

APPENDIX F  
UTILITY REPORT

**PUD SKETCH PLAN  
UTILITY IMPACT REPORT**

**FOR**

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**Red Mountain Ranch**

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**May 2017**

**PUD SKETCH PLAN  
UTILITY IMPACT REPORT**

**FOR**

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**Red Mountain Ranch**

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**May 2017**

Prepared for: Red Mountain Partnership  
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## **I INTRODUCTION**

Red Mountain Ranch is a 130.835 acre parcel of land that extends east from the Town of Eagle along the Eagle River. The parcel is generally located between the river and U.S. Highway 6. The western boundary of the property is located at the first U.S. Highway 6 bridge crossing of the Eagle River east of town and extends east approximately 2.05 miles.

The property includes high terrace upland areas south of U.S. Highway 6 and a wetland and riparian complex along the stream frontage. Several sections of the upland terrace have been mined for gravel and placed in reclamation. There are two occupied residential homes. There are several residential, gravel pit and agricultural access points from U.S. Highway 6 that provide current access to various portions of the property.

The property is currently located outside the Town of Eagle boundary and is proposed for annexation to the Town of Eagle.

The property falls within the study area of the Eagle Area Community Plan and the Town of Eagle River Corridor Plan.

The Red Mountain Ranch PUD will contain a total of 153 dwelling units, 3,200 square feet of commercial space, an environmental education center, public and private open space, active and passive parks, recreation areas and trails on 130.835 acres of land within the Town of Eagle, Eagle County, Colorado as described in the approved Red Mountain Ranch PUD Sketch Plan.

## **II SITE DESCRIPTION**

The majority of the existing property is currently grasslands covered with sage and grasses as well as riparian area since all parcels have frontage on the Eagle River. There are several existing buildings on the property.

The proposed Red Mountain Ranch development is located east of Eagle on the south side of U.S. Highway 6 and adjacent to and north of the Eagle River. It is proposed to be annexed to the Town of Eagle, Colorado. The site contains several development parcels as shown on the concept plan.

Parcel 1 is the closest to the Town of Eagle and extends from the new Eagle River Bridge on U.S. Highway 6 to the east for approximately 2,000 feet. It is proposed to contain a mixed use of condominiums, 4 and 6-Plex units, townhouses, duplex and single family units. The parcel area is 34.6 acres.

Parcel 2 is called the Farm and is east of and adjacent to Parcel 1. The Farm is anticipated to be a restaurant and 6-Plex units. The Farm parcel is 5.0 acres.

Parcel 3 is east of the Farm and is a parcel that is proposed to become an Environmental Education Center. The parcel area is 15.0 acres.

East of the Education Center is Parcel 4. Parcel 4 is proposed to have single family lots and open space. This development parcel is 13.7 acres.

Parcel 5B is east of Parcel 4 and is the Eagle River Park. The Eagle River Park area is 2.9 acres. The Eagle River Park will be dedicated to the Town of Eagle and is proposed to have a boat ramp to access the Eagle River.

East of Parcel 5B is Parcel 5. Parcel 5 is proposed to have single family lots and is 15.4 acres in area.

East of Parcel 5 is Parcel 6. Parcel 6 is proposed to have single family lots and is 19.2 acres in area.

Parcel 7 is east of Parcel 6. Parcel 7 is proposed to have single family lots and open space and is 24.5 acres in area.

The balance of the acreage will either be undeveloped, natural open space or more formal open space containing trails and park appurtenances.

### **III. PROJECT OVERVIEW-UTILITIES**

The Concept Plan for Red Mountain Ranch shows that there are seven (7) individual planning parcels within the overall project site. Parcels 1 and 2 located at the western end of the site are currently able to be served by municipal water and sewer service and the balance of the parcels are proposed to be served by wells and septic or by municipal water and sewer if the property north of U.S. Highway 6 were to be developed and the infrastructure extended to the southern edge of the development parcel within close proximity to Parcels 3 through 7.

### **IV. SANITARY SEWER – PARCEL 1 AND THE FARM**

The Red Mountain Ranch sewer is proposed to connect to the Town's existing sewer main located in Nogal Road through a force main that will pump sewage effluent up to the connection with the existing gravity main. The proposed sewer within Red Mountain Ranch Parcel 1 will be a gravity flow collection system as illustrated on the attached Schematic Utility Plans. The Parcel 1 sewer main is proposed to run parallel and above the 50' stream setback line which will be the lowest point along the site and will provide collection service lines as needed to serve the proposed units.

The sewer main spur line is shown on Sheet U-3 which will serve the units in parcel 1D and then extend eastward to serve the Farm Parcel. All of the proposed sewer mains in Parcel 1 are proposed to be 8" SDR-35 PVC per the Town's regulations. Public utility easements will be created by Final Plat and dedicated to the Town.

