honeycombed", damaged or otherwise defective. Wet the area and then fill with a dry-pack mortar. Remove and/or repair damaged or defective concrete so as to retain the structural integrity of the member.

## 7. CURING

Prevent concrete from drying for at least 7 days after it is placed. Keep exposed surfaces continuously moist during this period by flooding, misting, covering with moistened canvas, burlap, straw, sand or other approved material, unless they are sprayed with a curing compound or covered with a 4 mil or thicker polyethylene. Keep forms left in place during the curing period wet.

If an impervious, protective coating will be applied to the surface of the concrete, follow the coating manufacturer's recommendation for concrete curing beyond the 7 days required above. Other concrete, except at construction joints, may be coated with a curing compound in lieu of continued application of moisture. Spray the compound on moist concrete surfaces as soon as free water has disappeared, but not on any surface until patching, repairs and finishing of that surface are completed.

Apply curing compound in a uniform layer over all surfaces requiring protection at a rate of not less than 1 gallon per 150 square feet of surface or to manufacturer's recommendations.

## 8. CONCRETING IN COLD WEATHER

Do not mix or place concrete when the daily atmospheric low temperature is less than 40°F unless facilities are provided to prevent the concrete from freezing. The contractor will furnish to NRCS, for approval, a written plan that shows how the contractor will meet the requirements of this specification.

Minimum requirements for cold weather concreting are:

- a. Use of warm concrete with temperatures from 55° to 65°F.
- b. Adequate protection from the weather, including the use of artificial heat, if needed, to prevent the temperature of the concrete from falling below 50°F for a period of 3 days when using type I cement and 2 days when using a set accelerator or type III cement. Alternatively, adequate protection from the weather, including the use of artificial heat, if needed, to prevent the temperature of the concrete from falling below 40°F for a period of 6 days when using type I cement and 4 days when using a set accelerator or type III cement.
- c. Set accelerators, including calcium chloride, or Type III cement may be used to speed the hardening of concrete and are allowed as part of a cold weather concreting plan.

- d. Where plain concrete will be loaded, such as in use of heavy equipment traffic, do not apply the load until the concrete has been tested to have at least 75% of its design strength. Test cylinders left on site until testing will be used to determine concrete strength.

9. CONCRETING IN HOT WEATHER

Hot weather precautions should be taken when air temperatures are at or above 85°F.

Concrete temperature shall be less than 90°F during mixing, conveying and placing.

10. LOADING SLABS

Heavy equipment traffic or other loads may not be applied to a new slab until the concrete has attained at least 65% of its design strength. Test cylinders left on site until testing may be used to determine concrete strength.

Concrete may be assumed to have attained at least 65% of its design strength when:

- 1) Concrete temperature has been maintained at 50°F or higher for a minimum of 7 days after placement, or
- 2) The concrete temperature has been maintained at less than 50°F, but above 32°F for 14 days after placement.

## CONSTRUCTION SPECIFICATION

### MI-174. TIMBER FABRICATION AND INSTALLATION

#### 1. SCOPE

The work shall consist of the construction of timber structures and timber portions of composite structures.

#### 2. MATERIALS

Structural timber and lumber shall conform to the requirements shown on the drawings. Unless otherwise specified on the drawings, timber and lumber shall be treated with:

- 1) Chromated copper arsenate (CCA) with a minimum net retention of 0.6 pounds per cubic foot for placement in contact with concrete or for building poles and and 0.4 pounds per cubic foot for other uses.
- 2) Alkaline Copper Quat (ACQ-C) ) with a minimum net retention of 0.6 pounds per cubic foot for placement in contact with concrete or for building poles and and 0.4 pounds per cubic foot for other uses.

Hardware for CCA treated wood, except cast iron and stainless steel, shall be galvanized or cadmium plated. Hardware for ACQ except cast iron and stainless steel, shall be hot dipped galvanized. Unless otherwise specified, structural steel shapes, plates and rods shall not be galvanized. Driftbolts, dowels and screws shall be either wrought iron or medium steel. Nuts, washers and bolts on a single structure shall all be of the same material and have the same coatings.

#### 3. WORKMANSHIP

All framing shall be true and exact. Timber and lumber shall be accurately cut and assembled to a close fit and shall have even bearing over the entire contact surfaces. No open or shimmed joints will be accepted. Nails and spikes shall be driven with just sufficient force to set the heads flush with the surface of the wood. Deep hammer marks in wood surfaces shall be considered evidence of poor workmanship and sufficient cause for rejection of the work.

Holes for round driftpins and dowels shall be bored with a bit 1/16 inch (1.5 mm) smaller in diameter than that of the driftpin or dowel to be used. The diameter of holes for square driftpins or dowels shall be equal to one side of the driftpin or dowel. Holes for machine bolts and rods shall be bored with a bit of the same diameter as that of the bolt. Holes for lag screws shall be bored with a bit not larger than the body of the screw at the base of the thread.

Washers shall be used in contact with all bolt heads and nuts that would otherwise be in contact with wood. Where public access is anticipated, all nuts shall be checked or burred after final tightening to effectively prevent removal.

Surfacing, cutting and boring of timber and lumber shall be kept to the practical minimum where cutting of treated timber and lumber is required. All cuts and abrasions shall be carefully trimmed and coated with not less than three brush coats of a commercially available wood preservative or sealer.

All recesses and holes cut or bored in treated timber and lumber shall be swabbed with not less than three coats of a commercially available wood preservative or sealer. After field treatment any unfilled holes shall be plugged with tightly fitting wooden plugs treated with a commercially available wood preservative or sealer.

4. HANDLING AND STORING MATERIALS

All timber and lumber stored at the site of the work shall be neatly stacked on supports above the ground surface and protected from the weather by suitable covering. Timber and lumber shall be close-stacked. The ground underneath and in the vicinity of all stacks shall be cleared of weeds and rubbish. The use of cant hooks, peavies or other pointed tools, except end hooks, will not be permitted in the handling of structural timber or lumber. Timber and lumber shall be handled with rope slings or other methods that will prevent the breaking or bruising of outer fibers, or penetration of the surface in any manner.

Compost

## 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 = 0.5 (acres) (1000 square feet)

a. Lime

The following minimum amount of lime shall be applied:

                     pounds per (acre) (1000 square feet)

                     pounds total

*per MSUE recommendation + soil test*

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.

6 pounds of (12-<sup>0</sup>12-12) 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.<sup>2</sup>)</u>	<u>Total Seed (lbs.)(kg)</u>
Creeping red fescue	0.5 lbs/1000ft <sup>2</sup>	0.3 lbs
Kentucky blue grass	0.5 lbs/1000ft <sup>2</sup>	0.3 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