

STATE OF MONTANA  
DEPARTMENT OF ENVIRONMENTAL QUALITY  
CERTIFICATE OF SUBDIVISION PLAT APPROVAL  
(Section 76-4-101 et seq.)

TO: County Clerk and Recorder  
Gallatin County  
Bozeman, Montana

E.Q. # 17-1640

THIS IS TO CERTIFY THAT the plans and supplemental information relating to the subdivision known as:  
**VIKING-1 MINOR SUBDIVISION**

A tract of land as described in Film 106, Page 1168 DEEDS, located in the SE¼ and SW¼ of Section 23, Township 2 South, Range 4 East, P.M.M., Gallatin County, Montana as found in the records of the Gallatin County Clerk & Recorder, containing 25.123 acres and subject to any existing easement of record.

Consisting of five lots (LOTS 1, 2, 3, 4 & 5) having been reviewed by personnel of the Water Quality Division, and,

THAT the documents and data required by ARM Chapter 17 Section 36 have been submitted and found to be in compliance therewith, and,

THAT the approval of the lots are made with the understanding that the following conditions shall be met:

THAT the lot sizes as indicated on the Plat to be filed with the county clerk and recorder will not be further altered without approval, and,

THAT LOT 1 shall be used for two commercial units with a maximum total wastewater design flow of 312 gpd, LOT 2 and LOT 3 shall be used for one commercial unit each, with a maximum wastewater design flow of 312 gpd, and LOT 4 shall be used by one living unit, and LOT 5 shall be used by one 8-bedroom living unit, and,

THAT the approved proposed locations of the individual and shared wells and wastewater treatment system primary disposal and replacement areas shall be staked by the engineer or site evaluator prior to any construction on the lots, and,

**WATER SYSTEM REQUIREMENTS:**

THAT the existing individual well on LOT 5 shall be properly abandoned in accordance with requirements set forth in the Administrative Rules of Montana and local regulations, and,

THAT the proposed shared water system serving LOT 1 will consist of a well drilled to a minimum depth of 25 feet constructed in accordance with the criteria established in Title 17, Chapter 36, Sub-Chapters 1, 3, and 6 ARM and the most current standards of the Department of Environmental Quality, and,

THAT the proposed individual water systems serving LOTS 2, 3, 4 & 5 will consist of a well drilled to a minimum depth of 25 feet constructed in accordance with the criteria established in Title 17, Chapter 36, Sub-Chapters 1, 3, and 6 ARM and the most current standards of the Department of Environmental Quality, and,

Page 1 of 16  
Viking-1 Minor Subdivision  
Gallatin County, Montana  
EQ# 17-1640

**2598641**

Page: 1 of 16 11/15/2017 08:37:55 AM Fee: \$112.00  
Charlotte Mills - Gallatin County, MT MISC



THAT the well serving LOT 2 will be located onto LOT 1 by easement as shown on the plat, and,

THAT data provided indicates an acceptable water source at a depth of approximately 50 feet, and,

THAT the top of the well casing shall be sealed with a screened, vented sanitary well seal which, when installed, creates a watertight seal to prevent the entrance of water or foreign materials into the well, and,

**WASTEWATER TREATMENT SYSTEM REQUIREMENTS FOR COMMERCIAL LOTS 1, 2 & 3:**

THAT the individual (LOTS 2 & 3) and shared (LOT 1) wastewater treatment system will consist of a septic tank, effluent filter, dose tank and pressure-dosed, gravelless-chambered, **shallow-capped**, subsurface drainfield of such size and descriptions as will comply with Title 17, Chapter 36, Sub-Chapters 1, 3 & 6 ARM, and Gallatin City-County Regulations for Wastewater Treatment Systems, and shall be constructed in accordance with the approved plans and specifications, provided by Allied Engineering of Bozeman, MT or by equivalent plans and specifications, and,

THAT the pressure-dosed, gravelless-chambered, shallow-capped, subsurface drainfield shall have an absorption area of sufficient size to provide for an application rate of 0.5 gpd/square foot (plus a 25% size reduction for use of gravelless chambers), and,

THAT the pressure-dosed, gravelless-chambered, shallow-capped, subsurface drainfield trenches shall be 12-inches in depth, covered by a cap of topsoil material a minimum of 12-inches deep which also extends two feet beyond the edges of the trench before the sides are shaped to a 3:1 or lesser slope, and with the cap sloped to provide positive drainage away from the center of the drainfield, and,

THAT the replacement drainfield area shall be sized without reduction, and,

THAT the commercial units shall not dispose of hazardous/deleterious waste substances in the wastewater treatment system, and the wastewater treatment system shall only accept wastewater having a strength and chemical make-up typical of residential toilet, sink and shower waste. The Gallatin City-County Health Department may choose to require effluent sampling of wastewater to confirm that the entity is producing residential strength wastewater and is not exceeding the design flow. If found to exceed the definition of residential strength or design flow, a design rewrite may be required at a future date, and,

THAT the commercial units shall not service 25 or more people for more than sixty (60) days per year unless approval is first obtained from the Department for the expanded use.

THAT the onsite wastewater treatment system shall be protected from both vehicular traffic and livestock trampling, and,

**WASTEWATER TREATMENT SYSTEM REQUIREMENTS FOR LOT 4:**

THAT part of the individual wastewater system serving LOT 4 will be located on LOT 3 by easement as shown on the plat, and,

THAT the individual wastewater treatment system will consist of a septic tank, effluent filter and pressure-dosed, gravelless-chambered, subsurface drainfield of such size and descriptions as will comply with Title 17, Chapter 36, Sub-Chapters 1, 3 & 6 ARM, and Gallatin City-County Regulations for Wastewater Treatment Systems, and shall be constructed in accordance with the approved plans and

specifications, provided by Allied Engineering of Bozeman, MT or by equivalent plans and specifications, and,

THAT the pressure-dosed, gravelless-chambered, subsurface drainfield shall have an absorption area of sufficient size to provide for an application rate of 0.5gpd/square foot (plus a 25% reduction for use of gravelless chambers), and,

THAT the pressure-dosed, gravelless-chambered, subsurface absorption trenches shall be excavated no deeper than 24 to 36 -inches below natural ground surface, and,

THAT the replacement drainfield area shall be sized without reduction, and,

THAT the onsite wastewater treatment system shall be protected from both vehicular traffic and livestock trampling, and,

**WASTEWATER TREATMENT SYSTEM REQUIREMENTS FOR LOT 5:**

THAT the existing wastewater treatment system on LOT 5 shall be properly abandoned in accordance with requirements set forth in the Administrative Rules of Montana and local regulations, and,

THAT the individual sewage treatment system will at a minimum consist of a 1,000 gallon septic tank, effluent filter, recirculating trickling filter, dosing tank and shallow-capped, pressure-dosed, gravelless-chambered, subsurface drainfield of such size and description as will comply with Title 17, Chapter 36, Sub-Chapters 1, 3, and 6 ARM, and,

THAT the shallow-capped, pressure-dosed, gravelless-chambered, subsurface drainfield shall have an absorption area of sufficient size to provide an application rate of 0.5 gallons per day per square foot (plus a 25% size reduction due to the use of the gravelless-chambers for the primary drainfield) and,

THAT the shallow-capped, pressure-dosed, gravelless-chambered, subsurface drainfield trenches shall be 20-inches in depth, covered by a cap of topsoil material a minimum of 12-inches deep which also extends two feet beyond the edges of the trench before the sides are shaped to a 3:1 or lesser slope, and with the cap sloped to provide positive drainage away from the center of the drainfield, and,

THAT the replacement drainfield area shall be sized without reduction, and,

That the conditions of approval of a recirculating trickling filter treatment requires an Operation & Maintenance (O&M) contract with an authorized Dealer/Representative, in accordance with Department Circular DEQ 4 Appendix D and ARM 17.30.718(8) , and,

THAT the O&M contract shall include a bi-annual on-site inspection of all major components of the wastewater treatment system for the first two (2) years after use of the system begins, and annually thereafter, in accordance with Department Circular DEQ 4 Appendix D and ARM 17.30.718(8)(a), and

THAT annual sampling in accordance with Department Circular DEQ 4 Appendix D and ARM 17.30.718(8)(b) is required for the life of the system and shall be for the following parameters: nitrate; nitrite, ammonia, TKN, BOD, TSS, fecal coliform, specific conductance and temperature. Effluent sampling shall be conducted after all treatment is complete but before discharge into the absorption system. All water analysis shall be conducted according to the EPA approved method by an independent laboratory, except for temperature which shall be measured on-site. The monitoring results must be

maintained by the service provider and made available to the Department by the service provider at any time that the Department requests the results, and,

THAT the onsite wastewater treatment system shall be protected from both vehicular traffic and livestock trampling, and,

**OTHER REQUIREMENTS FOR ALL LOTS:**

THAT the bottom of the drainfield shall be at least four feet above the water table, and,

THAT no sewage treatment system shall be constructed within 100 feet of the maximum high-water level of a 100-year flood of any stream, lake, watercourse, or irrigation ditch, nor within 100 feet of any domestic water supply source, and,

THAT water supply systems, sewage treatment systems and storm drainage systems will be located as shown on the approved plans, and,

THAT the conveyance and catchment structures consisting of roadside ditches, one 17-inch by 13-inch CMP Archway, grading, lawn and landscaping, and retention facilities shall be constructed and located in accordance with the approved plan sheets prepared by Allied Engineering Services, Inc., dated 8/22/2017 under the stamp and signature of Mark A. Fasting, P.E. License #12071, and received by the Department on 8/30/2017, and,

THAT the storm drainage design submitted by Allied Engineering Services, Inc. requires that square footage amounts of impervious area, well-maintained irrigated lawn and landscaped area, and non-irrigated native grasses shall be in accordance with Detail Section 7 on Sheet WW9, and,

THAT within 90 days after construction is completed, project certification shall be accompanied by a complete set of "as-built" drawings bearing the signature and seal of the professional engineer must be submitted to the Department, and,

THAT the commercial storm drainage system will be owned, operated, and maintained by the Homeowners' Association in accordance with the attached Minor Subdivision No. Storm Drainage Maintenance Plan, and,

THAT construction of the commercial storm drainage system will be completed within three years of the approval date. If more than three years elapse before completing construction, plans and specifications must be resubmitted and approved before construction begins. This three-year expiration period does not extend any compliance schedule requirements associated with a Department enforcement action against a public water or sewage system, and,

THAT if construction disturbance will exceed 1-acre, a construction stormwater permit from the Department will be required, and,

THAT the developer and/or owner of record shall provide each purchaser of property with a copy of the Plat approved location of water supply, sewage treatment system and storm drainage structures as shown on the attached lot layout, and a copy of this document, and,

THAT instruments of transfer for this property shall contain reference to these conditions, and,

THAT plans and specifications for any proposed sewage treatment systems will be reviewed and approved by the county health department and will comply with local regulations and ARM, Title 17, Chapter 36, Subchapters 3 and 9, before construction is started.

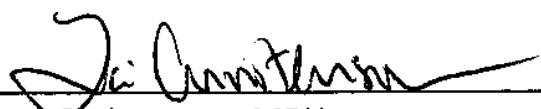
THAT departure from any criteria set forth in the approved plans and specifications and Title 17, Chapter 36, Sub-Chapters 1, 3, and 6 ARM when erecting a structure and appurtenant facilities in said subdivision without Department approval, is grounds for injunction by the Department of Environmental Quality.


Pursuant to Section 76-4-122 (2)(a), MCA, a person must obtain the approval of both the State under Title 76, Chapter 4, MCA, and local board of health under section 50-2-116(1)(i), before filing a subdivision plat with the county clerk and recorder.

YOU ARE REQUESTED to record this certificate by attaching it to the Plat filed in your office as required by law.

DATED this 30<sup>th</sup> day of August 2017.

REVIEWED AND APPROVED BY:

  
Lori Christenson, MPH  
Environmental Health Director  
Gallatin City-county Health Department

TOM LIVERS  
DIRECTOR  
  
Barbara Kingery, PE Supervisor  
Subdivision Review Section  
*for* Water Quality Division  
Department of Environmental Quality



Owner’s Name: Viking-1 Investors LLC, Shawn Housley

SEP 05 2017  
MT DEQ PUBLIC WATER  
& SUBDIVISIONS

# MINOR SUBDIVISION No. \_\_\_\_\_ STORM DRAINAGE MAINTENANCE PLAN

The Homeowners' Association (HOA) shall be responsible for adequate maintenance and operation of all storm drainage facilities (including roadside ditches, ponds, swales, culverts, etc.) located within the "storm drainage" easements and "utility" easements as shown on the Final Plat of Minor Subdivision No. \_\_\_\_\_. The individual lot Owners of Lots 1, 2, & 3 shall be responsible for adequate maintenance and operation of all storm facilities (including ponds, swales, culverts, etc.) that are only serving their individual needs of their respective lot.

All trash and debris shall be removed from the storm drainage facilities by no later than May 1<sup>st</sup> of each year. If the HOA fails to remove the trash or debris from the shared storm drainage facilities as described, individual lot owners may cause trash or debris to be removed and proportionately bill the Owners of the subdivision for such efforts. Similarly, if individual lot Owners fail to remove trash or debris from their lot specific storm drainage facilities as described, the HOA may cause trash or debris to be removed and bill the Lot Owner for such efforts.