Projected sewer effluent volumes are included in Table 2 and illustrate that an 8” sewer main will be sufficient to serve Parcel 1. The report attached in Appendix A – Offsite Sewer Study shows that the existing sewer main west of the connection point on Nogal Road has capacity to serve the proposed development on Red Mountain Ranch Parcel 1 and the Farm Parcel. Further study should be done on the existing main to determine if the lines could accommodate sewage volumes from the Eagle River Station project which would also connect to the existing sewer main. The proposed sewer lift station would collect gravity flow into a cistern and the lift station pumps would have float controls that would initiate the pumping cycle through the force mains. The lift station pump could be set to turn on during off peak times if capacity of the existing main line was deemed an issue.

## **V. TREATED WATER – PARCEL 1 AND THE FARM**

Water service for Parcel 1 and The Farm will be from a looped 12” DIP water main that will connect to the current dead end line in Nogal Road, cross U.S. Highway 6 at the western end of Parcel 1, loop through the proposed development site and then run back across U.S. Highway 6 and the Union Pacific Railroad to tie into the existing 8” DIP water main in Marmot Lane between Lots I-5 and I-6 of the Eagle Commercial Park Subdivision (see Schematic Utility Plans).

The Town’s water system engineer, Mott MacDonald, performed a hydraulic study for Parcel 1 based on a less dense development proposal but the report showed that there was adequate fire flow volumes available while maintaining a residual pressure above 20 psi when modelling a 12” DIP water main loop. The hydraulic model will need to be updated based on the final uses and density proposed for Parcel 1 and The Farm under a future Development Permit submittal.

It is anticipated that the Red Mountain Ranch water system will have 12” DIP water mains serving the site with water services to individual units or multi-family buildings to be designed in compliance with the Town Design Standards. Public water line easements will be created and dedicated to the Town by Final Plat.

Water demand for Parcel 1 and The Farm Parcel is shown in Figure 1. This illustrates that only in house use will be needed to serve the proposed development since the outdoor consumptive usage will be provided by a non-potable irrigation system that will draw water from the Eagle River based on the water rights owned by Red Mountain Ranch.

## **VI. SHALLOW UTILITIES – PARCEL 1 AND THE FARM**

Electric and communication infrastructure is located within the U.S. Highway 6 Right-of-Way along the length of Parcel 1 and The Farm and are proposed to be extended into the site. Natural gas infrastructure is located in Marmot Lane and is proposed to be extended to the Red Mountain Ranch site generally along the alignment of the water main loop. Holy Cross Energy, Black Hills Energy and CenturyLink will be contacted and sent a set of Schematic Utility Plans for

review and comment. Ability to serve letters will be acquired from all the utility providers under Preliminary Plan or Development Permit.

There is an existing overhead electric transmission line located at the western end of Parcel 1. This line is intended to be rerouted and buried out of the proposed development site. The balance of the electric overhead line runs along the U.S. Highway 6 Right-of-Way line and will remain in place as an overhead line.

## **VII. PARCELS 3-7**

Red Mountain Ranch Parcels 3 through 7 do not currently have municipal water and sewer service available. The elevation of these parcels precludes water service and adequate fire flow pressures or volumes from the Town's existing water system. A new tank site has been identified as a part of the Eagle River Station PUD north of I-70 at an approximate elevation of 6900' which would provide adequate fire flow pressure for all of the outlying parcels if water system infrastructure was extended southward in close proximity to these outlying parcels.

There is currently no sewer infrastructure within close proximity to Parcels 3-7 and all of the parcels lie topographically below the elevation of any extended sewer north of U.S. Highway 6 and would therefore require lift stations to be installed to serve any of the parcels. Future development north of U.S. Highway 6 would likely include extended sewer mains which would provide connection points for the lift stations and force mains required to serve these parcels. Therefore, these parcels will likely utilize Onsite Wastewater Treatment Systems (OWTS) for sewage treatment and will be designed per the Eagle County Land Use Regulations, Chapter 4, Onsite Wastewater Treatment Systems (OWTS) based on the following assumptions and criteria for each development parcel.

- Residential sewage volume of greater than 2000 gallons per day will require Colorado state approval (Water Quality Control Commission- CDPHE)
- Percolation test reveal rates between 5 and 100 minutes per inch
- Septic system can be designed to meet the setback criteria listed in Table 3 of the OWTS regulations
- Extra design may apply for percolation rates that are not between 5 and 100 minutes per inch
- Water treatment system data to be provided to engineer.
- Extra design is applicable if insufficient depth to groundwater, bedrock, or impervious soil layer is determined per the soil profile-hole observation
- It is recommended to utilize an Orenco AdvanTex AX-RT advanced water treatment system. This pre-packaged system helps to reduce BOD (biochemical oxygen demand), TSS (total suspended solids) and nitrogen from the septic tank effluent. Reducing these (3) factors will prolong the life of the sewage leach field and ease maintenance.
- Extra design will be required for non-gravity systems to provide pump sizing info to Orenco and to size pipe perforations in the soil treatment area. The discharge pump is provided within the Orenco Vault.

- Extra design is applicable if dosing is required to reduce soil treatment area for a possible site restriction.
- Control and alarm panel are to be placed on a 4 foot post near the Orenco vault, unless the owner/architect provides an enclosure next to the electric panel on the house, etc.

