PLANS PREPARED FOR:

BRYAN AND EMMA CLONINGER
BRYAN CLONINGER FARM

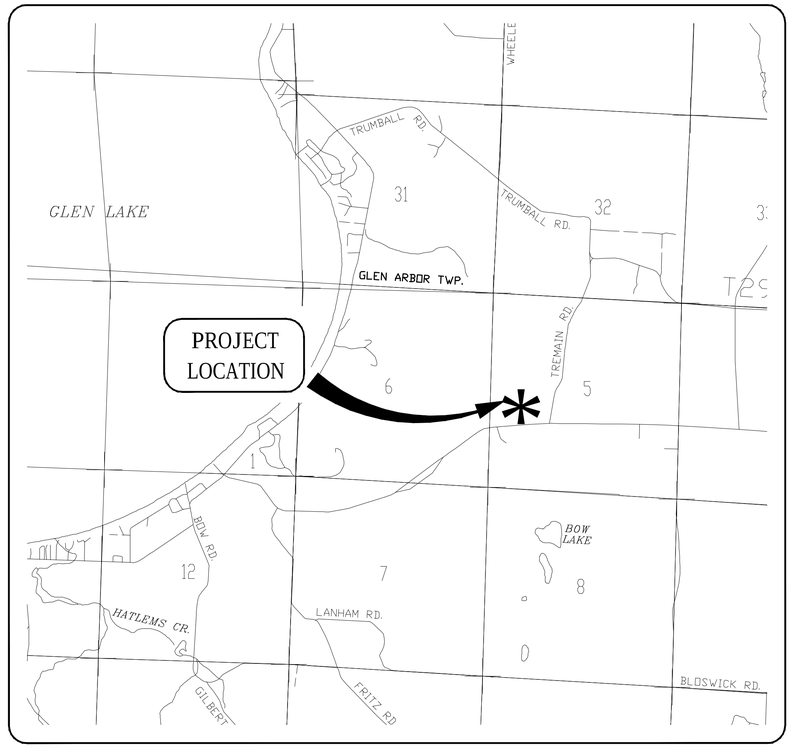
CLIENT

BRYAN AND EMMA CLONINGER
12950 HUNTBRIDGE FOREST LANE
TOWN & COUNTRY, MO 63131
PHONE: 314.504.0203

ENGINEER

Gourdie-Fraser

GOURDIE-FRASER
123 WEST FRONT STREET
TRAVERSE CITY, MICHIGAN 49684
1.800.900.5874



LOCATION MAP

KASSON TOWNSHIP, LEELANAU COUNTY, MICHIGAN
SCALE: 1" = 2,000

SHEET INDEX

1.0	COVER SHEET
2.1	EXISTING CONDITIONS AND CLEARING PLAN
3.1	PHASING PLAN
3.2	OVERALL PHASE PLAN
3.3	GRADING PLAN
3.4	DRAINAGE AND SOIL EROSION PLAN
3.5	PLAN AND PROFILE VIEW
4.0	CONSTRUCTION DETAILS

REVISION DATE: 10/22/2015

(TO TOWNSHIP)

Know what's below. Call before you dig.

PUBLIC AGENCIES AND UTILITIES

PUBLIC AGENCIES

KASSON TOWNSHIP
Telephone: 231.228.5736

BENZIE-LEELANAU HEALTH DEPARTMENT
Telephone: 231.256.0200

LEELANAU COUNTY ROAD COMMISSION
Telephone: 231.271.3993

LEELANAU COUNTY DRAIN COMMISSION
Telephone: 231.256.7688

LEELANAU COUNTY CONSTRUCTION CODE
Telephone: 231.256.9806

UTILITY AGENCIES

CHERRYLAND ELECTRIC COOPERATIVE
Telephone: 231.943.8377

CONSUMERS ENERGY
Telephone: 231.929.6242

DTE ENERGY
Telephone: 231.592.3244

CHARTER COMMUNICATIONS
Telephone: 231.929.7012

AT&T MICHIGAN
Telephone: 231.941.2707

EMERGENCY SERVICES

EMERGENCY CALLS
911

EMERGENCY AMBULANCE SERVICE
911

POLICE AGENCIES
EMERGENCY SERVICE: 911
City of Traverse City: Telephone: 231.941.2300
Leelanau County Sheriff: Telephone: 231.256.8800
Michigan State Police: Telephone: 231.946.4646

FIRE DEPARTMENTS
EMERGENCY SERVICE: 911
Cedar Lake Fire
Telephone: 231.228.5396

Elmwood Township Fire Department
Telephone: 231.941.1647

MISS DIG
EMERGENCY SERVICE: 811
Telephone: 1.800.482.7171

BRYAN AND EMMA CLONINGER: BRYAN CLONINGER FARM

These documents are prepared in accordance with the contractual terms and conditions for this project.

GFA JOB #
14118

SHEET #
1.0

Legend

TANK COVER	N.	NORTH
ELECTRICAL PANEL	S.	SOUTH
GUARD POST	E.	EAST
FLAG POLE	W.	WEST
FLOOD LIGHT	°	DEGREES
CATCH BASIN	'	FEET OR MINUTES
TEST LEAD	''	INCHES OR SECONDS
LIGHT POLE	Sq.	SQUARE
CURB STOP	Ft.	FEET
MANHOLE	Vol.	VOLUME
ELEC. TRANSFORMER	Pg.	PAGE
FIRE HYDRANT	O.R.	OFFICIAL RECORD
MAILBOX	Calc.	CALCULATED
SIGN	Rec.	RECORD
UTILITY POLE	R/W	RIGHT OF WAY
TELE. RISER	C/L	CENTERLINE
FOUND IRON	T	TITLE
FOUND MONUMENT		
SECTION CORNER LABEL		
SOIL BORING		

PHASE 1: APPROXIMATE CLEARING AND GRUBBING LIMITS

PHASE 2: APPROXIMATE CLEARING AND GRUBBING LIMITS

N W E S

GRAPHIC SCALE: 1 inch = 100 feet

0 50 100 200 300

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Municipal | Development | Transportation

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www.gourdie@fraser.com

123 W Front Street
Traverse City, MI 49684

REV#	DATE	DRN	DESC
14	08/24/2015	AJP	ISSUED TO TOWNSHIP
15	10/22/2015	AJP	RE-GRADING OF UNIT 3 AND THE PHASE 1 TURN AROUND

BRYAN AND EMMA CLONINGER

BRYAN CLONINGER FARM

EXISTING CONDITIONS AND CLEARING PLAN

SECTION 5, T28N-R13W,

KASSON TOWNSHIP, LEELANAU COUNTY, MICHIGAN

These documents are prepared in accordance with the contractual terms and conditions for this project.

P.M.: DANIEL P. WAGNER, P.E.