The Homeowners' Association shall ensure that yearly maintenance is conducted to remove sediment or debris as needed from the storm water swales, ponds, and culverts so that the aforementioned facilities function properly. Until such time that the Association assumes the maintenance responsibilities of the storm drainage facilities, such requirements shall be the responsibility of the Developer.

The control of noxious weeds by the Homeowners' Association on those areas for which the HOA is responsible, including storm drainage easements, roadside ditches, etc. shall comply with the Weed Management and Revegetation Plan as approved by the Gallatin County Weed Control District.

The individual lot owner of Lot 4 shall be required to landscape 21,200 square feet (0.487 acres) of lawn area and the individual lot owner of Lot 5 shall be required to landscape 26,670 square feet (0.612 acres) of lawn area. Lawns shall be maintained at a height of 2 ½" – 3 ½" and shall be irrigated/water, fertilized, controlled for noxious weeds, and otherwise properly cared for. If each individual lot owner fails to properly maintain their lawn area, the HOA may cause the lawn to be maintained at the Owner's expense.

APPROVED  
Montana Department of  
Environmental Quality  
*[Signature]* 9/6/2017  
Reviewer Date  
Storm water only

*[Signature]*  
MARK A. FASLING  
No. 12071 PE  
LICENSED PROFESSIONAL ENGINEER  
21 2017

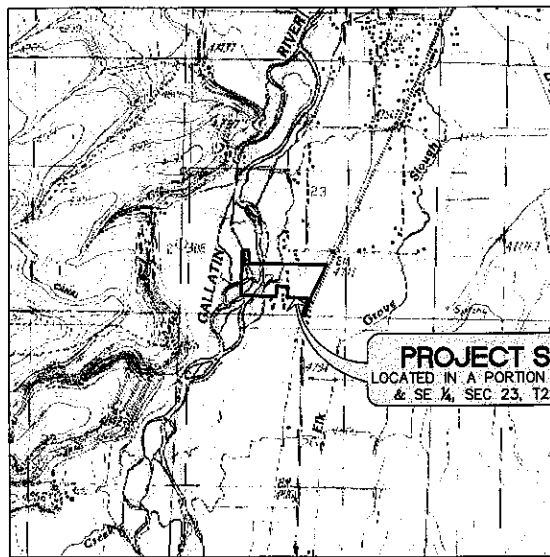
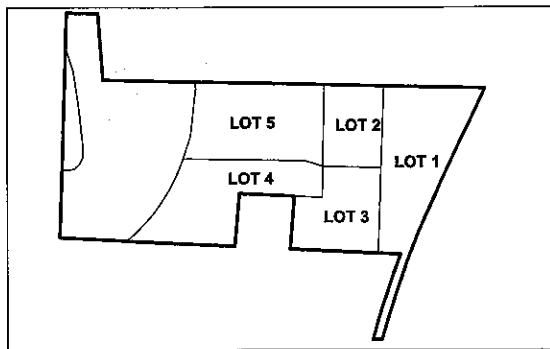
MT DEQ PUBLIC WATER

SEP 05 2017

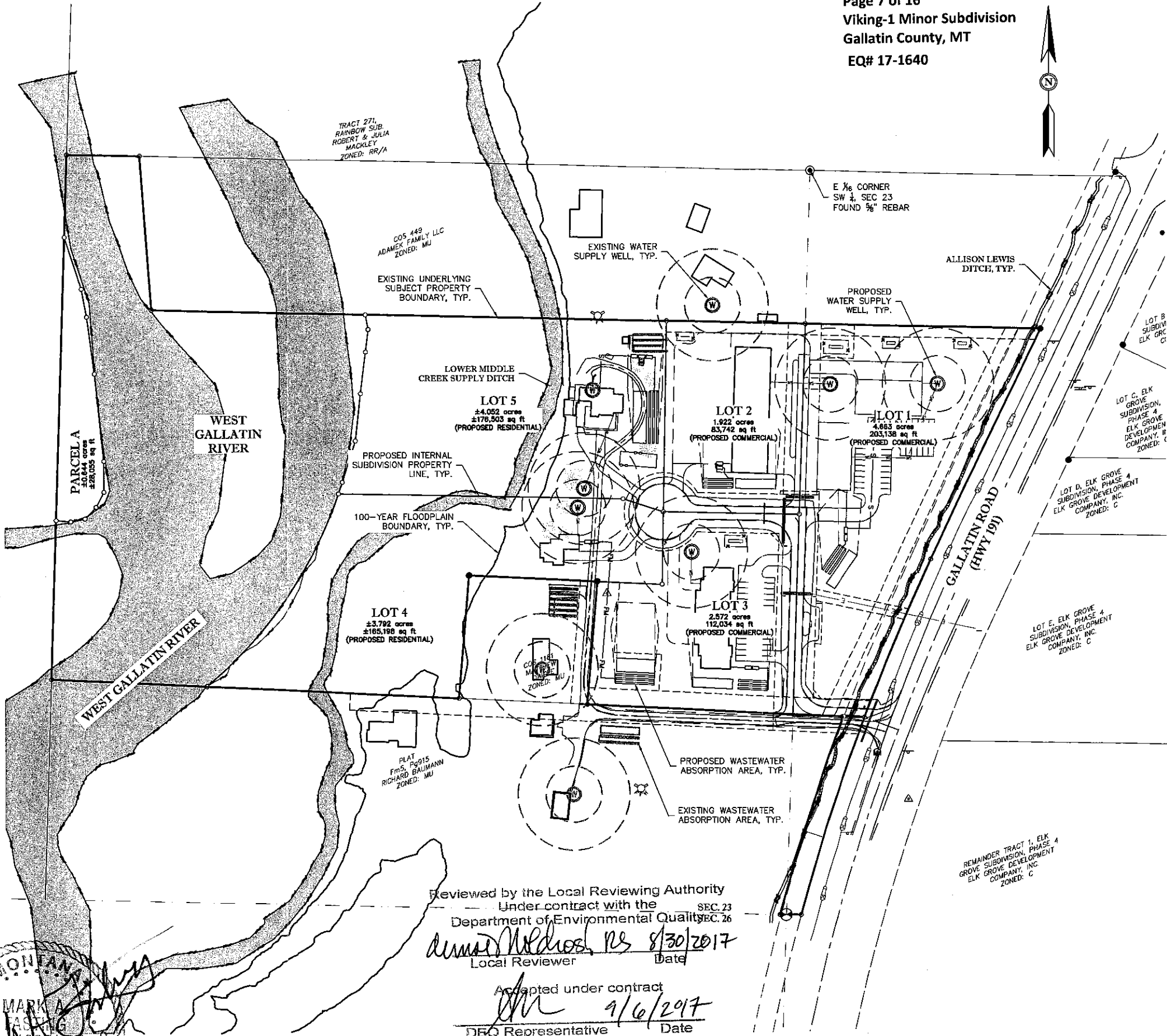
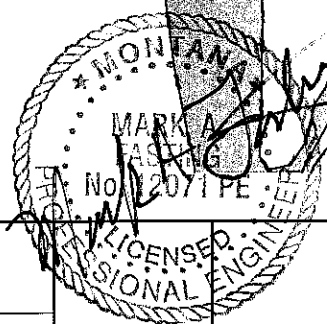
MT DEQ PUBLIC WATER  
& SUBDIVISIONS

- GENERAL NOTES:
- NO WELLS OR SURFACE WATER WITHIN 100' OF DRAINFIELD AREAS.
  - WORK SHALL BE PERFORMED IN ACCORDANCE TO MDEQ CIRCULAR 4 AND GALLATIN COUNTY, MT.
  - CLOSED COMPONENTS (SEPTIC TANKS, DOSING TANK, SEWER SERVICE, FORCEMAIN, ETC.) SHALL MAINTAIN 50' MINIMUM FROM SURFACE WATER AND WELLS.
  - INSTALL SEWER SERVICE CLEAN-OUTS AS REQUIRED BY GALLATIN COUNTY.
  - WASTEWATER SYSTEM COMPONENTS SHALL MAINTAIN 10' MINIMUM SEPARATION FROM ALL LOT LINES, WATER LINES, AND STRUCTURES.
  - CONTRACTOR RESPONSIBLE FOR UTILITY LOCATE PRIOR TO DIGGING OR DRILLING.
  - CONTRACTOR RESPONSIBLE FOR MEETING ALL UTILITY REQUIREMENTS.
  - INSTALLER SHALL BE LICENSED AND QUALIFIED TO INSTALL WASTEWATER SYSTEMS IN GALLATIN COUNTY, MT.
  - CONTRACTOR SHALL VERIFY ALL PROJECT SITE CONDITIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES IN WRITING.

- SITE SPECIFIC NOTES:
- DRAINFIELDS WERE DESIGNED WITH CONVENTIONAL PRESSURE-DOSED 3-FT WIDE GRAVEL-LESS INFILTRATOR CHAMBERS. SEE LOT HYDRAULICS SPECIFICATIONS TABLE ON SHEET WW-8 FOR DRAINFIELD SIZING INFORMATION.
  - SIZING OF THE WASTEWATER TREATMENT SYSTEM WAS BASED ON LOAM (0.5 gpd/ft<sup>2</sup>) RESULTING IN A REQUIRED TOTAL AREA OF 624 SQ FT FOR LOTS 1-3, 800 SQ FT FOR LOT 4, AND 1,100 SQ FT FOR LOT 5 (WITHOUT AN INFILTRATOR CHAMBER REDUCTION).
  - TRENCH WIDTH SHALL BE 3-FT WIDE.
  - TRENCHES SHALL BE SHALLOW-CAPPED WITH A DEPTH OF 12" (MAX) AND LAID LEVEL (FOR LOTS 1, 2, & 3).
  - TRENCH DEPTH SHALL BE BETWEEN 24" AND 36" AND LAID LEVEL (FOR LOT 4). TRENCHES SHALL BE SHALLOW-CAPPED WITH A DEPTH OF 20" (MAX) AND LAID LEVEL (FOR LOT 5).
  - TRENCHES SHALL BE INSTALLED AS SHOWN ON THE SITE PLAN.
  - THE SCH40 PVC FORCEMAIN SHALL MAINTAIN GRADE TO DRAINFIELD SO 100% DRAINAGE CAN BE OBTAINED BETWEEN DOSE CYCLES. (I.E. NO HUMPS OR BELLIES) TO MINIMIZE FREEZING POTENTIAL.
  - CONTRACTOR SHALL INSTALL ALL OTHER COMPONENTS IN COMPLIANCE WITH GALLATIN COUNTY AND CIRCULAR DEQ-4 REGULATIONS.
  - CONTRACTOR SHALL INSULATE ALL APPLICABLE WASTEWATER TREATMENT SYSTEM COMPONENTS NECESSARY TO MINIMIZE FREEZING POTENTIAL.
  - CONTRACTOR TO COORDINATE ALL UTILITY CROSSINGS AND POTENTIAL CONFLICTS WITH APPROPRIATE UTILITY AGENCIES/COMPANIES. CONTRACTOR TO FIELD VERIFY ACTUAL LOCATIONS AND DEPTHS OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
  - EASEMENTS SHOWN MAY NOT INCLUDE ALL EASEMENTS OF RECORD, MAY NOT REFLECT EASEMENTS THAT HAVE SUBSEQUENTLY BEEN VACATED/REMOVED, AND ARE SHOWN FOR CONCEPTUAL/PLANNING PURPOSES ONLY.
  - POTENTIAL LOCATIONS OF HOMES, COMMERCIAL BUILDINGS, PARKING AREAS, GRAVEL YARDS, SEPTIC TANKS, DOSE TANKS, SEWER PIPE, WATER PIPE, ETC. HAVE BEEN CONCEPTUALLY SHOWN WITHIN THIS PLAN SET FOR CONCEPTUAL PURPOSES ONLY. FUTURE LOCATIONS OF THE AFOREMENTIONED ITEMS MAY VARY FROM THE CONCEPTUALLY DEPICTED LOCATIONS.
  - ON-SITE GRADING MAY REQUIRE MODIFICATION TO SEWER SERVICE, SEPTIC TANK, DOSING TANK, SEWER FORCEMAIN, AND WATER SERVICE LINE LOCATIONS RELATIVE TO ASSUMPTIONS MADE AS PART OF THIS DESIGN. A QUALIFIED ENGINEER MUST BE CONTACTED TO CONDUCT A PRESSURE DESIGN PRIOR OF WASTEWATER COMPONENTS PRIOR TO OBTAINING A LOCAL PERMIT TO CONSTRUCT.
  - CONTRACTOR TO FIELD VERIFY ALL EXISTING WASTEWATER AND POTABLE WATER SUPPLY LOCATIONS.
  - INSTALL 15" DIAMETER CMP CULVERT (OR APPROVED EQUIVALENT) AT THE DRIVEWAY APPROACHES FOR ALL LOTS.