Domestic water and fire protection for Parcels 3 through 7 would be with drilled water wells and either individual or communal public water systems. If municipal water service is not available each parcel would likely require separate water wells and water distribution systems to serve the proposed units within each development parcel. A technical memorandum is attached as Appendix B that summarizes the assumptions and criteria for Water Supply and Fire Protection for these parcels.

**TABLE 1 – RED MOUNTAIN RANCH – DOMESTIC IN-HOUSE WATER DEMAND (Parcel 1 and the Farm)**

Water Demand Calculations – Maximum Day Demand (Mdd) at Buildout

Unit/Density Type	Unit Count	Persons Per Unit	Water Volume Per Capita Daily (Gallons)	Average Daily Volume (Gallons)	Peaking Factor	Peak Day Volume (Gallons)
<b>Single-Family</b>	17	3.2	85	4624	2	9,248
<b>Multi-Family</b>	32	2.8	85	7616	2	15,232
<b>Condominium</b>	58	2.0	85	9860	2	19,360
<b>Restaurant</b>	1*			800	2	1,600
<b>TOTALS</b>	<b>107</b>					<b>45,440</b>

\*250 gpd/1000 SF; Restaurant is 3200 SF

**TABLE 2: SEWAGE VOLUME (Parcel 1 and the Farm)**

Peak Day Volume at Buildout

Density Type	Unit Count	Persons Per Unit	Sewage Volume Per Capita Daily (Gallons)	Average Daily Volume (Gallons)	Peaking Factor	Peak Day Volume (Gallons)
<b>Single-Family</b>	17	3.2	77	4189	1.5	6,284
<b>Multi-Family</b>	32	2.8	77	6899	1.5	10,349
<b>Condominium</b>	58	2.0	77	8932	1.5	13,398
<b>Restaurant</b>	1*			1280	1.5	1,920