DR.: AJP | CKD.: DPW

JOB NO.: 14118

2.1

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Site Data

PROPERTY OWNER:
BRYAN AND EMMA CLONINGER
12950 HUNTBRIDGE FOREST LANE
TOWN & COUNTRY, MO 63131

PARCEL ADDRESS:
712 W. BURDICKVILLE RD.
MAPLE CITY, MI 49664

PARCEL INFORMATION:
PARCEL ZONING: FORESTED DISTRICT (FD)
PROPOSED PLANNED DEVELOPMENT (PD)

PROPERTY TAX NO: 45-007-005-008-10 AND 45-007-005-006-00

SEC., TOWN, RANGE: 5, T28N, R13W

PARCEL SIZE: 78.00 ACRES

PROPOSED BUILDING FOOTPRINT SQUARE FOOTAGE:
VARIES – TO BE DETERMINED

TYPICAL PARKING SPACE DIMENSIONS
PER PERTINENT STANDARDS AND REQUIREMENTS
SEE DETAILS

(PLANNED DEVELOPMENT – FORESTED DISTRICT REQUIRMENTS)

MINIMUM PARCEL AREA: 20 AC.

MAXIMUM DENSITY DEVELOPMENT ACREAGE: 1 UNIT/5 ACRES

REQUIRED OPEN SPACE: 70%

TOTAL AREA: 78 AC.
DEVELOPED AREA : 12.81 AC.
TOTAL OPEN SPACE 65.19 AC.
(INCL. PRIVATE ROAD AND R.O.W.)
= 83.58% (FULL BUILD OUT)

MINIMUM LOT WIDTH: 165'

STRUCTURE BUILDING HEIGHT: 35'

YARD SETBACKS (PROPOSED):
FRONT: 50'
SIDE: 25'
REAR: 50'

PARKING REQUIREMENTS:
PER KASSON TOWNSHIP AND PERTINENT STANDARDS.
TO BE DETERMINED

Surveyor's Legend

Tank Cover	N	North
Electrical Panel	S	South
Guard Post	E	East
Flag Pole	W	West
Flood Light	°	Degrees
Catch Basin	'	Feet or Minutes
Test Lead	''	Inches or Seconds
Light Pole	Sq.	Square
Curb Stop	Ft.	Feet
Manhole	Vol.	Volume
Elec. Transformer	Pg.	Page
Fire hydrant	O.R.	Official Record
Mailbox	C	Calculated
Sign	R	Record
Utility Pole	R/W	Right of Way
Guy Anchor	C/L	Centerline
Tele. riser	T	TITLE
Found Iron		
Found Monument		
Section Corner Label		

Phase Legend

PHASE 1: GRAVEL ROAD W/ STORM BASINS, TRAILS, TENT PLATFORMS, PRIVIES, AND BARN

PHASE 2: PAVE EXISTING GRAVEL ROAD (PHASE 1) AND PAVE TO CUL-DE-SAC, EXCAVATE ADD'L STORM BASINS, CONSTRUCT COTTAGES AND DRAINFIELDS IN NUMERICAL ORDER (1–7) W/ OPTIONAL COTTAGE EXPANSION (8*–10*)

PHASE 3: PAVE FROM CUL-DE-SAC TO TREMAIN ROAD, CONSTRUCT INN KEEPERS HOME AND WEC

General Notes

1. BEARING BASIS: CERTIFICATE OF SURVEY BY GOURDIE-FRASER, FILE NO. 07310
2. DATUM OF ELEVATIONS: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88)
3. CONTOUR INTERVAL: 10 FEET
4. CONTOURS DERIVED FROM USGS DIGITAL TERRAIN MODELS AND JUNE 2014 GFA TOPOGRAPHICAL SURVEY
5. TITLE WORK CONTAINING RECORD EASEMENTS HAS NOT BEEN MADE AVAILABLE TO GOURDIE-FRASER, INC. AT THE TIME OF THE PREPARATION OF THIS DRAWING AND MAY AFFECT AREA CALCULATIONS.
6. RESIDENTIAL HOMES TO BE SERVICED BY INDIVIDUAL WATER WELLS, SEPTIC TANKS AND DRAIN FIELDS AND WILL BE APPROVED BY THE BENZIE-LEELANAU HEALTH DEPARTMENT.
7. PROPOSED ROADS, INTERSECTIONS, PARKING AND OTHER REGULATED IMPROVEMENTS WILL BE IN ACCORDANCE WITH ALL REQUIREMENTS OF KASSON TOWNSHIP, LEELANAU COUNTY ROAD COMMISSION OR OTHER AGENCIES HAVING JURISDICTION.
8. THE EXISTING STAND OF MATURE PINES WOULD BE RETAINED ALONG THE SOUTH AND EAST PORTIONS OF THE PROPERTY WHERE THE PROJECT ABUTS THE PUBLIC ROADS TO PROVIDE FOR PERIMETER BUFFERING AND SCREENING AS SHOWN ON THE SUBMITTED SITE PLAN.

Legal Descriptions

(AS FURNISHED)

Legal Description for 45-007-005-006-00:

UNREC SURVEY SW 1/4 OF NW 1/4 MORE FULLY DESCR AS BEG AT W 1/4 SEC 5 TH N 00 DEG 08'35" E ALG W SEC LN 1323.17 FT TO N 1/8 LN TH S 87 DEG 36'20" E ALG N 1/8 LN 1313.05 FT TO W 1/8 LN TH S 00 DEG 01'15" E ALG W 1/8 LN 1323.70 FT TO E-W 1/4 LN TH N 87 DEG 35'21" W ALG E-W 1/4 LN 1316.65 FT TO POB

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BRYAN AND EMMA CLONINGER
BRYAN CLONINGER FARM
PHASING PLAN
SECTION 5, T28N-R13W,
KASSON TOWNSHIP, LEELANAU COUNTY, MICHIGAN

These documents are prepared in accordance with the contractual terms and conditions for this project.