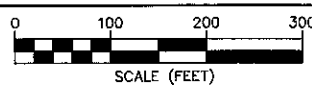
PROJECT SITE  
LOCATED IN A PORTION OF SW 1/4  
& SE 1/4, SEC 23, T2S, R4E



Reviewed by the Local Reviewing Authority  
Under contract with the SEC. 23  
Department of Environmental Quality SEC. 26  
*David M. [Signature]* 8/30/2017  
Local Reviewer Date  
  
Accepted under contract  
*[Signature]* 9/6/2017  
DEQ Representative Date

NO.	REVISIONS	DRAWN BY	DATE

PROJECT ENGINEER: MAF	DRAWN BY: JDS
DESIGNED BY: JDS	REVIEWED BY: MAF



"VIKING-1" MINOR SUBDIVISION  
OVERALL SITE LAYOUT  
GALLATIN COUNTY, MONTANA

32 DISCOVERY DRIVE  
BOZEMAN, MT 59718  
PHONE (406) 582-0221  
FAX (406) 582-6770  
www.alliedengineering.com

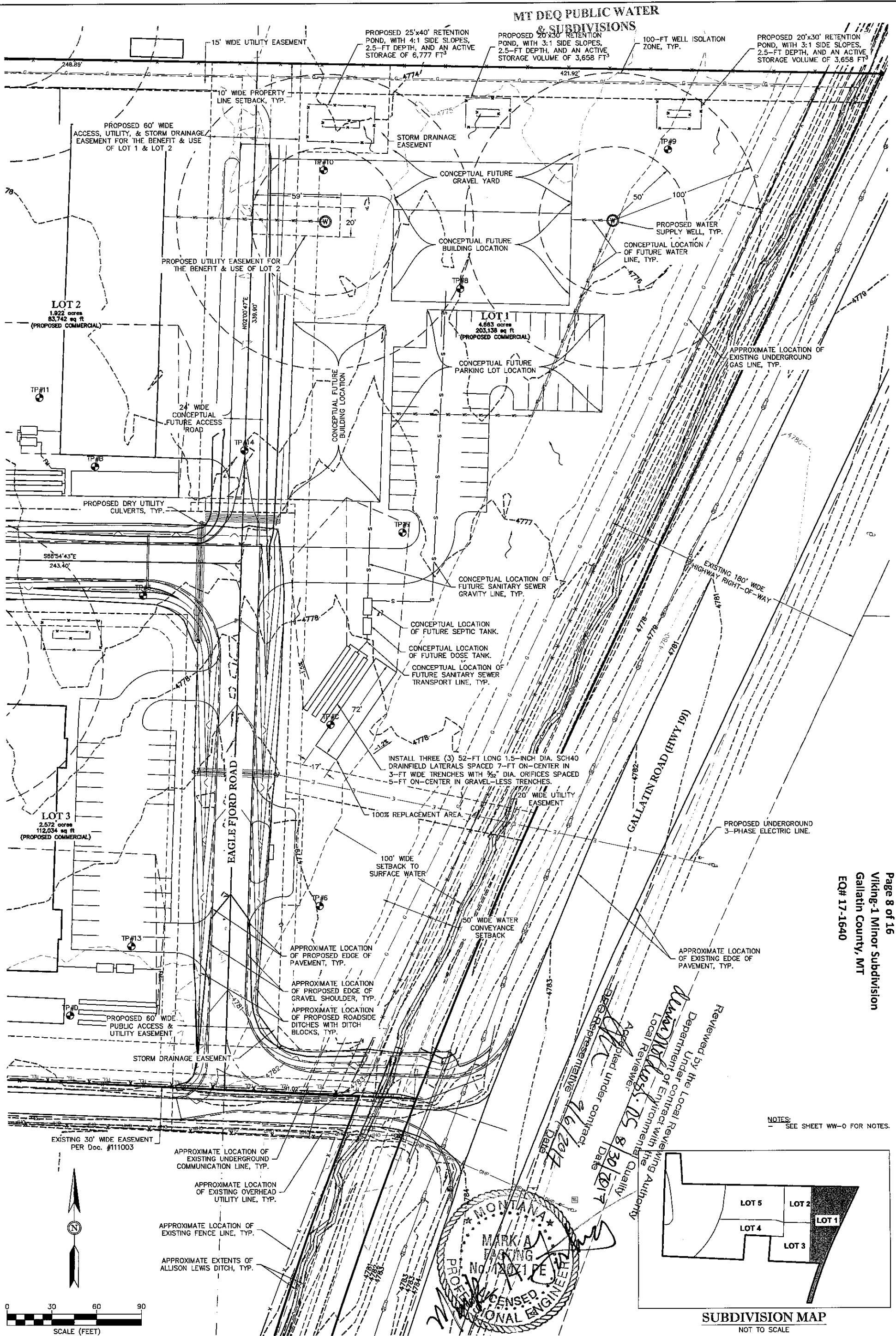
Civil Engineering  
Geotechnical Engineering  
Land Surveying



PROJECT #: 16-081	SHEET
DATE: 08/22/2017	WW-0
"VIKING-1" MINOR SUB OVERALL SITE LAYOUT	

AUG 24 2017





AUG 24 2017

"VIKING-1" MINOR SUBDIVISION  
LOT 1 - LOT LAYOUT  
GALLATIN COUNTY, MONTANA

32 DISCOVERY DRIVE  
BOZEMAN, MT 59718  
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FAX (406) 582-5770  
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Civil Engineering  
Geotechnical Engineering  
Land Surveying

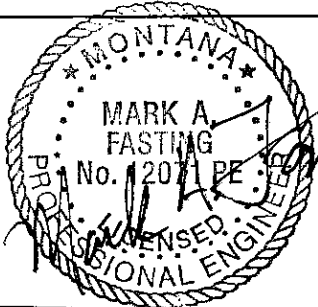


PROJECT #: 16-081  
DATE: 08/22/2017  
PROJECT ENGINEER: MAF  
DRAWN BY: JDS  
REVIEWED BY: MAF

FIGURE  
WW-1

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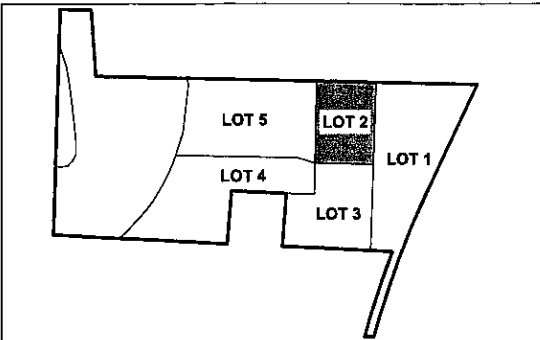
MT DEQ PUBLIC WATER  
& SUBDIVISIONS

LOT 5  
±4.052 acres  
±176,503 sq ft  
(PROPOSED RESIDENTIAL)

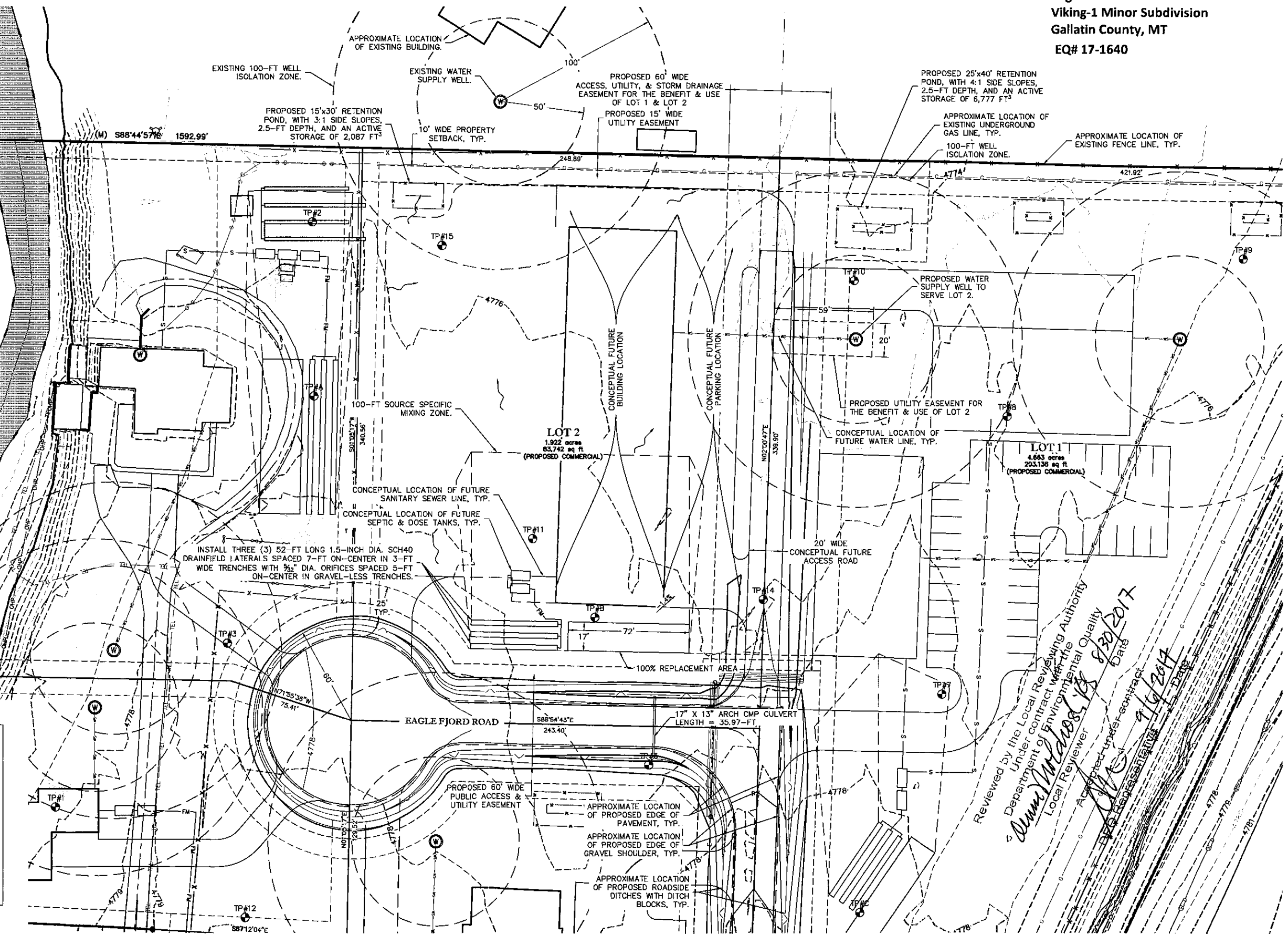
LOT 2  
1.922 acres  
83,742 sq ft  
(PROPOSED COMMERCIAL)

LOT 1  
4.683 acres  
203,136 sq ft  
(PROPOSED COMMERCIAL)

NOTES:  
SEE SHEET WW-0 FOR NOTES.



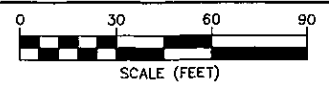
SUBDIVISION MAP  
NOT TO SCALE



Reviewed by the Local Reviewing Authority  
Under contract with the  
Department of Environmental Quality  
Local Reviewer  
*Ann M. Anderson* 8/30/2017  
Approved under contract  
8/30/2017

NO.	REVISIONS	DRAWN BY	DATE

PROJECT ENGINEER: MAF		DRAWN BY: JDS	
DESIGNED BY: JDS		REVIEWED BY: MAF	



"VIKING-1" MINOR SUBDIVISION  
LOT 2 - LOT LAYOUT  
GALLATIN COUNTY, MONTANA

32 DISCOVERY DRIVE  
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Civil Engineering  
Geotechnical Engineering  
Land Surveying



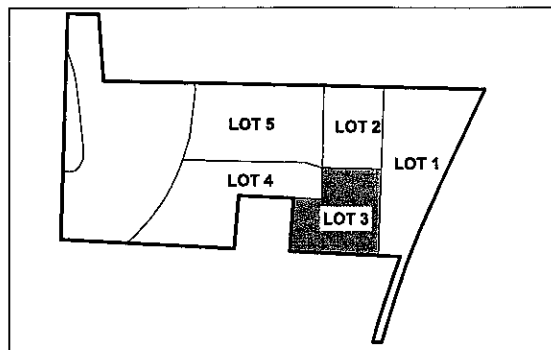
PROJECT #: 16-081	SHEET
DATE: 08/22/2017	WW-2
"VIKING-1" MINOR SUB LOT 2 - LOT LAYOUT	