\*3200 SF Restaurant at 400 gpd/1000 SF

# RED MOUNTAIN RANCH

## SCHEMATIC UTILITY PLANS

### TOWN OF EAGLE, COLORADO

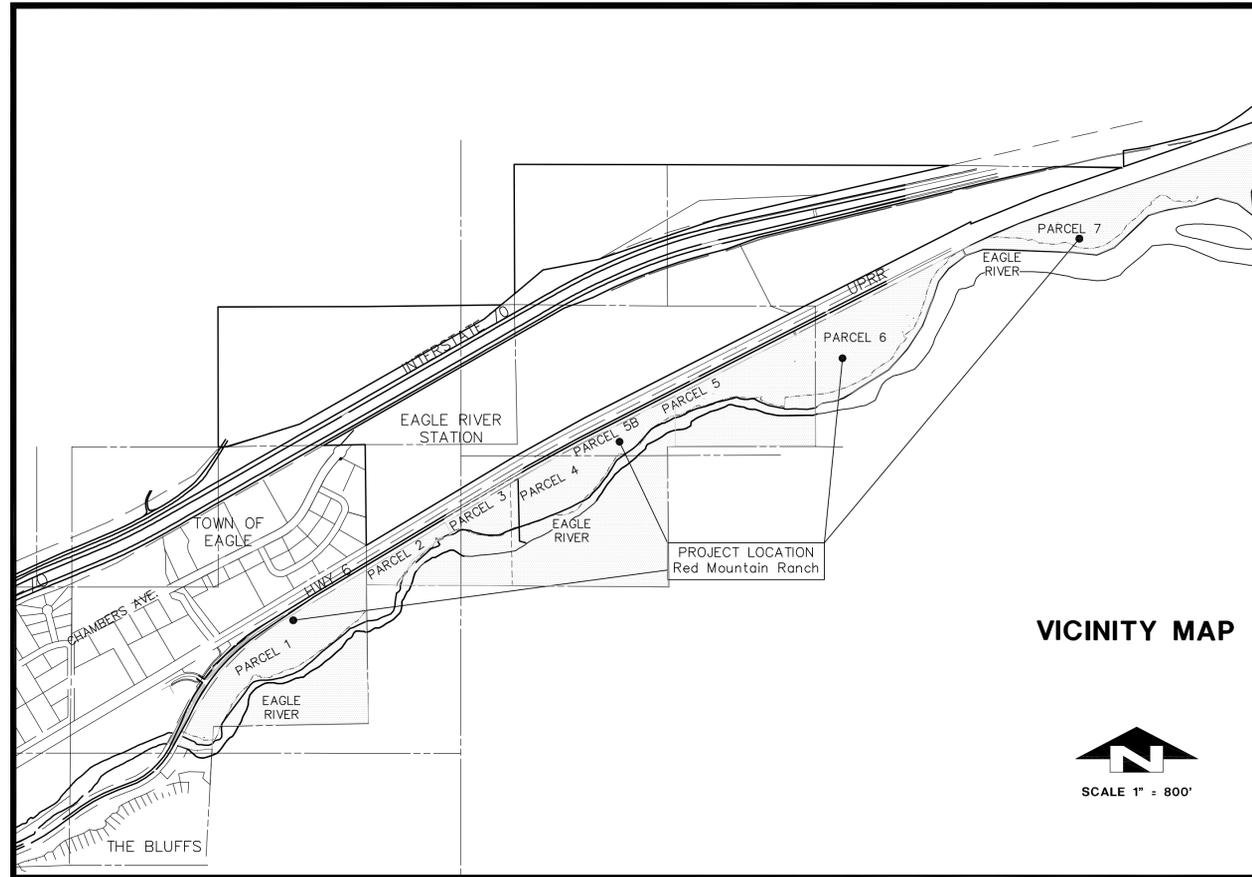
#### MAY 2017

### GENERAL NOTES

- The Contractor shall notify Alpine Engineering, Inc., Owner and Town of Eagle Engineering Dept. at least 48 hours prior to any construction. The Contractor shall coordinate all work with Alpine Engineering, Inc. and Owner.
- Alpine Engineering, Inc., assumes no responsibility for utility locations. It is the Contractor's responsibility to field verify the location of all utilities prior to commencement of any construction.
- The Contractor shall conform to all Town of Eagle rules, regulations and stipulations while accessing through or working in the Town.
- The Contractor shall take all appropriate precautions to significantly reduce any potential pollution caused by his activities, including vehicle fueling, storage of fertilizers or chemicals, etc. The Contractor shall have identified procedures for handling potential pollutants and have identified spill prevention and response procedures prior to any activities at the project site.
- The Contractor shall keep 2 sets of contract drawings marked up to fully indicate asbuilt conditions. The drawings shall be provided to the Owner and Alpine Engineering, Inc. upon completion of this work. Contractor is to provide at least three ties from physical monuments to all fittings, valves, hydrants, curb stops, air vac valves, prv's, manholes, and services. The Town regulations require a description of all materials and appurtenances to be included in the asbuilts.
- The Contractor shall maintain traffic at all times to the satisfaction of the Owner and the Town of Eagle. The Contractor shall minimize traffic disruptions and provide adequate safety precautions to ensure public safety.
- Safety is the responsibility of the Contractor. The Engineer is not responsible for safety in, on, or about the project site, nor for compliance by the appropriate party with any regulations relating thereto.
- It is the Contractor's responsibility to obtain (and conform to) all proper construction permits including a road cut permit for work within the public right of way.
- The Owner will designate staging areas.
- The Contractor shall minimize all off site tracking. All soil tracked off site shall be immediately cleaned up to the satisfaction of The Town of Eagle and The Owner.
- If any groundwater is encountered the Contractor shall contact Owner, Alpine Engineering, Inc., and the Project Geotechnical Engineer immediately.
- The Contractor shall protect and preserve all trees, bushes, shrubs, and ground cover in a manner acceptable to The Owner.
- Observations of the work in progress and on-site visits are not to be construed as a guarantee or warranty by the Engineer of the Contractor's contractual responsibilities.
- All materials and workmanship shall be subject to inspection by the Town and/or their representatives, and Alpine Engineering, Inc. The Town reserves the right to accept or reject any such materials and workmanship that do not conform to the approved drawings and/or district standards or specifications.
- All construction shall conform to town standards and specifications and be subject to construction observation by their representatives. Copies of town standards must be obtained by the Contractor. Contractor shall have one (1) copy of the plans and one (1) copy of the appropriate specifications on the job site at all times.
- Street closures shall be kept to a minimum length of time. There shall be no material storage on Town Streets or property.
- It is the Contractor's responsibility to prepare and submit a Traffic Control Plan, as a requirement of the Town of Eagle's Road Cut Permit, and submit to the Town's Engineer prior to construction. The plan shall show existing and proposed traffic signs, existing and proposed crosswalk striping, construction limits, fencing and access, and vehicle tracking control measures.
- Contractor shall conform to all recommendations in the preliminary subsol study prepared by HP Geotech (Report # 106 D011, December 19, 2005)
- The Contractor shall conform to the Technical Specifications