P.M.: DANIEL P. WAGNER, P.E.
DR.: AJP CKD.: DPW
JOB NO.: 14118
3.1

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Guard Post	E	East
Flag Pole	W	West
Flood Light	°	Degrees
Catch Basin	'	Feet or Minutes
Test Lead	''	Inches or Seconds
Light Pole	Sq.	Square
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Manhole	Vol.	Volume
Elec. Transformer	Pg.	Page
Fire hydrant	O.R.	Official Record
Mailbox	C	Calculated
Sign	R	Record
Utility Pole	R/W	Right of Way
Guy Anchor	C/L	Centerline
Tele. riser	T	TITLE
Found Iron		
Found Monument		
Section Corner Label		

Construction Notes

1. PAVING DETAIL (SEE DETAIL SHEETS)
2. GRAVEL ROAD DETAIL (SEE DETAIL SHEETS)
3. INSTALL COMMERCIAL ENTRANCE DRIVEWAY OPENING (SEE SHEET 3.3 FOR GRADING & DIMENSIONS)
4. LAYOUT FOR STANDARD PARKING SPACES (SEE SHEET 3.3 FOR GRADING & DIMENSIONS)
5. 12' UTILITY ACCESS DRIVE
6. INSTALL SEPTIC TANK & DRAINFIELD, FOLLOWING SOILS EVALUATION (TO BE DESIGNED)
7. INSTALL CLONINGER FARM SIGN TO MEET KASSON TOWNSHIP STANDARDS (SEE DETAIL SHEETS)
8. INSTALL LANDSCAPE BUFFER PER KASSON TOWNSHIP LANDSCAPING STANDARDS (SEE DETAIL SHEETS)
9. INSTALL NO THRU TRAFFIC SIGN TO MEET KASSON TOWNSHIP STANDARDS (SEE DETAIL SHEETS)

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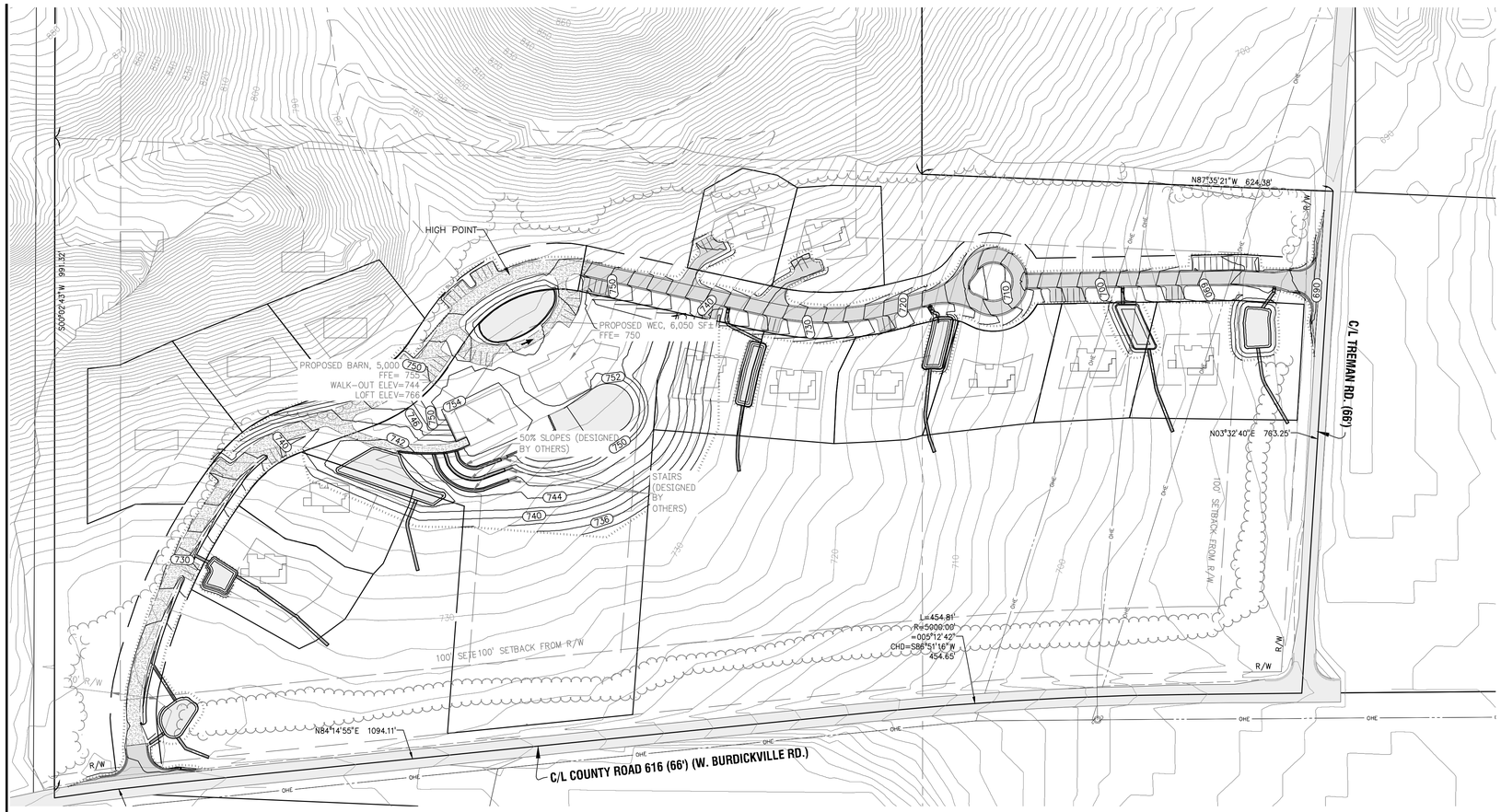
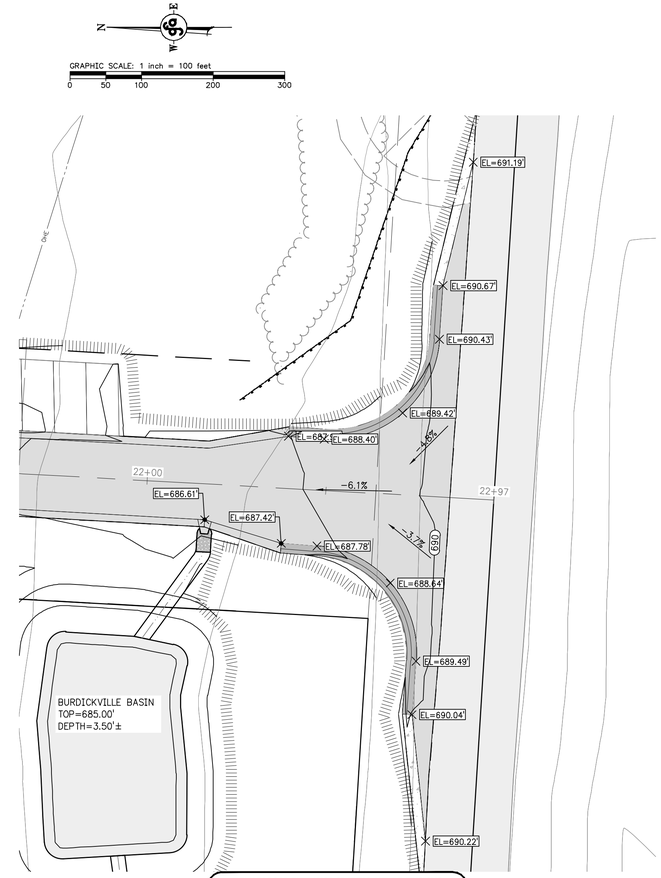
BRYAN AND EMMA CLONINGER
BRYAN CLONINGER FARM
OVERALL SITE PLAN
SECTION 5, T28N-R13W,
KASSON TOWNSHIP, LEELANAU COUNTY, MICHIGAN