AUG 24 2017

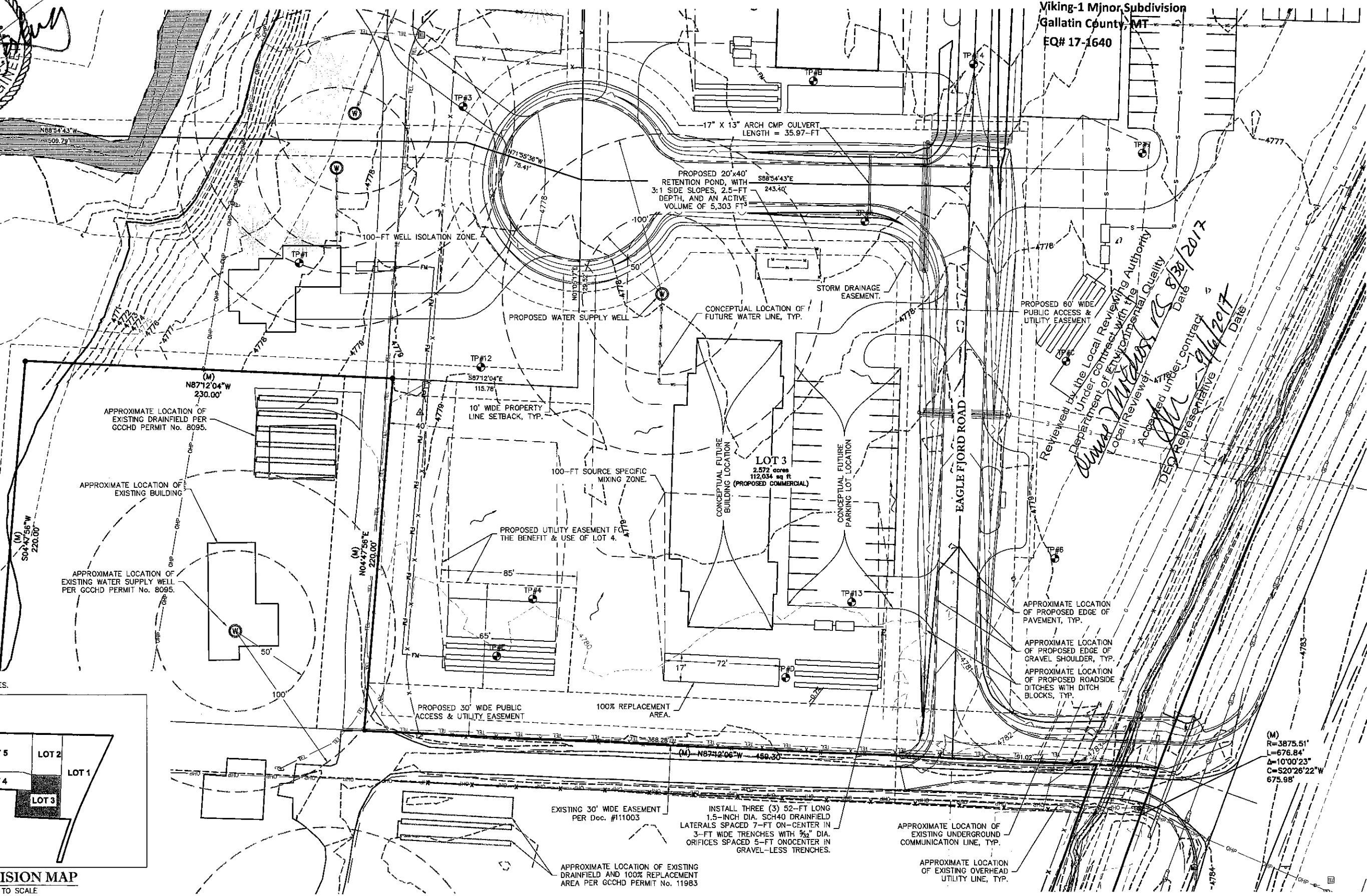
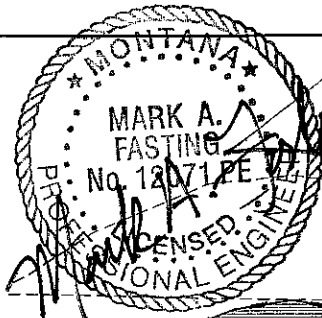
SEP 05 2017

MT DEQ PUBLIC WATER  
& SUBDIVISIONS

NOTES:  
SEE SHEET WW-0 FOR NOTES.



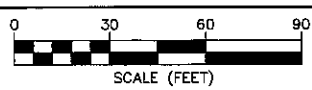
SUBDIVISION MAP  
NOT TO SCALE



Reviewed by the Local Reviewing Authority  
Under contract with the  
Department of Environmental Quality  
Local Reviewer: *David J. [Signature]* Date: *8/30/2017*  
Accepted under contract  
DEQ Representative: *[Signature]* Date: *9/6/2017*

NO.	REVISIONS	DRAWN BY	DATE

PROJECT ENGINEER: MAF		DRAWN BY: JDS	
DESIGNED BY: JDS		REVIEWED BY: MAF	



"VIKING-1" MINOR SUBDIVISION  
LOT 3 - LOT LAYOUT  
GALLATIN COUNTY, MONTANA

32 DISCOVERY DRIVE  
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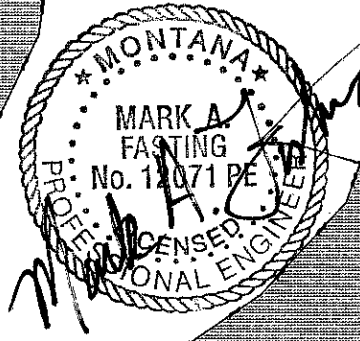
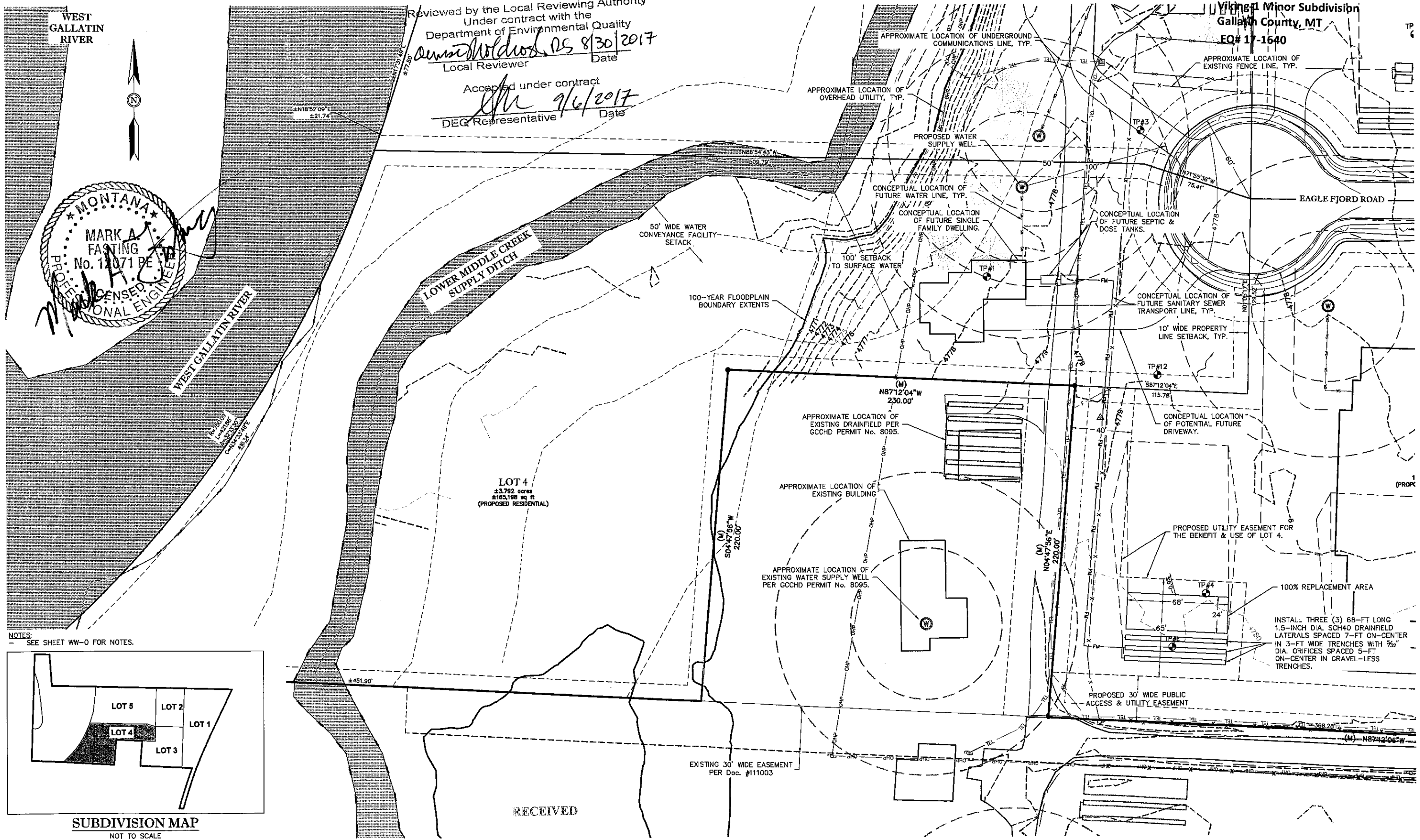
Civil Engineering  
Geotechnical Engineering  
Land Surveying



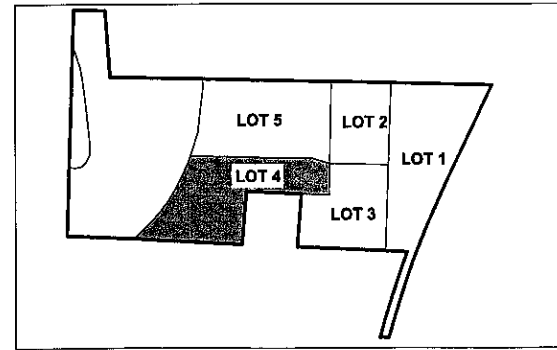
PROJECT #: 16-081	SHEET
DATE: 08/22/2017	WW-3
"VIKING-1" MINOR SUB	
LOT 3 - LOT LAYOUT	

AUG 24 2017

Reviewed by the Local Reviewing Authority  
Under contract with the  
Department of Environmental Quality  
*Sumner Wildros, PE* 8/30/2017  
Local Reviewer Date  
Accepted under contract  
*MAF* 9/6/2017  
DEQ Representative Date



NOTES:  
SEE SHEET WW-0 FOR NOTES.



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SEP 05 2017

NO.	REVISIONS	DRAWN BY	DATE

0 30 60 90  
SCALE (FEET)

PROJECT ENGINEER: MAF  
DESIGNED BY: JDS

DRAWN BY: JDS  
REVIEWED BY: MAF

MT DEQ PUBLIC WATER & SUBDIVISIONS  
**VIKING-1" MINOR SUBDIVISION**  
**LOT 4 - LOT LAYOUT**  
GALLATIN COUNTY, MONTANA

32 DISCOVERY DRIVE  
BOZEMAN, MT 59718  
PHONE (406) 582-0221  
FAX (406) 582-5770  
www.alliedengineering.com

**Civil Engineering**  
**Geotechnical Engineering**  
**Land Surveying**

**ALLIED ENGINEERING SERVICES, INC.**

PROJECT #: 16-081  
DATE: 08/22/2017  
SHEET **WW-4**  
"VIKING-1" MINOR SUB  
LOT 4 - LOT LAYOUT

AUG 24 2017

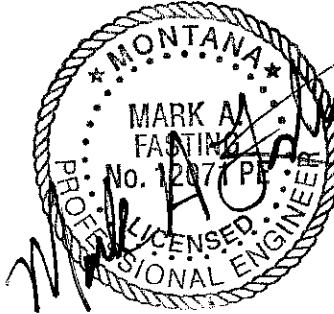


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SEP 05 2017

MT DEQ PUBLIC WATER  
& SUBDIVISIONS

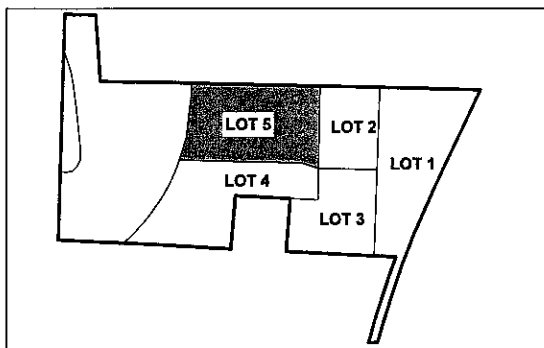
Page 12 of 16  
Viking-1 Minor Subdivision  
Gallatin County, MT  
EQ# 17-1640



Reviewed by the Local Reviewing Authority  
Under contract with the  
Department of Environmental Quality  
*Anna M. Nichols* PS 8/30/2017  
Local Reviewer Date

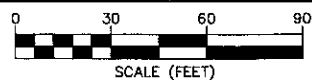
Accepted under contract  
*JDS* 9/6/2017  
DEQ Representative Date

NOTES:  
- SEE SHEET WW-0 FOR NOTES.



SUBDIVISION MAP  
NOT TO SCALE

NO.	REVISIONS	DRAWN BY	DATE



PROJECT ENGINEER: MAF  
DESIGNED BY: JDS  
DRAWN BY: JDS  
REVIEWED BY: MAF

"VIKING-1" MINOR SUBDIVISION  
LOT 5 - LOT LAYOUT  
GALLATIN COUNTY, MONTANA

32 DISCOVERY DRIVE  
BOZEMAN, MT 59718  
PHONE (406) 582-0221  
FAX (406) 582-5770  
www.alliedengineering.com

Civil Engineering  
Geotechnical Engineering  
Land Surveying



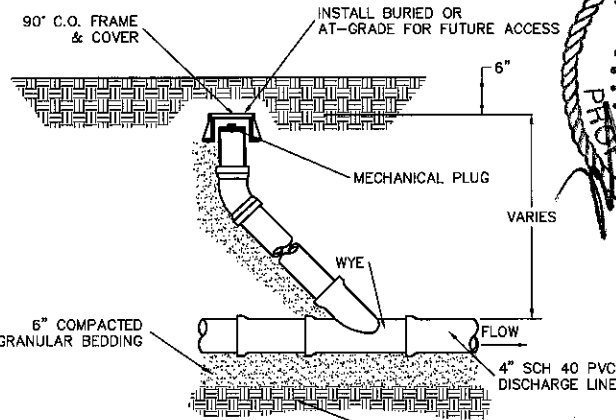
PROJECT #: 16-081  
DATE: 08/22/2017

SHEET  
WW-5

"VIKING-1" MINOR SUB  
LOT 5 - LOT LAYOUT

AUG 24 2017

SEP 05 2017

MT DEQ PUBLIC WATER  
& SUBDIVISIONS

## NOTES:

1. USE INLAND FOUNDRY MODEL 240 FRAME & COVER IN ALL TRAFFIC AREAS.
2. COVER AND FRAME SHALL BE GRAY CAST IRON ASTM A-48, CLASS 30.
3. COVER AND FRAME TO BE MACHINED TO A TRUE BEARING ALL AROUND.
4. PROVIDE 6" CLEANOUT WHERE SPECIFIED ON 6" SEWER MAINS.