### UTILITY NOTES

- The Contractor is warned that conflicts with existing utility services may exist. Prior to beginning any construction, the Contractor shall contact all appropriate utility companies for line locations. The Contractor shall then locate all utilities (including depth). Any conflicts with the proposed construction shall be brought to the attention of the Engineer so that line or grade changes can be made to eliminate any conflicts with these existing utilities. All existing utilities shall be protected from damage by the Contractor. Damaged utilities shall be repaired by the Contractor at no expense to the Owner.
- All construction activities and excavating for utility trenches shall meet OSHA requirements.
- All Water System and Sanitary Sewer System construction shall conform to Town of Eagle standard specifications.
- All water mains and services shall have a minimum cover of 6 feet.
- Provide 10 feet minimum horizontal separation between water and sewer mains and services or encase per Colorado Department of Health requirements.
- The Contractor shall mark all service line ends as shown on the details.
- The Contractor shall provide thrust blocks and megalug restraints at all bends and tees. Angles of water line bends are shown only as a guideline, all bends have not been identified or dimensioned, and additional bends may be required during construction. Vertical bends are not shown but may be required to maintain minimum cover.
- Water service lines to be Type K Copper or Class 52 DIP with size per plan, a curb stop shall be installed for each service at the property line or edge of easement or as shown on the plans.
- The Contractor shall verify existing pipe or manhole inverts at tie in points prior to construction.
- The Contractor shall lay 10 gauge insulated copper trace wire along the water lines, (see detail sheet), and ductile iron water pipe shall be cad-welded charge size of CA-45. The Contractor shall test the pipe and the tracer wire to confirm conductivity prior to acceptance. The Contractor shall field install polyethylene wrap on all water lines (see detail sheet).
- The Contractor shall test all water mains in accordance with Town standard specifications, tests to include pressure test, chlorine test, bacteria test and leakage test.
- The Contractor shall attend a mandatory preconstruction meeting with the Town of Eagle Engineering Dept. and Alpine Engineering, Inc., prior to the start of construction.
- All sewer lines shall have a minimum of 4.5 feet of cover.
- The Contractor shall test all sewer mains in accordance with Town standard specifications, tests to include low pressure air test, manhole vacuum test, and television test.
- The Contractor shall have water running in sewer lines during the t.v. recording process and cut sheet format shall conform to Town standard specifications.
- The Contractor is responsible for coordinating, conducting and scheduling for the testing of all utilities and obtaining approval and acceptance from all utility companies.
- To maintain adequate skin friction on existing water mains during construction, the Contractor shall valve off stubs and deplete the pressure prior to excavation for extending water main stubs. The Contractor shall also go 10 feet minimum from the main cross tee before beginning the excavation trench. The excavation trench shall be a maximum of 1.5 : 1 slope.
- The Contractor may need to perform hydraulic testing and disinfection of existing waterlines as part of the testing and acceptance procedure for the proposed waterline.
- Compaction of all trenches and bedding must be attained as per specifications.
- PHONE\CATV: All phone and cable TV conduits, pedestals and appurtenances shall be installed in accordance with CenturyLink's design specifications and shall be reviewed and accepted by CenturyLink.
- If Water lines cross within 18" (vertical) of sewer lines, or if water lines are beneath sewer lines, the contractor shall use C900 pipe for the sewer line. A stick of C900 sewer lines shall be centered on the water line.
- All shallow utility conduit shall be Schedule 40 unless noted otherwise.



SHEET INDEX	
COVER SHEET	U-COVER
PARCEL 1 SEWER AND WATER	U-1
PARCEL 1 SEWER AND WATER	U-2
THE FARM SEWER AND WATER	U-3

PROJECT CONTACTS		
OWNER: MERV LAPIN	MERV LAPIN	(970) 471-4224
TOWN OF EAGLE, ENGINEERING	VERN BROCK	(970) 328-6678
TOWN OF EAGLE, PUBLIC WORKS	DUSTY WALLS	(970) 328-6678
SOURCE GAS	TODD ELLSWORTH	(970) 309-2722
HOLY CROSS ENERGY (ELECTRIC)	KEITH HERNANDEZ	(970) 947-5439
CENTURY LINK (PHONE\CATV)	JASON SHARPE	(970) 328-8288
CIVIL ENGINEER, ALPINE ENGINEERING INC.	GARY BROOKS	(970) 926-3373
GEOTECHNICAL ENGINEER, HP-GEOTECH	DAVE YOUNG	(970) 945-7988
LAND SURVEYOR, ARCHIBEQUE LAND CONSULTANTS	TED ARCHIBEQUE	(970) 3286020