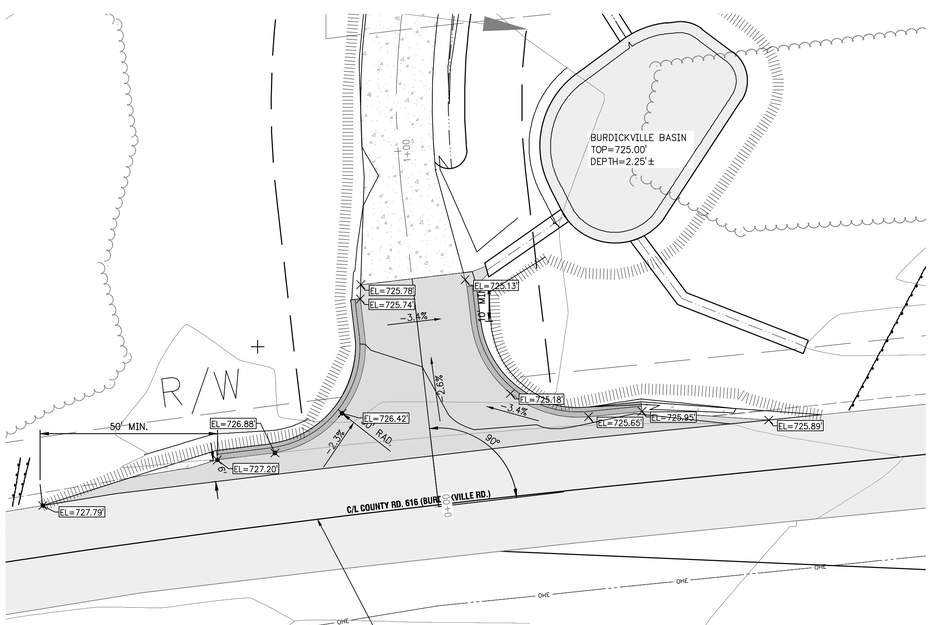
P.M.: DANIEL P. WAGNER, P.E.
DR.: AJP CKD.: DPW
JOB NO.: 14118

3.2

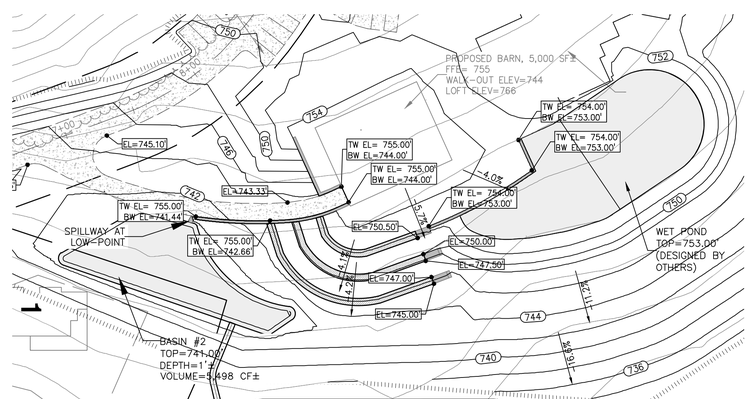




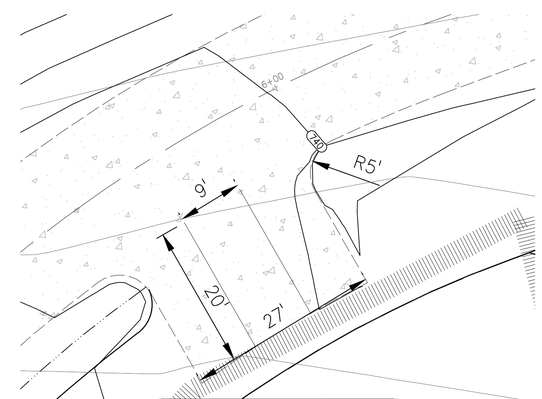
TREMAIN ROAD ENTRANCE GRADING AND DIMENSIONS
SCALE:1" = 20'



BURDICKVILLE ROAD ENTRANCE GRADING AND DIMENSIONS
SCALE:1" = 20'



BARN GRADING AND DIMENSIONS
SCALE:1" = 50'



TYPICAL PARKING AREA GRADING AND DIMENSIONS
SCALE:1" = 10'

General Notes

1. ALL CURB GRADES ARE BACK OF CURB UNLESS OTHERWISE DESIGNATED.
2. SITEWORK CONTRACTOR SHALL GRADE BUILDING PAD AREA TO 4" BELOW FFL GRADE WITHIN BUILDING LIMITS. BACKFILL MATERIAL SHALL BE CLEAN GRANULAR FILL FROM ON-SITE EXCAVATIONS. COORDINATE FILL MATERIAL PLACEMENT WITH SITE ENGINEER FOR CONCURRENCE.
3. ANNUAL INSPECTIONS OF STORMWATER BASINS SHALL BE COMPLETED TO VERIFY BASINS ARE FUNCTIONING PROPERLY.