STABLE SUBGRADE

# 1 DETAIL 4" CLEANOUT NOT TO SCALE

Reviewed by the Local Reviewing Authority  
Under contract with the  
Department of Environmental Quality

*Anna M. Mordosh* RS 8/30/2017  
Local Reviewer Date

Accepted under contract

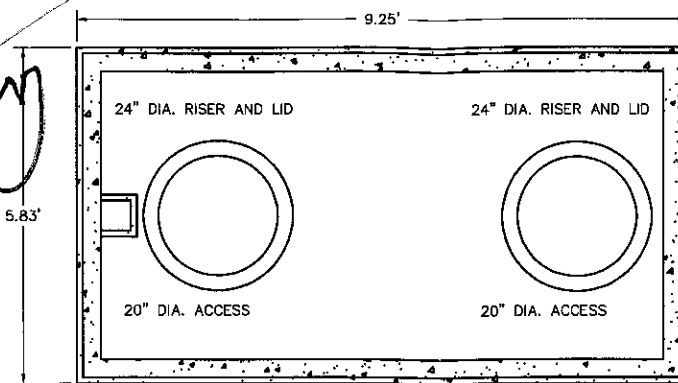
*DM* 9/6/2017  
DEQ Representative Date

## GENERAL NOTES:

1. WORK SHALL BE PERFORMED IN ACCORDANCE WITH CIRCULAR DEQ 4, AND GALLATIN COUNTY REGULATIONS.
2. CONTRACTOR SHALL BE LICENSED AND QUALIFIED TO INSTALL WASTEWATER TREATMENT SYSTEMS IN GALLATIN COUNTY, MONTANA.
3. NO WELLS OR SURFACE WATER EXIST WITHIN 100 FEET OF PRIMARY ABSORPTION AREA OR 100% REPLACEMENT AREA.
4. NO WELLS OR SURFACE WATER EXIST WITHIN 50 FEET OF WASTEWATER TREATMENT SYSTEM'S SEALED COMPONENTS.
5. SURFACE DRAINAGE IS ADEQUATE.

## NOTES TO INSTALLER:

1. CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION ACTIVITIES.
2. CONTRACTOR TO VERIFY SEWER STUB LOCATIONS PRIOR TO INSTALLATION OF WASTEWATER TREATMENT SYSTEM.
3. CONTRACTOR TO FIELD VERIFY ALL APPLICABLE SETBACKS PRIOR TO INSTALLATION OF WASTEWATER TREATMENT SYSTEM. IF ANY DISCREPANCIES ARE DETERMINED BY CONTRACTOR, ENGINEER SHALL BE NOTIFIED IMMEDIATELY IN WRITING.
4. 10 FEET (MIN.) SEPARATION BETWEEN WATER AND SEWER LINES SHALL BE MAINTAINED.
5. THERE IS THREE INCHES (3") OF FALL BETWEEN INLET AND OUTLET OF TANKS. INSTALLER TO PROVIDE 1% (MIN.) SLOPE BETWEEN OUTLET OF SEPTIC TANK AND INLET OF DOSE TANK.
6. ANY DESIGN CHANGES WITH RESPECT TO ORIENTATION, LAYOUT, MATERIALS, ETC. MUST BE APPROVED BY ENGINEER.
7. CONTRACTOR SHALL INSTALL FORCEMAIN AT CONSTANT GRADE (I.E. NO HUMPS OR BELLIES) TO ALLOW FOR 100% DRAINAGE BETWEEN DOSE CYCLES.
8. CONTRACTOR SHALL INSULATE ALL APPLICABLE WASTEWATER TREATMENT SYSTEM COMPONENTS TO PROHIBIT FREEZING OF ANY AND ALL SYSTEM COMPONENTS.
9. ALL TANK DETAILS REFLECT STANDARD TANK CONSTRUCTION. CONTRACTOR MAY PROPOSE ALTERNATIVE. IF ALTERNATIVE IS PROPOSED, CONTRACTOR SHALL OBTAIN APPROVAL FROM THE ENGINEER PRIOR TO CONSTRUCTION.
10. THE OWNER MAY INSTALL A 1,500 GALLON DOUBLE COMPARTMENT CONCRETE SEPTIC TANK IN LIEU OF THE SPECIFIED 1,000 GALLON (MIN) DOUBLE COMPARTMENT SEPTIC TANK FOR LOTS 1-3. ALL OTHER COMPONENTS (I.E. LIDS, RISERS, EFFLUENT FILTER, HIGH LEVEL ALARM, ETC.) AND NOTES NOT-SPECIFIC TO THE 1,000 GALLON SEPTIC TANK WITHIN THIS PLAN SET WOULD APPLY TO THE 1,500 GALLON DOUBLE COMPARTMENT CONCRETE SEPTIC TANK ALTERNATIVE.
11. IF TANK CONFIGURATIONS/LOCATIONS VARY FROM ASSUMPTIONS MADE AS PART OF THIS DESIGN, CONTRACTOR SHALL NOTIFY ENGINEER AND REQUEST VERIFICATION OF FLOAT SETTINGS, HYDRAULIC CALCULATIONS, PUMP SIZING, ETC.
12. ALL FLOAT SETTINGS AND PUMP SIZING HAS BEEN PERFORMED BASED ON AN ASSUMED FORCEMAIN LENGTH AND AN ASSUMED ELEVATION DIFFERENCE. IF ACTUAL CONDITIONS VARY FROM AFOREMENTIONED ASSUMED CONDITIONS, CONTRACTOR SHALL NOTIFY ENGINEER IN WRITING AND REQUEST VERIFICATION OF FLOAT SETTINGS, PUMP SIZING, HYDRAULIC CALCULATIONS, ETC.



\*INSTALL SAFETY GRATES AT ALL SEPTIC TANK/DOSING TANK OPENINGS. CUT TO FIT AROUND EFFLUENT FILTER HANDLE AND PUMP DISCHARGE PIPING (IF NECESSARY).

## ALTERNATE

\*OWNER MAY INSTALL FIBERGLASS RISERS AND LIDS IN LIEU OF CONCRETE. RISERS AND LIDS (TYPICAL ALL TANKS)

\*PRIOR TO PLACEMENT OF TANKS CONTACT ENGINEER IF TANK DEPTHS ARE ANTICIPATED TO EXCEED 4' BURY DEPTH.

## MDEQ 5.1.2.1:

LIQUID CONNECTION BETWEEN COMPARTMENTS SHALL CONSIST OF A SINGLE OPENING COMPLETELY ACROSS THE COMPARTMENT WALL OR TWO OR MORE OPENINGS EQUALLY SPACED ACROSS THE WALL. THE TOTAL AREA OF THE OPENINGS SHALL BE AT LEAST THREE TIMES THE AREA OF THE INLET PIPE.

ALL SEPTIC AND DOSING TANKS MUST BE TESTED IN ACCORDANCE WITH MDEQ4 CHAPTER 5 FOR WATERTIGHTNESS.

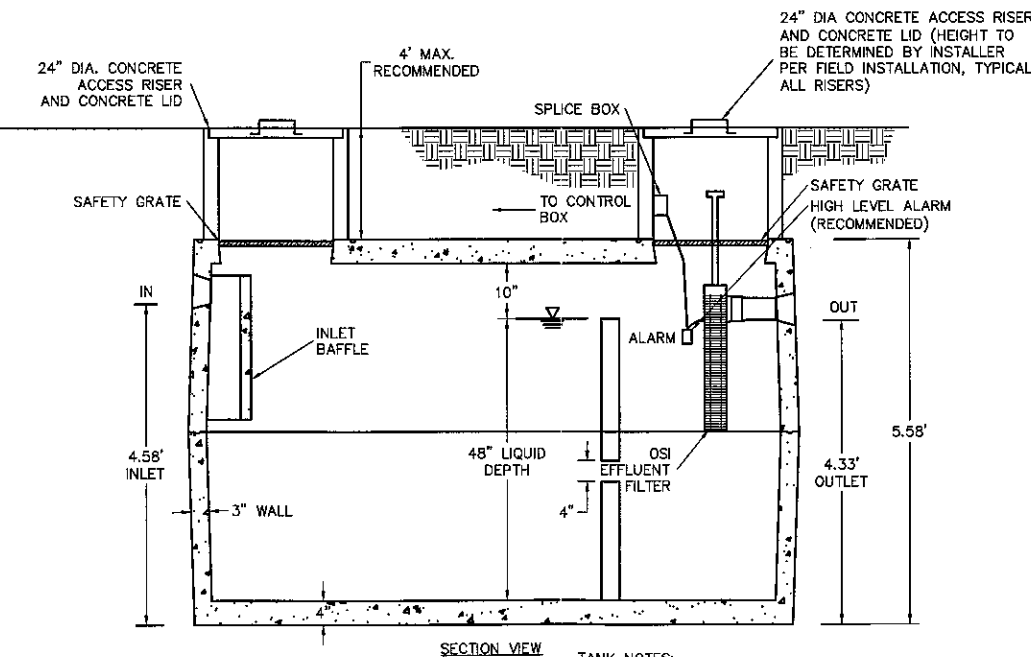
WATER TESTING MUST BE CONDUCTED BY SEALING THE OUTLETS, FILLING THE SEPTIC TANK TO ITS OPERATIONAL LEVEL, AND ALLOWING THE TANK TO STAND FOR AT LEAST 24 HOURS. IF THERE IS A MEASURABLE LOSS (2 INCHES OR MORE), REFILL THE TANK AND LET STAND FOR ANOTHER 24 HOURS. IF THERE IS AGAIN A MEASURABLE LOSS, THE TANK MUST BE REJECTED.

## OR

VACUUM TESTING MUST BE CONDUCTED BY SEALING ALL INLETS, OUTLETS, AND ACCESSES, THEN INTRODUCING A VACUUM OF 4 INCHES OF MERCURY, IF THE VACUUM DROPS IN THE FIRST 5 MINUTES IT MUST BE BROUGHT BACK TO 4 INCHES OF MERCURY. IF THE SEPTIC TANK FAILS TO HOLD THE VACUUM AT 5 INCHES OF MERCURY FOR 5 MINUTES, THE TANK MUST BE REJECTED.

## 2 DETAIL (PLAN VIEW) - LOTS 1, 2, & 3

1,000 GALLON DOUBLE COMPARTMENT SEPTIC TANK (NOT TRAFFIC RATED)  
NOT TO SCALE



## NOTES:

- ALL SEPTIC TANK DIMENSIONS HAVE BEEN SUPPLIED BY ANDERSON PRECAST & SUPPLY, INC (BOZEMAN, MT). CONTRACTOR MAY ELECT TO USE ALTERNATIVE SUPPLIER, IN WHICH CASE CONTRACTOR SHALL SUBMIT STANDARD SEPTIC TANK DETAILS PER SUPPLIERS PROPOSED CONSTRUCTION PRIOR TO INSTALLATION.
- WE RECOMMEND THE USE OF A HIGH LEVEL ALARM.

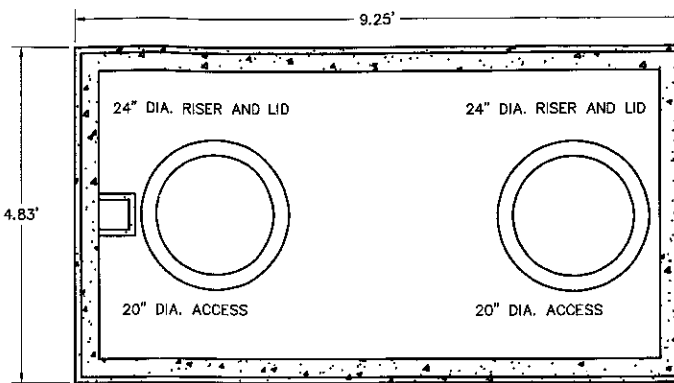
## TANK NOTES:

1. CONCRETE IS 5,000 PSI AT 28 DAYS
2. INLET AND OUTLET HAVE PLASTIC SEAL WHICH ACCEPTS SCH 40 OR SEWER AND DRAIN PIPE.
3. NORMALLY SET IN ONE PIECE
4. SIDE INLET (KNOCK-OUTS) PROVIDED.
5. EACH SEGMENT IS POURED MONOLITHICALLY.
6. ALL HANDLES ARE 1/4" SMOOTH STEEL.
7. WEIGHT OF TANK IS 16,000 LBS.
8. REINFORCING = #3 REBAR GRADE 40.
9. ACTUAL CAPACITY = ±1,000 GALLONS
10. MAXIMUM EARTH COVER IS 4 FEET.
11. TANK JOINT IS SEALED WITH 3/4" DIA. CONSEAL.