**PRELIMINARY PLAN**  
May 15, 2017  
**NOT FOR CONSTRUCTION**

### HOLY CROSS ENERGY CONSTRUCTION SPECIFICATIONS

#### TRENCH AND CONDUIT

- The developer or contractor will contact Holy Cross Energy before conduit and vault installation begins to schedule a pre-construction meeting with the project inspector.
- Changes in power facility construction from that shown on the project plans will not be made without advance approval from the Holy Cross Energy inspector.
- Holy Cross Energy material shall not be moved from the project to which it was assigned without the advance approval of the inspector and the completion of necessary paperwork. Holy Cross Energy material shall not be installed for any use other than construction of power facilities.
- All roads will be built to subgrade and all drainages will be constructed to grade before any vaults or conduits are installed.
- All trench will be excavated deep enough to ensure that the top of installed power facilities will be 48" below final grade. Special care must be taken to insure that the top of conduits will be 48" below the bottom of drainage ditches and all other low areas.
- Trench will be as straight as possible between vaults and shall have a smooth bottom free from low and high spots. Six inches of road base will be placed the entire length of the trench and well compacted prior to conduit installation. When placed in the trench, the conduit shall be in continuous contact with the compacted road base with no hold down weight added. Twelve inches of road base, as measured from the top of the conduit, will be placed on the conduit and well compacted prior to returning any native backfill to the trench. Large rocks shall not be placed directly on the road base layer. Care must be taken to avoid conduit damage during backfill and compaction; conduits found to be unusable at the time of power cable installation will be repaired by the developer or contractor before power can be made available.
- Power facilities to be placed parallel to deeper utilities will have a horizontal separation from the deeper utility greater than the depth of such utility below final grade less four feet (see attached drawing). When crossing a deeper utility is unavoidable, the crossing will be made as close to perpendicular as possible.
- Power line conduits will be installed with a minimum separation of 12" from all other new or existing underground utility lines. Wherever possible, this separation will be horizontal. The power line separation from plastic gas lines will be greater than this minimum wherever practicable. Power line conduits will be located deeper in the trench than the facilities of all other utilities unless the inspector grants a waiver prior to the start of construction.
- Backfill and compaction above the road base layer will be as required by the governmental entity or other party having jurisdiction.
- Conduit ball ends will not be allowed in the vaults. Holy Cross Energy will supply factory couplers, 90°, 45°, and 22 1/2° elbows as needed for job. Non-factory bends and heated bends will not be allowed. No more than two 90° elbows will be allowed in a conduit run of 500 feet. The conduit shall run straight between factory bends. Allowed bends must be further than 5' from a vault. Factory elbows supplied must be used intact; they cannot be cut to make a lesser bend. Balls will not be cut off conduit sticks to use as couplers. Holy Cross Energy elbows and pipe will be used only for the power facility installation.
- The conduit will not be backfilled without the Holy Cross Energy inspector seeing all joints unless the inspector gives prior permission. All joints shall be completely seated to the line marked on the male end of the conduit after sufficient glue is applied to both conduits being jointed, even in areas where the trench cannot be excavated completely straight. Glue in the joint shall be allowed to completely dry prior to any stress being applied to the conduit on either side of the joint. Trench backfilled without the inspector viewing each joint or giving prior permission to cover the conduit will be re-excavated to expose the conduit, or the contractor will put a camera through each conduit in the span which was prematurely backfilled to verify the joint seating and conduit condition. The camera verification will be witnessed by the Holy Cross Energy inspector.
- Individual conduits shall enter each vault at a consistent location. There is to be no crossing of conduits in the trench.
- Both ends of a conduit run shall be securely plugged at the time of installation with Holy Cross Energy supplied material. Conduit ending outside a vault shall be marked with a 4" x 4" post or other approved method.
- Trench marking tape will be supplied by Holy Cross Energy and shall be installed 18" to 24" above the conduit during backfill.
- At completion of the job, the inspector will do a final inspection. If the job does not meet with Holy Cross Energy's specifications or the approval of inspector, service will not be provided until specifications are met.

#### U. VAULTS

- Vaults shall be installed as follows:
  - A Splice vaults shall be installed with the manhole lid grade being slightly above final grade of the surrounding area, except when the vault is in a roadway, the manhole lid grade shall match the grade of the finished roadway surface.
  - B Splice vaults located in roads or other sloped areas will be installed so that the concrete base and lid are at the slope of the surrounding area. Vaults placed in roads will not be located in areas normally traversed by vehicle wheels. The inspector must approve all vaults installed at a slope.
  - C Transformer vaults and switchgear vaults will be installed with the bottom of the lid at final grade. The lid will be level.
  - D Where transformer and switchgear vaults are set into hillsides or sloped cuts, the downhill side of the vault will be graded according to C above. The slope behind the vault will be laid back sufficiently to prohibit soil or rocks from sloughing onto the vault. If the slope cannot be laid back far enough, a retaining wall shall be constructed behind the vault at the direction of the inspector.
  - E All vault pads will be placed on the vaults at the time of vault installation to protect the public and wildlife, unless otherwise instructed by the inspector. The holes through transformer and switchgear pads will be covered at the time of vault installation with concrete pieces supplied by Holy Cross Energy, unless otherwise instructed by the inspector.
  - F Large vault pieces shall be jointed with a tar type sealant provided by Holy Cross Energy, with the exception of the vault lid, at the direction of the inspector.
- Holes knocked in vaults for conduit installation shall be as small as possible and shall be grouted closed on the outside of the vault prior to backfill.
- Conduit shall enter vaults perpendicular to the vault wall, at least 2" from any adjacent walls and at least 2" above the vault base. There shall be a minimum separation of 1" between conduits. See vault drawings.
- Conduit will extend 4" into the vault (measured from the inside wall of the vault) after backfilling is complete.
- Ground rods in vaults for underground cable installation shall be laid in the trench with the conduits. The end of the rod shall extend approximately 6" into the vault through the conduit knockout. The rod will have a 45° bend located approximately 3" from the vault end, with the bend going away from the conduits. The bent end of the rod must be far enough from the vault wall to allow crimping the grounding conductor onto the rod. The rod must be at least 2" from the conduit at its entrance into the vault. See vault drawings.
- After the vault has been set, pipes extended in and grouted and the ground rod is in place, vaults shall be swept out removing all dirt or rocks. Cleanup shall be completed to the satisfaction of the inspector prior to cable installation being scheduled.
- Pedestals for other utilities shall not be located closer than 10' to a vault on sides where transformers or switchgear will have access doors. Pedestals shall not be located closer than 5' to a vault on sides where the pad-mounted equipment will not have access doors.