Legend

665	EXISTING CONTOURS
665	PROPOSED CONTOURS
-2.0%	PROPOSED GRADING DIRECTION

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BRYAN AND EMMA CLONINGER
BRYAN CLONINGER FARM
GRADING PLAN
SECTION 5, T28N-R13W,
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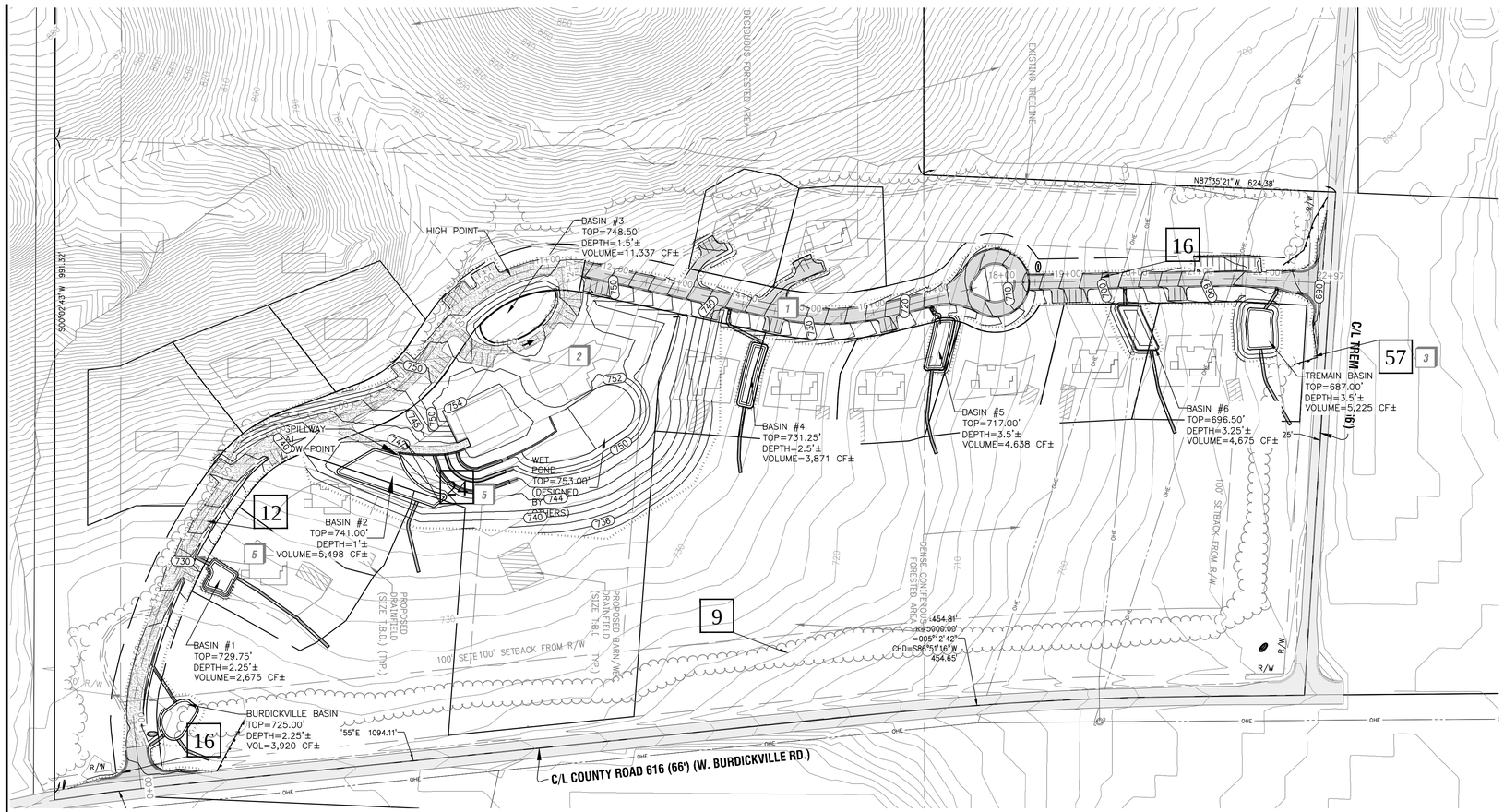
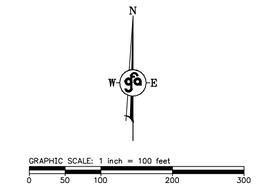
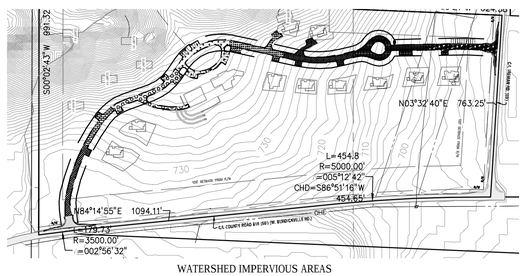
3.3

T:\PROJECTS\14118\DWG\BCORD\ V5\14118.G.RD 15.DWG-(10/22/15 11:12 AM) AJPERRIN







WATERSHED IMPERVIOUS AREAS

- BURDICKVILLE (10,090 SF)
- DRAINAGE 1 (4,344 SF)
- DRAINAGE 2 (13,682 SF)
- DRAINAGE 3 (12,163 SF)
- DRAINAGE 4 (8,655 SF)
- DRAINAGE 5 (10,531 SF)
- DRAINAGE 6 (12,213 SF)
- TREMAIN (9,880 SF)

WATERSHED MAP
SCALE 1"=300'

DESIGN PARAMETERS:
PER A CORRESPONDENCE WITH STEVE CHRISTENSEN WITH LEELANAU SOILS, THE STORM WATER BASINS FOR EACH WATERSHED WERE DESIGNED WITH THE "SIMPLIFIED METHOD". THE SIMPLIFIED METHOD APPLIES 2 ½" OF RAIN OVER THE PROPOSED IMPERVIOUS AREA.

EACH OF THE BASINS WERE DESIGNED WITHOUT APPLYING ANY INFILTRATION RATES. AND EACH OF THE BASINS EXCEPT FOR BASIN #4 HAVE OVERFLOW SWALES TO THE PROPOSED AGRICULTURAL AREAS. BASIN #4 WILL OVERFLOW TO THE PROPOSED WET POND (AS SHOWN).

BURDICKVILLE DRAINAGE:

ROAD IMPERVIOUS AREA=	10,080 SF
VOLUME REQUIRED=10,080 SF x 2.5"/12"/1FT=	2,100 CF
VOLUME PROVIDED IN BURDICKVILLE BASIN=	3,920 CF

DRAINAGE #1:

ROAD IMPERVIOUS AREA=	4,344 SF
COTTAGE IMPERVIOUS AREA= (1) x 2,300 SF=	2,300 SF
TOTAL IMPERVIOUS AREA=	6,644 SF
VOLUME REQUIRED=6,644 SF x 2.5"/12"/1FT=	1,385 CF
VOLUME PROVIDED IN BASIN #1=	2,675 CF

DRAINAGE #2:

ROAD IMPERVIOUS AREA=	11,382 SF
COTTAGE IMPERVIOUS AREA=	2,300 SF
SCHOOL/RESIDENCE IMPERVIOUS AREA=	5,000 SF
TOTAL IMPERVIOUS AREA=	18,682 SF
VOLUME REQUIRED=13,682 SF x 2.5"/12"/1FT=	3,892 CF
VOLUME PROVIDED IN BASIN #2=	5,498 CF

DRAINAGE #3:

ROAD IMPERVIOUS AREA=	12,163 SF
WEC IMPERVIOUS AREA=	6,050 SF
TOTAL IMPERVIOUS AREA=	18,213 SF
VOLUME REQUIRED=21,805 SF x 2.5"/12"/1FT=	3,794 CF
VOLUME PROVIDED IN BASIN #3=	11,337 CF

DRAINAGE #4:

ROAD IMPERVIOUS AREA=	8,655 SF
COTTAGE IMPERVIOUS AREA= (2) x 2,300 SF=	4,600 SF
TOTAL IMPERVIOUS AREA=	13,255 SF
VOLUME REQUIRED=13,255 SF x 2.5"/12"/1FT=	2,762 CF
VOLUME PROVIDED IN BASIN #4=	3,871 CF

DRAINAGE #5:

ROAD IMPERVIOUS AREA=	10,531 SF
COTTAGE IMPERVIOUS AREA= (3) x 2,300 SF=	6,900 SF
TOTAL IMPERVIOUS AREA=	17,431 SF
VOLUME REQUIRED=17,431 SF x 2.5"/12"/1FT=	3,631 CF
VOLUME PROVIDED IN BASIN #5=	4,638 CF

DRAINAGE #6:

ROAD IMPERVIOUS AREA=	12,213 SF
COTTAGE IMPERVIOUS AREA= (2) x 2,300 SF=	4,600 SF
TOTAL IMPERVIOUS AREA=	16,813 SF
VOLUME REQUIRED=12,213 SF x 2.5"/12"/1FT=	3,503 CF
VOLUME PROVIDED IN BASIN #6=	4,675 CF

TREMAIN DRAINAGE:

ROAD IMPERVIOUS AREA=	9,881 SF
COTTAGE IMPERVIOUS AREA=	2,300 SF
TOTAL IMPERVIOUS AREA=	12,181 SF
VOLUME REQUIRED=9,881 SF x 2.5"/12"/1FT=	2,538 CF
VOLUME PROVIDED IN BASIN #6=	5,225 CF

STORMWATER CALCULATIONS
SCALE 1"=

MICHIGAN UNIFIED KEYING SYSTEM

9	VEGETATIVE BUFFER STRIP	SLOWS RUNOFF VELOCITY FILTERS SEDIMENT FROM RUNOFF REDUCES VOLUME OF RUNOFF ON SLOPES
12	COMPACTION	HELPS HOLD SOIL IN PLACE, MAKING EXPOSED AREAS LESS VULNERABLE TO EROSION
15	PAVING	PROTECTS AREA WHICH OTHERWISE CANNOT BE PROTECTED, BUT INCREASES RUNOFF VOLUME AND VELOCITY IRREGULAR SURFACE WILL HELP SLOW VELOCITY
16	CURB & GUTTER	KEEPS HIGH VELOCITY RUNOFF ON PAVED AREAS FROM LEAVING PAVED SURFACE COLLECTS AND CONDUCTS RUNOFF TO ENCLOSED DRAINAGE SYSTEM OR PREPARED DRAINAGEWAY
24	GRASSED WATERWAY	MUCH MORE STABLE FORM OF DRAINAGEWAY THAN BARE CHANNEL GRASS TENDS TO SLOW RUNOFF AND FILTER OUT SEDIMENT USED WHERE BARE CHANNEL WOULD BE ERODED
57	GEOTEXTILE SILT FENCE	USES GEOTEXTILE AND POSTS OR BALES MAY BE CONSTRUCTED OR PREPACKAGED EASY TO CONSTRUCT AND LOCATE AS NECESSARY

Storm/Drainage Notes

1. INSTALL ASPHALT SPILLWAY (TYP.) AND RIP-RAP APRON (SEE DETAILS)
2. INSTALL 12" CMP CULVERT AND END SECTIONS WITH STONE RIP-RAP APRON (SEE DETAILS)
3. INSTALL SILT FENCE (140 LF +/-) (SEE DETAILS)
4. INSTALL EMERGENCY OVERFLOW (TYP.) (SEE DETAILS)
5. GRASSED "V" BOTTOM SWALE (TYP.) (SEE DETAILS)

Legend

- 665 EXISTING CONTOURS
- 665 PROPOSED CONTOURS
- PROPOSED SILT FENCE (140 LF +/-)
- PROPOSED DRAINAGE FLOW

General Notes

1. ALL CURB GRADES ARE BACK OF CURB UNLESS OTHERWISE DESIGNATED.
2. SITEWORK CONTRACTOR SHALL GRADE BUILDING PAD AREA TO 4" BELOW FFL GRADE WITHIN BUILDING LIMITS. BACKFILL MATERIAL SHALL BE CLEAN GRANULAR FILL FROM ON-SITE EXCAVATIONS. COORDINATE FILL MATERIAL PLACEMENT WITH SITE ENGINEER FOR CONCURRENCE.
3. EMERGENCY OVERFLOW SWALE SHALL BE GRADED TO PROMOTE DRAINAGE AWAY FROM THE
4. ANNUAL INSPECTIONS OF STORMWATER BASINS SHALL BE COMPLETED TO VERIFY BASINS ARE FUNCTIONING PROPERLY.
5. SITE GRADING COST ESTIMATE DOES NOT INCLUDE THE EXCAVATION OF POND(S) #1 AND #2

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REV#	DATE	DRN	DESC
14	08/24/2015	AJP	ISSUED TO TOWNSHIP
15	10/22/2015	AJP	RE-GRADING OF UNIT 3 AND THE PHASE 1 TURN AROUND

These documents are prepared in accordance with the contractual terms and conditions for this project.

BRYAN AND EMMA CLONINGER
BRYAN CLONINGER FARM
DRAINAGE AND SOIL EROSION PLAN
SECTION 5, T28N-R13W,
KASSON TOWNSHIP, LEELANAU COUNTY, MICHIGAN