## 4 DETAIL (PROFILE VIEW) - LOTS 1, 2, & 3

1,000 GALLON DOUBLE COMPARTMENT SEPTIC TANK (NOT TRAFFIC RATED)  
NOT TO SCALE

Page 13 of 16  
Viking-1 Minor Subdivision  
Gallatin County, MT  
EQ# 17-1640



\*INSTALL SAFETY GRATES AT ALL SEPTIC TANK/DOSING TANK OPENINGS. CUT TO FIT AROUND EFFLUENT FILTER HANDLE AND PUMP DISCHARGE PIPING (IF NECESSARY).

## ALTERNATE

\*OWNER MAY INSTALL FIBERGLASS RISERS AND LIDS IN LIEU OF CONCRETE. RISERS AND LIDS (TYPICAL ALL TANKS)

\*PRIOR TO PLACEMENT OF TANKS CONTACT ENGINEER IF TANK DEPTHS ARE ANTICIPATED TO EXCEED 4' BURY DEPTH.

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LIQUID CONNECTION BETWEEN COMPARTMENTS SHALL CONSIST OF A SINGLE OPENING COMPLETELY ACROSS THE COMPARTMENT WALL OR TWO OR MORE OPENINGS EQUALLY SPACED ACROSS THE WALL. THE TOTAL AREA OF THE OPENINGS SHALL BE AT LEAST THREE TIMES THE AREA OF THE INLET PIPE.

ALL SEPTIC AND DOSING TANKS MUST BE TESTED IN ACCORDANCE WITH MDEQ4 CHAPTER 5 FOR WATERTIGHTNESS.

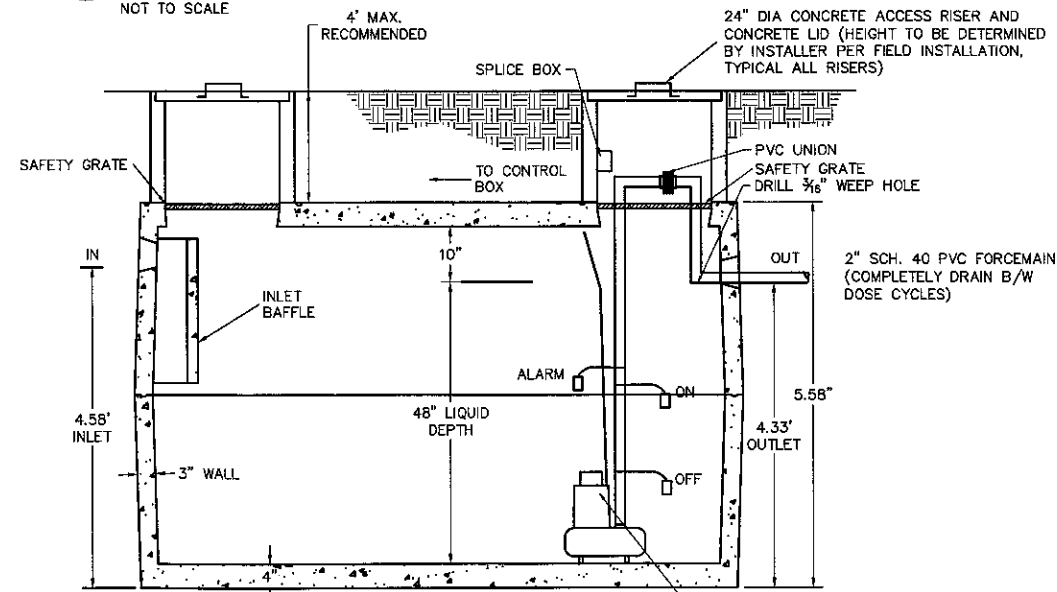
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## OR

VACUUM TESTING MUST BE CONDUCTED BY SEALING ALL INLETS, OUTLETS, AND ACCESSES, THEN INTRODUCING A VACUUM OF 4 INCHES OF MERCURY, IF THE VACUUM DROPS IN THE FIRST 5 MINUTES IT MUST BE BROUGHT BACK TO 4 INCHES OF MERCURY. IF THE SEPTIC TANK FAILS TO HOLD THE VACUUM AT 4 INCHES OF MERCURY FOR 5 MINUTES, THE TANK MUST BE REJECTED.

## 3 DETAIL (PLAN VIEW) - LOTS 1, 2, & 3

1,000 GALLON SINGLE COMPARTMENT DOSE TANK (NOT TRAFFIC RATED)  
NOT TO SCALE



## TANK NOTES:

1. CONCRETE IS 5,000 PSI AT 28 DAYS
2. INLET AND OUTLET HAVE PLASTIC SEAL WHICH ACCEPTS SCH. 40 OR SEWER AND DRAIN PIPE.
3. NORMALLY SET IN ONE PIECE
4. SIDE INLET (KNOCK-OUTS) PROVIDED.
5. EACH SEGMENT IS POURED MONOLITHICALLY.
6. ALL HANDLES ARE 1/4" SMOOTH STEEL.
7. WEIGHT OF TANK IS 11,000 LBS.
8. REINFORCING = #3 REBAR GRADE 40.
9. ACTUAL CAPACITY = 996 GALLONS.
10. MAXIMUM EARTH COVER IS 4 FEET.
11. TANK JOINT IS SEALED WITH 3/4" DIA. CONSEAL.
12. ALL SEPTIC TANK DIMENSIONS HAVE BEEN SUPPLIED BY ANDERSON PRECAST & SUPPLY, INC (BOZEMAN, MT). CONTRACTOR MAY ELECT TO USE ALTERNATIVE SUPPLIER, IN WHICH CASE CONTRACTOR SHALL SUBMIT STANDARD SEPTIC TANK DETAILS PER SUPPLIERS PROPOSED CONSTRUCTION PRIOR TO INSTALLATION.

## 5 DETAIL (PROFILE VIEW) - LOTS 1, 2, & 3

1,000 GALLON SINGLE COMPARTMENT DOSE TANK (NOT TRAFFIC RATED)  
NOT TO SCALE

NO.	REVISIONS	DRAWN BY	DATE

SCALE AS NOTED

PROJECT ENGINEER: MAF

DRAWN BY: JDS

DESIGNED BY: JDS

REVIEWED BY: MAF

"VIKING-1" MINOR SUBDIVISION  
GENERAL DETAILS  
GALLATIN COUNTY, MONTANA

32 DISCOVERY DRIVE  
BOZEMAN, MT 59718  
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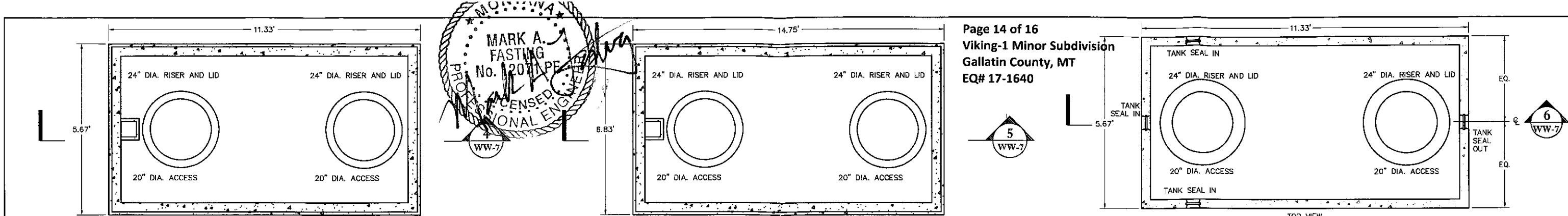


PROJECT #: 16-081  
DATE: 08/22/2017

SHEET  
WW-6

"VIKING-1" MINOR SUB  
GENERAL DETAILS

AUG 24 2017



\*INSTALL SAFETY GRATES AT ALL SEPTIC TANK/DOSING TANK OPENINGS. CUT TO FIT AROUND EFFLUENT FILTER HANDLE AND PUMP DISCHARGE PIPING (IF NECESSARY).

ALTERNATE  
\*OWNER MAY INSTALL FIBERGLASS RISERS AND LIDS IN LIEU OF CONCRETE. RISERS AND LIDS (TYPICAL ALL TANKS)

\*PRIOR TO PLACEMENT OF TANKS CONTACT ENGINEER IF TANK DEPTHS ARE ANTICIPATED TO EXCEED 4' BURY DEPTH.

MDEQ4 5.1.2.1.:  
LIQUID CONNECTION BETWEEN COMPARTMENTS SHALL CONSIST OF A SINGLE OPENING COMPLETELY ACROSS THE COMPARTMENT WALL OR TWO OR MORE OPENINGS EQUALLY SPACED ACROSS THE WALL. THE TOTAL AREA OF THE OPENINGS SHALL BE AT LEAST THREE TIMES THE AREA OF THE INLET PIPE.

ALL SEPTIC AND DOSING TANKS MUST BE TESTED IN ACCORDANCE WITH MDEQ4 CHAPTER 5 FOR WATERTIGHTNESS.

WATER TESTING MUST BE CONDUCTED BY SEALING THE OUTLETS, FILLING THE SEPTIC TANK TO ITS OPERATIONAL LEVEL, AND ALLOWING THE TANK TO STAND FOR AT LEAST 24 HOURS. IF THERE IS A MEASURABLE LOSS (2 INCHES OR MORE), REFILL THE TANK AND LET STAND FOR ANOTHER 24 HOURS. IF THERE IS AGAIN A MEASURABLE LOSS, THE TANK MUST BE REJECTED.

OR  
VACUUM TESTING MUST BE CONDUCTED BY SEALING ALL INLETS, OUTLETS, AND ACCESSES, THEN INTRODUCING A VACUUM OF 4 INCHES OF MERCURY, IF THE VACUUM DROPS IN THE FIRST 5 MINUTES IT MUST BE BROUGHT BACK TO 4 INCHES OF MERCURY. IF THE SEPTIC TANK FAILS TO HOLD THE VACUUM AT 5 INCHES OF MERCURY FOR 5 MINUTES, THE TANK MUST BE REJECTED.

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ALTERNATE  
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\*INSTALL SAFETY GRATES AT RECIRCULATION TANK OPENINGS. CUT TO FIT AROUND PIPING, SPLITER VALVE ASSEMBLY, ETC. (IF NECESSARY).

\*PRIOR TO PLACEMENT OF TANKS CONTACT ENGINEER IF TANK DEPTHS ARE ANTICIPATED TO EXCEED 6' BURY DEPTH.

Reviewed by the Local Reviewing Authority  
Under contract with the  
Department of Environmental Quality  
Date 8/30/2017  
Local Reviewer  
Accepted under contract  
Date 9/6/2017

RECIRCULATION TANK MUST BE TESTED IN ACCORDANCE WITH MDEQ4 CHAPTER 5 FOR WATERTIGHTNESS.

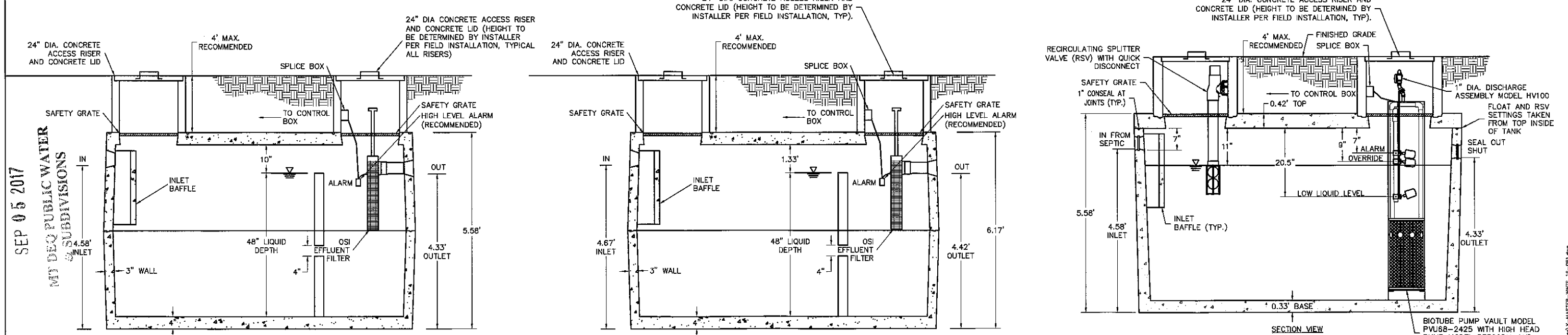
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1 **DETAIL (PLAN VIEW) - LOT 4**  
1,500 GALLON DOUBLE COMPARTMENT SEPTIC TANK (NOT TRAFFIC RATED)  
NOT TO SCALE

2 **DETAIL (PLAN VIEW) - LOT 5**  
2,500 GALLON DOUBLE COMPARTMENT SEPTIC TANK (NOT TRAFFIC RATED)  
NOT TO SCALE

3 **DETAIL (PLAN VIEW) - LOT 6**  
1,500 GALLON SINGLE COMPARTMENT RECIRCULATION TANK (NOT TRAFFIC RATED)  
NOT TO SCALE



**NOTES:**

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- WE RECOMMEND THE USE OF A HIGH LEVEL ALARM.

**TANK NOTES:**

- CONCRETE IS 5,000 PSI AT 28 DAYS
- INLET AND OUTLET HAVE PLASTIC SEAL WHICH ACCEPTS SCH40 OR SEWER AND DRAIN PIPE.
- NORMALLY SET IN ONE PIECE
- SIDE INLET (KNOCK-OUTS) PROVIDED.
- EACH SEGMENT IS POURED MONOLITHICALLY.
- ALL HANDLES ARE 1/4" SMOOTH STEEL.
- WEIGHT OF TANK IS 16,000 LBS.
- REINFORCING = #3 REBAR GRADE 40.
- ACTUAL CAPACITY = ±1,500 GALLONS
- MAXIMUM EARTH COVER IS 4 FEET.
- TANK JOINT IS SEALED WITH 3/4" DIA. CONSEAL.