**RED MOUNTAIN RANCH**  
 SCHEMATIC UTILITY PLANS  
 COVER SHEET

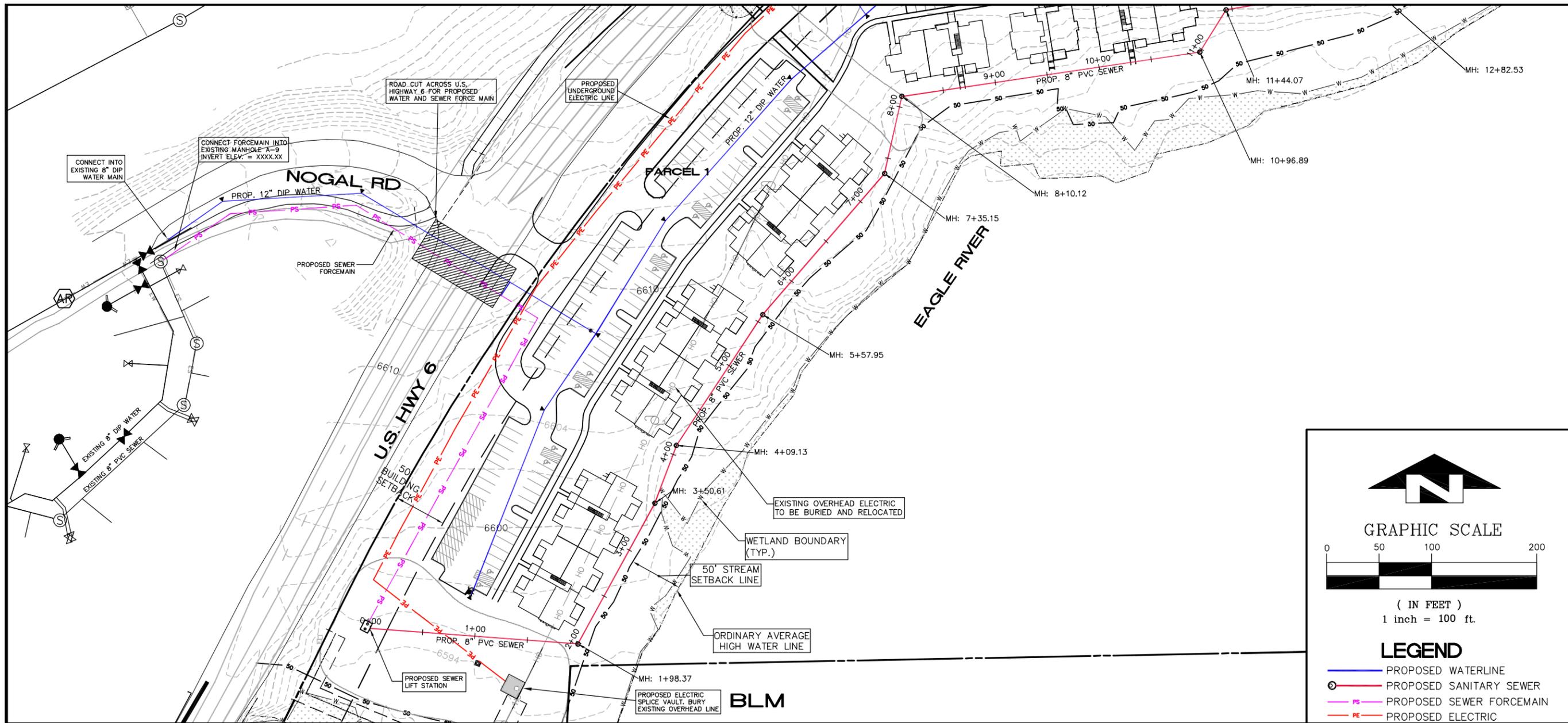
NO.	DATE	REVISIONS	BY
1	05/10/2017	P.U.D. SKETCH PLAN	GLB

DESIGNED	GLB
DRAWN	M/W
CHECKED	GLB
JOB NO.	44069.4
DATE	05/09/2017

**SHEET U-COVER**

(SEAL)

O:\Eagle\Red Mountain Ranch-44069.4- 2016\dwg\Master\Utility Plan.dwg, U-01-UTILITY-11x17, 5/9/2017 7:06:39 AM, Mues



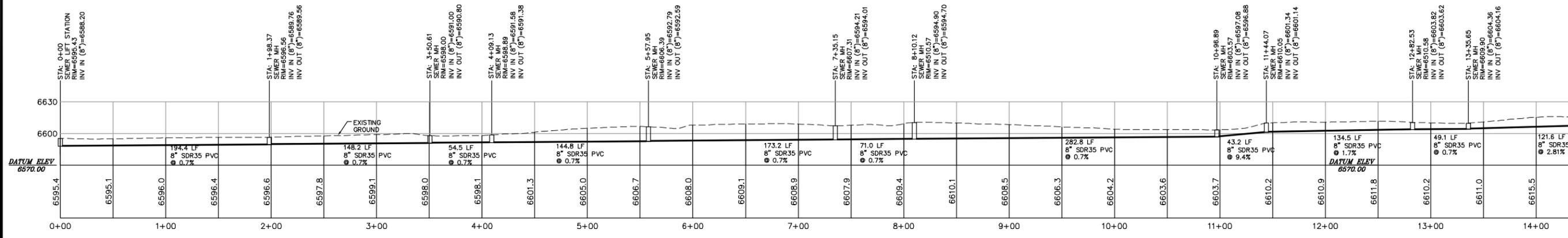
**GRAPHIC SCALE**

( IN FEET )  
1 inch = 100 ft.