P.M.: DANIEL P. WAGNER, P.E.
DR.: AJP
CKD.: DPW
JOB NO.: 14118

3.4

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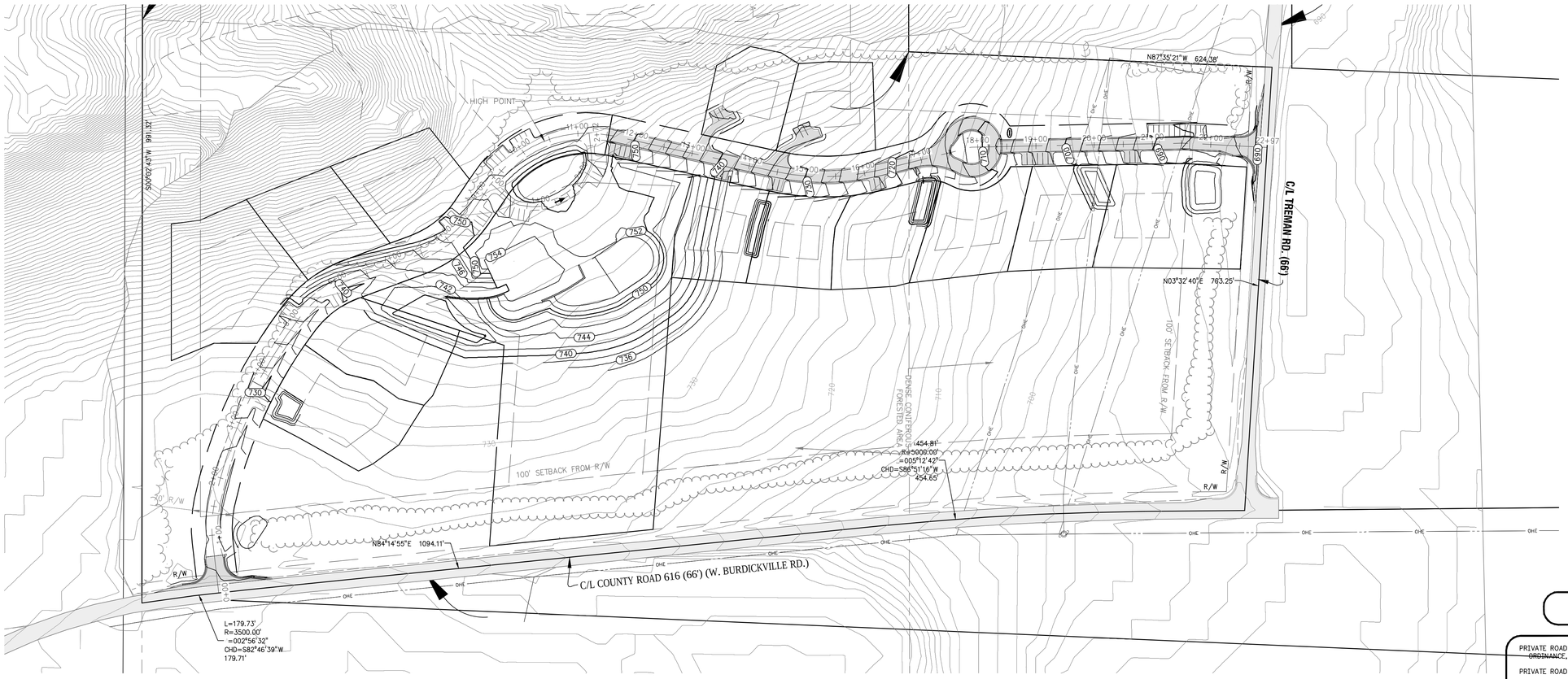
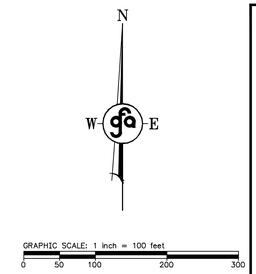




General Notes

PRIVATE ROAD DESIGNED IN ACCORDANCE WITH KASSON TOWNSHIP PRIVATE ACCESS ROAD ~~ORDINANCE~~, ORDINANCE NO. 2007-01.

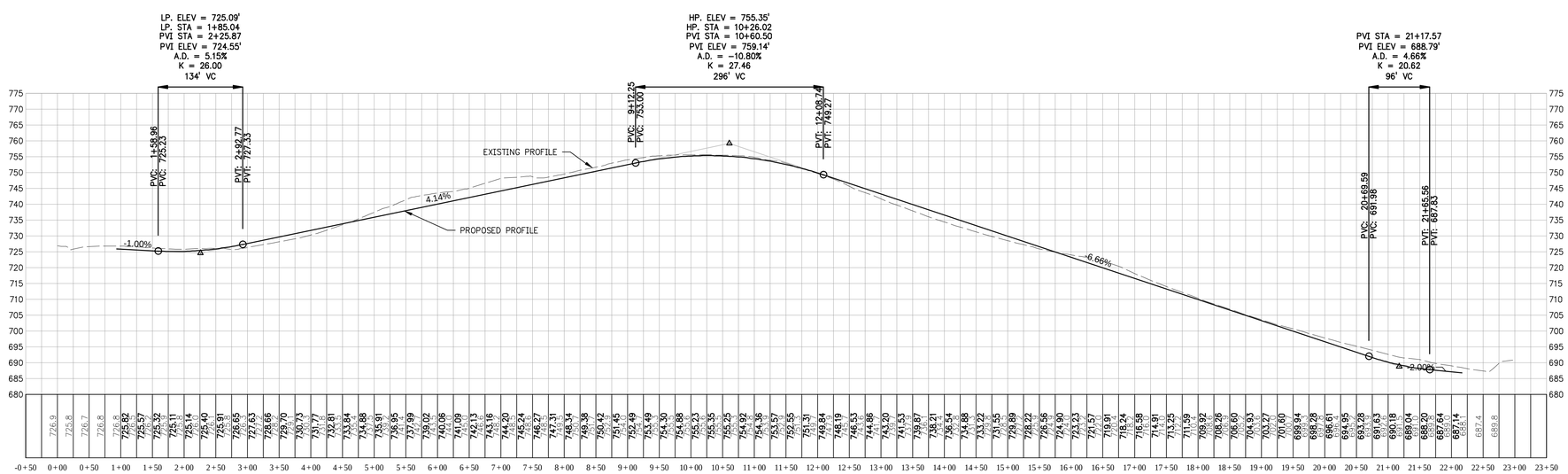
PRIVATE ROAD GEOMETRY BASED ON AASHTO RECREATIONAL ROAD STANDARDS AT 25 MPH

HORIZONTAL ALIGNMENT CRITERIA
MINIMUM HORIZONTAL CURVE RADIUS= 198 FT

VERTICAL ALIGNMENT CRITERIA
MINIMUM CREST VERTICAL CURVE= 12.00
MINIMUM SAG VERTICAL CURVE= 26.00

BRYAN CLONINGER FARM PRIVATE ROAD PROFILE (STA. 00+00 TO 22+85)

SCALE:
HORIZONTAL: 1" = 50'
VERTICAL: 1" = 10'



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REV#	DATE	DES	ISSUED TO TOWNSHIP
		BBSC	
L4	08/24/2015	AJP	
L5	10/12/2015	AJP	RE-GRADING OF UNIT 3 AND THE PHASE 1 TURN AROUND

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BRYAN AND EMMA CLONINGER
BRYAN CLONINGER FARM
PLAN AND PROFILE VIEW
SECTION 5, T28N-R13W,
KASSON TOWNSHIP, LEELANAU COUNTY, MICHIGAN

P.M.: DANIEL P. WAGNER, P.E.
DR.: AJP
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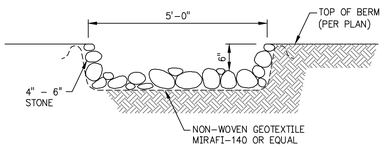
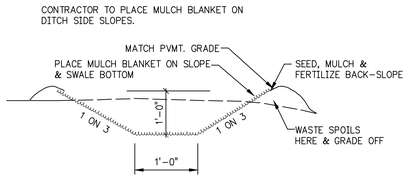
3.5