**NOTES:**

- ALL SEPTIC TANK DIMENSIONS HAVE BEEN SUPPLIED BY ANDERSON PRECAST & SUPPLY, INC (BOZEMAN, MT). CONTRACTOR MAY ELECT TO USE ALTERNATIVE SUPPLIER, IN WHICH CASE CONTRACTOR SHALL SUBMIT STANDARD SEPTIC TANK DETAILS PER SUPPLIERS PROPOSED CONSTRUCTION PRIOR TO INSTALLATION.
- WE RECOMMEND THE USE OF A HIGH LEVEL ALARM.

**TANK NOTES:**

- CONCRETE IS 5,000 PSI AT 28 DAYS
- INLET AND OUTLET HAVE PLASTIC SEAL WHICH ACCEPTS SCH40 OR SEWER AND DRAIN PIPE.
- NORMALLY SET IN ONE PIECE
- SIDE INLET (KNOCK-OUTS) PROVIDED.
- EACH SEGMENT IS POURED MONOLITHICALLY.
- ALL HANDLES ARE 1/4" SMOOTH STEEL.
- WEIGHT OF TANK IS 26,500 LBS.
- REINFORCING = #3 REBAR GRADE 40.
- ACTUAL CAPACITY = ±2,500 GALLONS
- MAXIMUM EARTH COVER IS 4 FEET.
- TANK JOINT IS SEALED WITH 3/4" DIA. CONSEAL.

**TANK NOTES:**

- CONCRETE IS 5,000 PSI AT 28 DAYS
- INLET AND OUTLET HAVE PLASTIC SEAL WHICH ACCEPTS SCH40 OR SEWER AND DRAIN PIPE.
- NORMALLY SET IN ONE PIECE
- BOTTOM SEGMENT OF TANK IS POURED MONOLITHICALLY WITH TOP SET IN PLACE WITH CONSEAL.
- TANK MUST BE PLACED ON 3" ROAD-BASE, OR SIMILAR MATERIAL. MINIMUM RELATIVE COMPACTION IS 95%. DO NOT USE FLOWABLE BACKFILL BACKFILL MATERIALS SUCH AS 3/4" WASHED GRAVELS.
- WEIGHT OF TANK IS 16,000 LBS.
- MAXIMUM EARTH COVER IS 4 FT.
- IF HIGH GROUNDWATER PRESENT, CONTRACTOR SHALL BALLAST TANK AND ENSURE WATERTIGHT
- DOSE TANK DIMENSIONS HAVE BEEN SUPPLIED BY ANDERSON PRECAST & SUPPLY, INC (BOZEMAN, MT). CONTRACTOR MAY ELECT TO USE ALTERNATIVE SUPPLIER, IN WHICH CASE CONTRACTOR SHALL SUBMIT STANDARD DOSE TANK DETAILS PER SUPPLIERS PROPOSED CONSTRUCTION PRIOR TO INSTALLATION.

4 **DETAIL (PROFILE VIEW) - LOT 4**  
1,500 GALLON DOUBLE COMPARTMENT SEPTIC TANK (NOT TRAFFIC RATED)  
NOT TO SCALE

5 **DETAIL (PROFILE VIEW) - LOT 5**  
2,500 GALLON DOUBLE COMPARTMENT SEPTIC TANK (NOT TRAFFIC RATED)  
NOT TO SCALE

6 **DETAIL (PROFILE VIEW) - LOT 6**  
1,500 GALLON SINGLE COMPARTMENT RECIRCULATION TANK (NOT TRAFFIC RATED)  
NOT TO SCALE

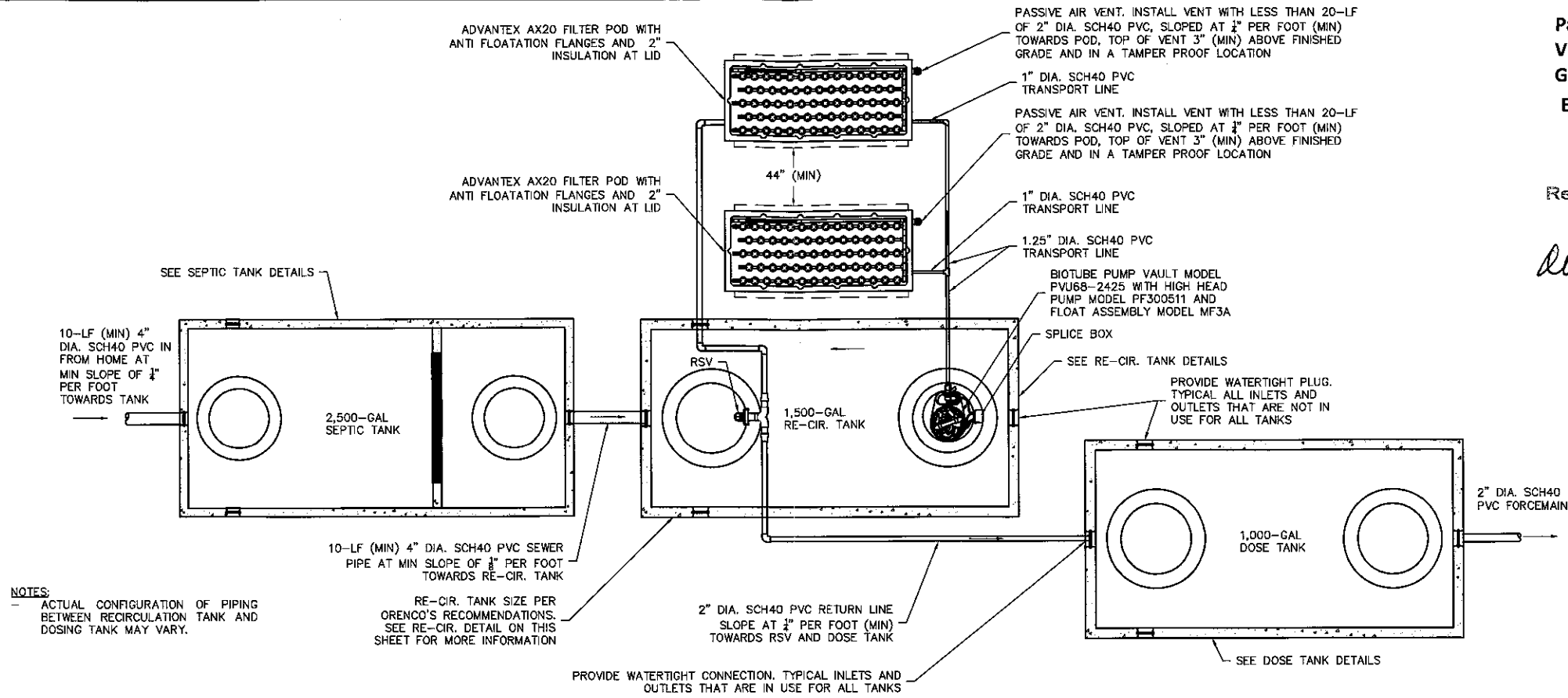
AUG 24 2017



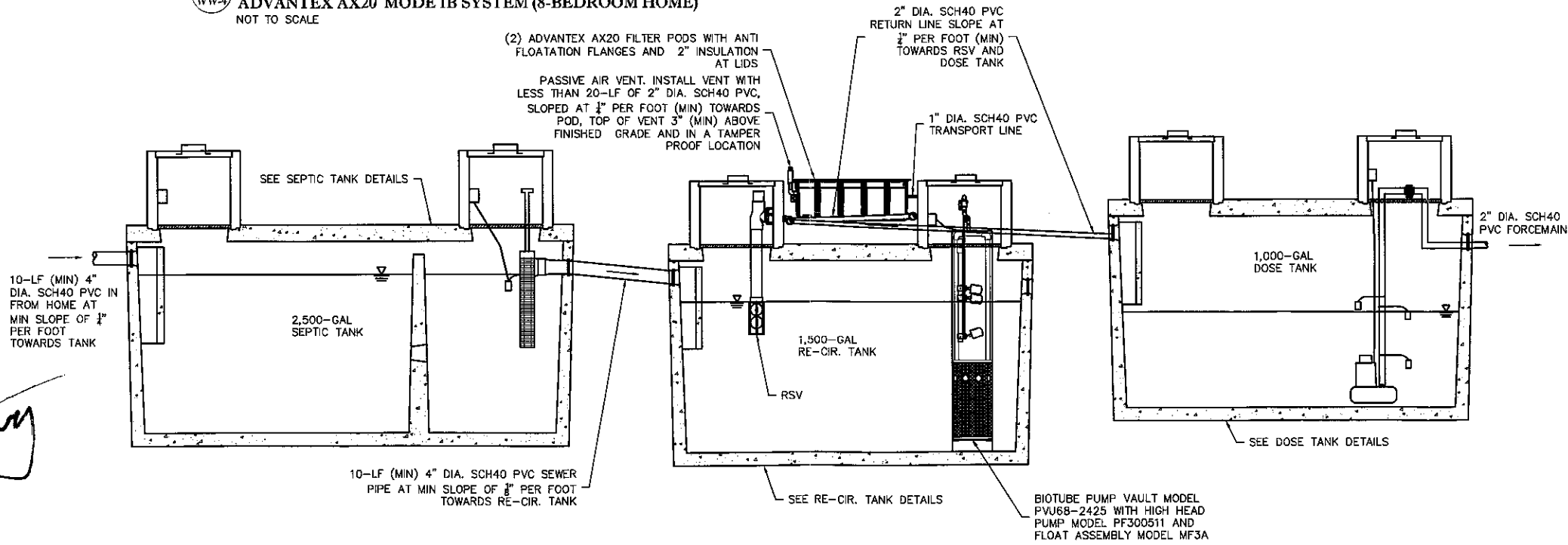
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MT DEQ PUBLIC WATER  
& SUBDIVISIONS

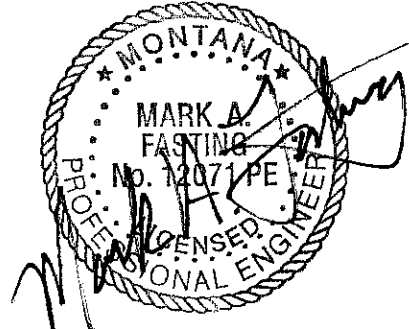
Reviewed by the Local Reviewing Authority  
Under contract with the  
Department of Environmental Quality  
*Amey Molder* RS 8/30/2017  
Local Reviewer Date  
Accepted under contract  
*MR* 9/6/2017  
DEQ Representative Date



3 DETAIL (PLAN VIEW) - LOT 5  
ADVANTEX AX20 MODE 1B SYSTEM (8-BEDROOM HOME)  
NOT TO SCALE



4 DETAIL (PROFILE VIEW) - LOT 5  
ADVANTEX AX20 MODE 1B SYSTEM (8-BEDROOM HOME)  
NOT TO SCALE



NO.	REVISIONS	DRAWN BY	DATE

PROJECT ENGINEER: MAF	DRAWN BY: JDS
DESIGNED BY: JDS	REVIEWED BY: MAF

"VIKING-1" MINOR SUBDIVISION  
GENERAL DETAILS  
GALLATIN COUNTY, MONTANA

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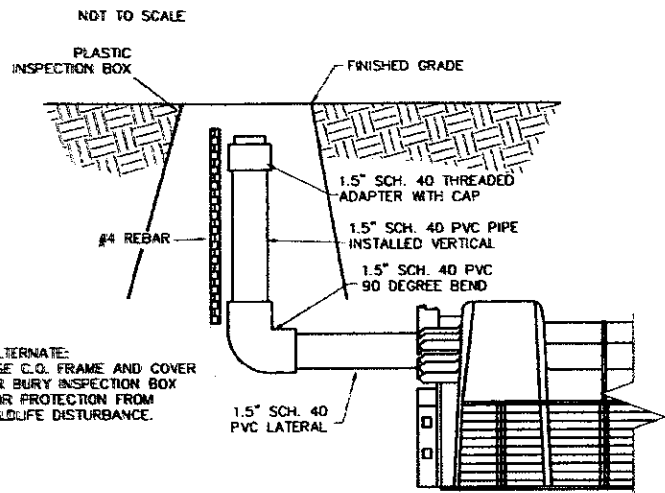
PROJECT #: 16-081	SHEET
DATE: 08/22/2017	WW-8
"VIKING-1" MINOR SUB GENERAL DETAILS	