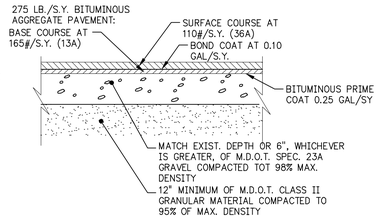
1 4.0 ARMORED EMERGENCY OVERFLOW DETAIL

NO SCALE



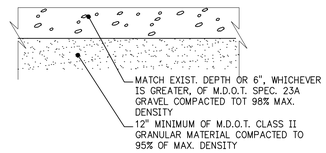
2 4.0 DRAINAGE SWALE DETAIL

NO SCALE



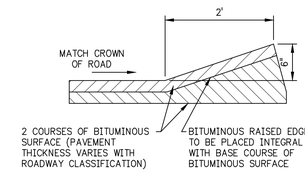
3 4.0 PAVING DETAIL

NO SCALE



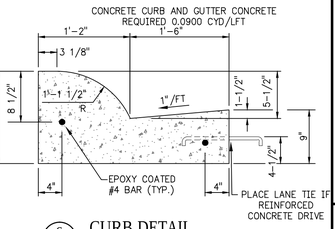
4 4.0 GRAVEL DETAIL

NO SCALE



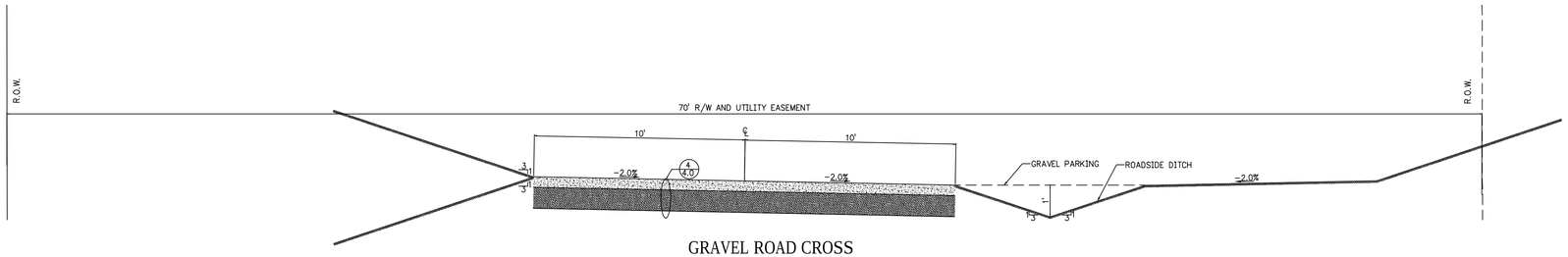
5 4.0 BITUMINOUS RAISED EDGE DETAIL

NO SCALE



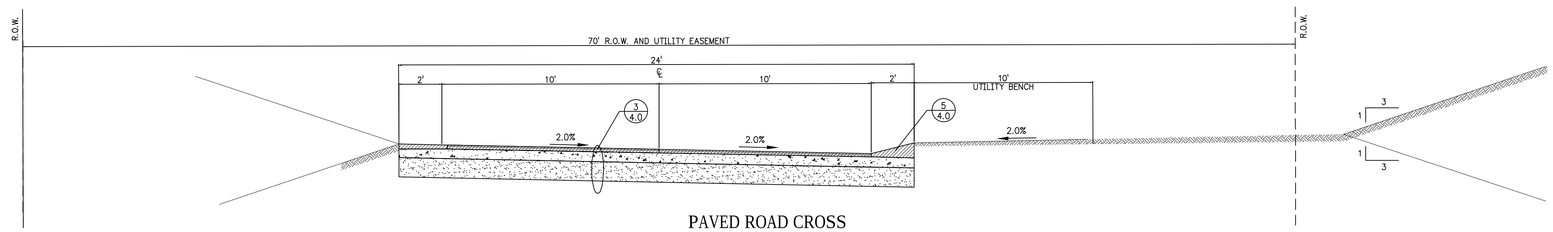
6 4.0 CURB DETAIL

(M.D.O.T. TYPE B2)



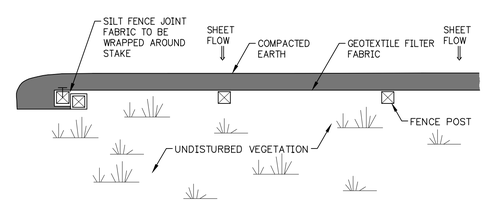
8 4.0 GRAVEL ROAD CROSS SECTION

STA 00+00 TO 11+53
SCALE: 1"=3'

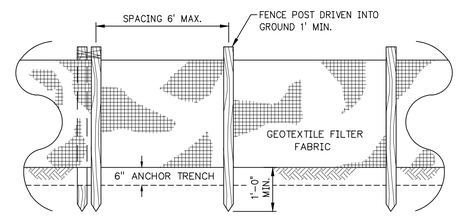


8 4.0 PAVED ROAD CROSS SECTION

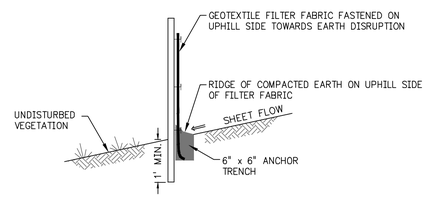
STA 11+53 TO 22+97
SCALE: 1"=3'



PLAN VIEW



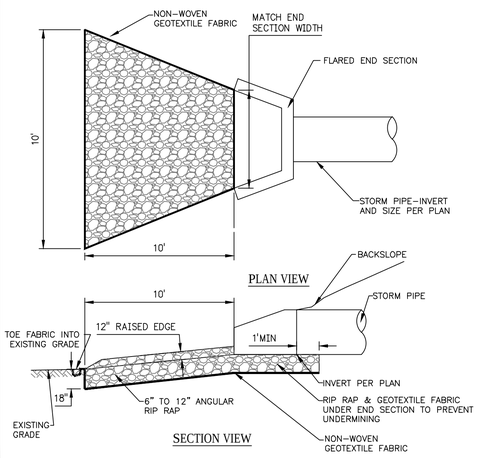
FRONT ELEVATION



SECTION VIEW

11 4.0 SILT FENCE DETAILS

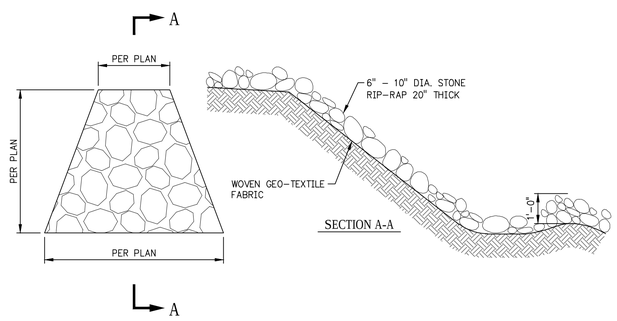
NO SCALE



SECTION VIEW

9 4.0 CULVERT END SECTION DETAIL

NO SCALE



10 4.0 STONE RIP-RAP APRON

NO SCALE

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