AUG 24 2017

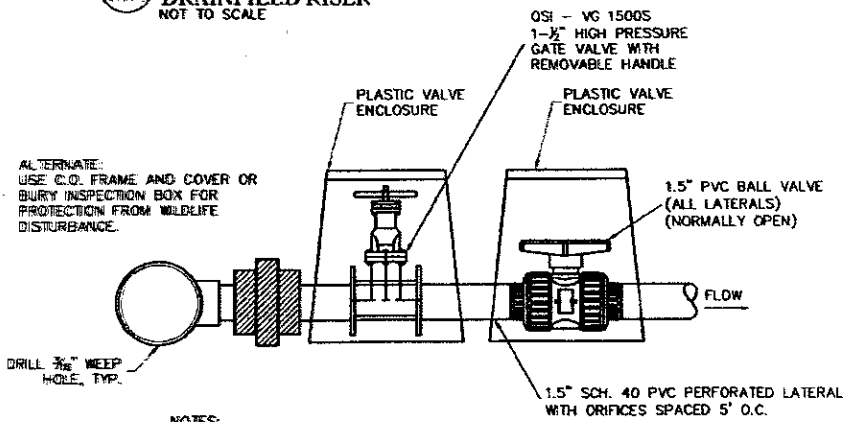
LOT HYDRAULICS SPECIFICATIONS*																			
LOT #	APPLICATION RATE USED (gpd/ft²)	TYPE OF WWTs PROPOSED	PROPOSED DRAINFIELD LATERALS	ORIFICE SIZING	No. OF ORIFICES PER LATERAL	DOSE TANK SIZE	PUMP	PUMP HEIGHT	PUMP SUBMERGENCE	DOSE VOLUME	No. OF DOSES PER DAY	DOSE FLOAT HEIGHT	ALARM FLOAT HEIGHT	ALARM FLOAT VOLUME	RESERVE VOLUME (ACTUAL)	RESERVE VOLUME (REQ'D)	DISTRIBUTING VALVE	FORCEMAIN & MANIFOLD SIZE	SUGGESTED TRENCH DEPTH**
1	0.50	PRESSURE-DOSED	(3) 52'-FT LONG	5/32	12	1,000 GAL	ORENCO PFEF-40B	15"	312.5 GAL	287.5 GAL	1.08	7"	6"	125 GAL	416.67 GAL	78.00 GAL	N/A	2" SCH40 PVC	12" (MAX)
2	0.50	PRESSURE-DOSED	(3) 52'-FT LONG	5/32	12	1,000 GAL	ORENCO PFEF-40B	15"	312.5 GAL	287.5 GAL	1.08	7"	6"	125 GAL	416.67 GAL	78.00 GAL	N/A	2" SCH40 PVC	12" (MAX)
3	0.50	PRESSURE-DOSED	(3) 52'-FT LONG	5/32	12	1,000 GAL	ORENCO PFEF-40B	15"	312.5 GAL	287.5 GAL	1.08	7"	6"	125 GAL	416.67 GAL	78.00 GAL	N/A	2" SCH40 PVC	12" (MAX)
4	0.50	PRESSURE-DOSED	(3) 68'-FT LONG	5/32	15	1,000 GAL	ORENCO PFEF-40B	15"	312.5 GAL	208.33 GAL	1.92	10"	3"	62.5 GAL	416.67 GAL	100.00 GAL	N/A	2" SCH40 PVC	24" - 36"
5	0.50	PRESSURE-DOSED W/LEVEL II	(3) 92'-FT LONG	5/32	15	1,000 GAL	ORENCO PFEF-40B	15"	312.5 GAL	287.5 GAL	2.20	12"	3"	62.5 GAL	375.0 GAL	137.5 GAL	N/A	2" SCH40 PVC	20" (MAX)

\* LOT HYDRAULICS SPECIFICATIONS ARE BASED ON AN ASSUMED FLOW RATE OF 312-gpd FOR LOTS 1, 2, & 3, AN ASSUMED FLOW RATE OF 400-GPD FOR LOT 4, AND AN ASSUMED FLOW RATE OF 550-GPD FOR LOT 5. A 50'-FT LONG FORCEMAIN WAS ASSUMED FOR LOTS 1-3, A 300'-FT LONG FORCEMAIN WAS ASSUMED FOR LOT 4, AND A 135'-FT LONG FORCEMAIN WAS ASSUMED FOR LOT 5. AN ELEVATION DIFFERENTIAL OF 5'-FT HAS BEEN ASSUMED FOR EACH LOT. A QUALIFIED ENGINEER SHOULD BE CONTACTED PRIOR TO CONSTRUCTION TO CONFIRM HYDRAULIC SPECIFICATION (I.E. PUMP SIZING, FLOAT SETTINGS, ETC.) PER AN ACTUAL SITE SPECIFIC LAYOUT.  
\*\* SUGGESTED TRENCH DEPTH IS BASED ON TEST PIT PERFORMED BY ALLIED ENGINEERING AND MAY NOT REPRESENT SUBSURFACE STRATA ACROSS ENTIRE DRAINFIELD AREA. CONTRACTOR SHALL PERFORM THE NECESSARY WORK TO ENSURE THAT THE TRENCH BOTTOM IS ABOVE THE COURSE SAND LAYER.

1 DETAIL  
LOT HYDRAULIC SPECIFICATIONS TABLE

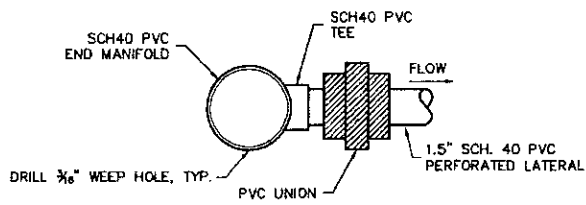


3 DETAIL  
DRAINFIELD RISER  
NOT TO SCALE



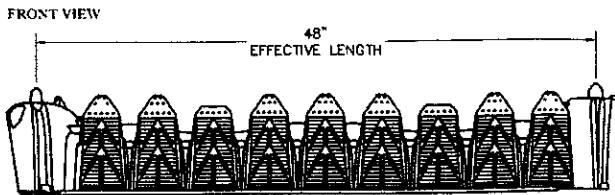
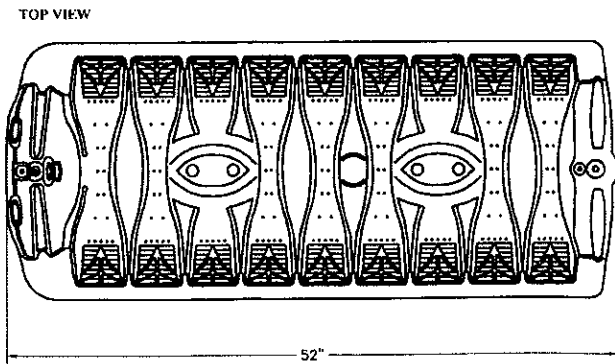
- NOTES:
1. FORCEMAIN & MANIFOLD SHALL BE INSTALL TO ALLOW FOR ALL EFFLUENT TO DRAIN IN BETWEEN DOSE CYCLES.
  2. ALL PIPE TO BE SCHEDULE 40 PVC UNLESS SPECIFICALLY APPROVED BY DESIGNER.
  3. A SUCCESSFUL SQUIRT TEST WILL DEMONSTRATE 5' MINIMUM OF HEAD AT THE LAST ORIFICE AND LESS THAN 10% VARIATION IN FLOW ACROSS THE FIELD.
  4. ADJUSTMENTS MAY BE MADE USING THE SPECIFIED HIGH PRESSURE GATE VALVE, MODEL VG 1500S.

5 DETAIL  
FLOW CONTROL VALVE  
NOT TO SCALE

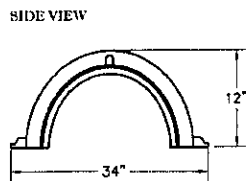


- NOTES:
1. FORCEMAIN & MANIFOLD SHALL BE INSTALL TO ALLOW FOR ALL EFFLUENT TO DRAIN IN BETWEEN DOSE CYCLES.
  2. ALL PIPE TO BE SCHEDULE 40 UNLESS SPECIFICALLY APPROVED BY DESIGNER.
  3. A SUCCESSFUL SQUIRT TEST WILL DEMONSTRATE LESS THAN 10% VARIATION IN FLOW ACROSS THE FIELD.

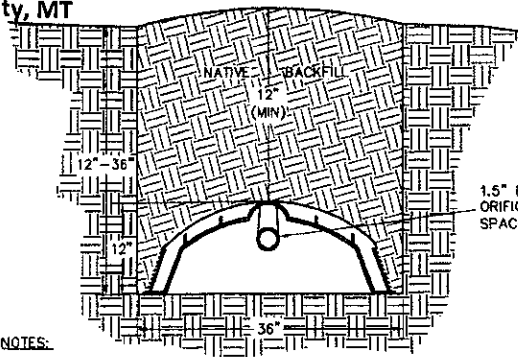
4 DETAIL  
END MANIFOLD CONNECTION  
NOT TO SCALE



6 DETAIL (PROFILE VIEW)  
INFILTRATOR CHAMBER (QUICK4 EQUILIZER)  
NOT TO SCALE

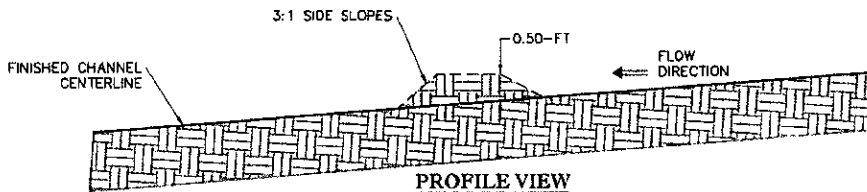
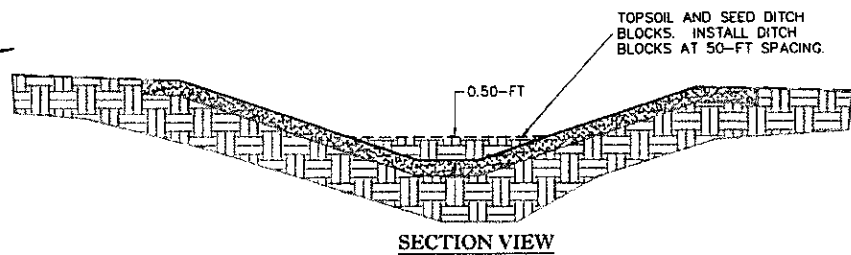


Reviewed by the Local Reviewing Authority  
Under contract with the  
Department of Environmental Quality  
*Denise M. H. PS* 8/30/2017  
Local Reviewer Date  
Accepted under contract  
*DM* 9/6/2017  
DEQ Representative Date



- NOTES:
1. FORCEMAIN & MANIFOLD SHALL BE INSTALLED TO ALLOW FOR ALL EFFLUENT TO DRAIN IN BETWEEN DOSE CYCLES.
  2. ALL PIPE TO BE SCHEDULE 40 PVC UNLESS SPECIFICALLY APPROVED BY DESIGNER.
  3. ORIFICES SHALL BE SPACED 5' ON CENTER FACING UPWARD WITH EVERY FIRST, FOURTH, AND LAST ORIFICE FACING DOWNWARD (USE ORIFICE SHIELD ON DOWNWARD FACING ORIFICES).
  4. TRENCH BOTTOM SHALL BE LOCATED ABOVE THE COURSE SAND LAYER AND WITHIN THE FINER GRAINED SOILS (I.E. LOAM, SANDY LOAM). TRENCH DEPTHS MAY VARY FROM LOT-TO-LOT. LOTS 1, 2, & 3 SHALL HAVE A 12" DEEP SHALLOW CAPPED TRENCHES, LOT 4 SHALL HAVE STANDARD 24" - 36" DEEP TRENCHES, AND LOT 5 SHALL HAVE SHALLOW-CAPPED TRENCHES WITH 20" (MAX) DEEP TRENCHES.

2 SECTION  
12" - 36" STANDARD/SHALLOW-CAPPED GRAVEL-LESS TRENCH  
NOT TO SCALE



7 SECTION  
DITCH BLOCK - SECTION AND PROFILE VIEWS  
NOT TO SCALE

LOT LANDUSE AREA REQUIREMENTS			
LOT	LANDUSE	MINIMUM AREA [SQ FT]	MAXIMUM AREA [SQ FT]
1	IMPERVIOUS AREA	N/A	133,779
	IRRIGATED LANDSCAPE	14,222	31,800
	NATIVE GRASSES	14,222	N/A
2	IMPERVIOUS AREA	N/A	52,836
	IRRIGATED LANDSCAPE	6,604	13,100
	NATIVE GRASSES	6,604	N/A
3	IMPERVIOUS AREA	N/A	73,600
	IRRIGATED LANDSCAPE	9,200	17,500
	NATIVE GRASSES	9,200	N/A
4	IMPERVIOUS AREA	N/A	N/A
	IRRIGATED LANDSCAPE	21,199	31,800
	NATIVE GRASSES	N/A	N/A
5	IMPERVIOUS AREA	N/A	N/A
	IRRIGATED LANDSCAPE	26,667	51,800
	NATIVE GRASSES	N/A	N/A

8 DETAIL  
LOT LANDUSE AREA REQUIREMENTS TABLE

NO.	REVISIONS	DRAWN BY	DATE
PROJECT ENGINEER: MAF		DRAWN BY: JDS	
DESIGNED BY: JDS		REVIEWED BY: MAF	

"VIKING-1" MINOR SUBDIVISION  
GENERAL DETAILS  
GALLATIN COUNTY, MONTANA

32 DISCOVERY DRIVE  
BOZEMAN, MT 59718  
PHONE (406) 582-0221  
FAX (406) 582-5770  
www.alliedengineering.com

Civil Engineering  
Geotechnical Engineering  
Land Surveying



PROJECT #: 16-081  
DATE: 08/22/2017

SHEET  
WW-9

"VIKING-1" MINOR SUB  
GENERAL DETAILS

AUG 30 2017