**LEGEND**

- PROPOSED WATERLINE
- PROPOSED SANITARY SEWER
- PROPOSED SEWER FORCEMAIN
- PROPOSED ELECTRIC

**SEWER PROFILE**  
SCALE: HORIZONTAL = 100'  
VERTICAL = 100'



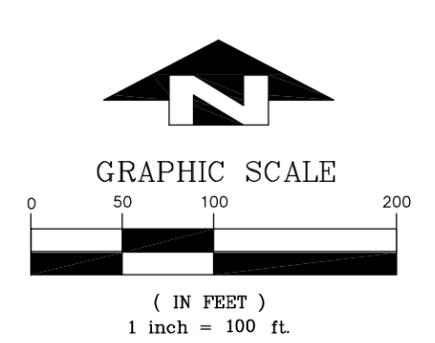
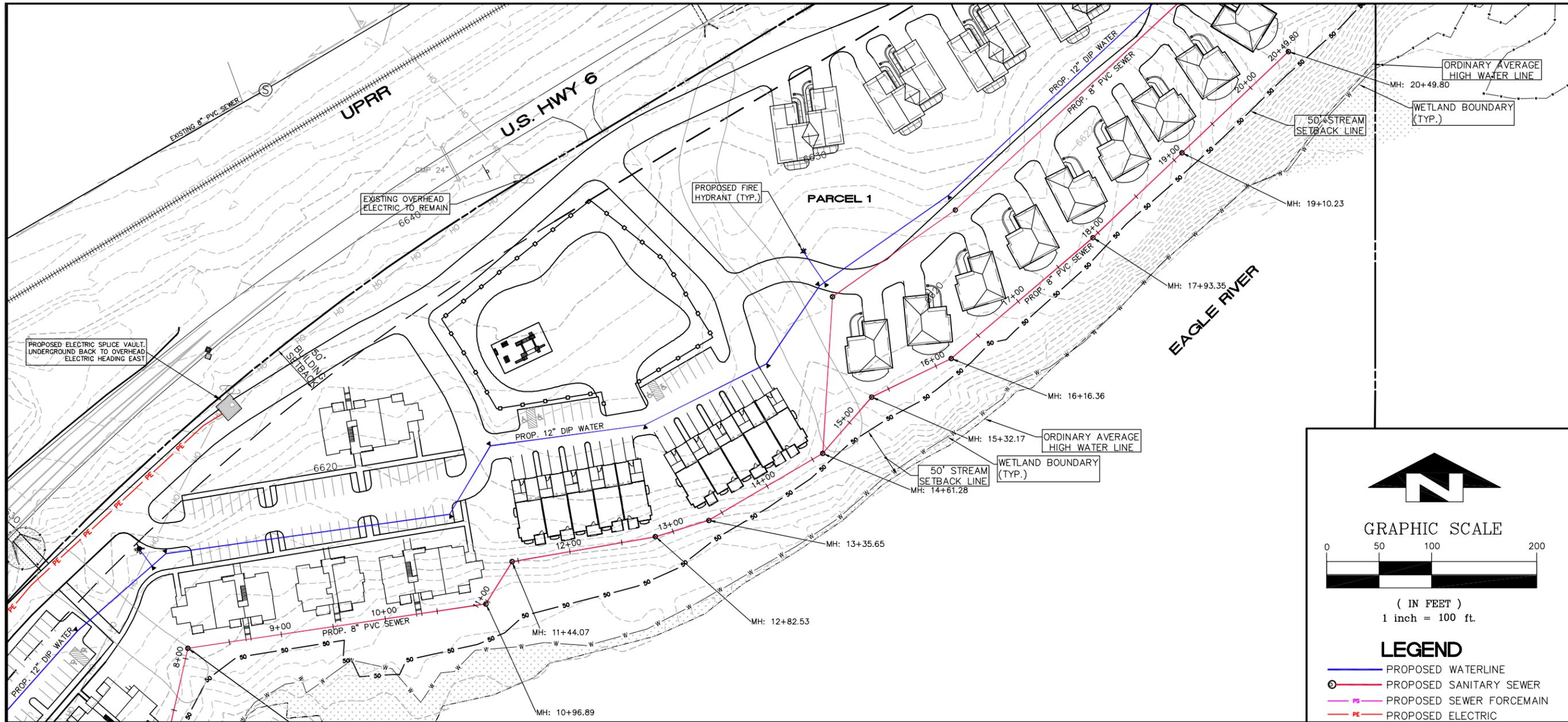
**SCHEMATIC**  
May 09, 2017  
NOT FOR CONSTRUCTION



**RED MOUNTAIN RANCH**  
EAGLE COLORADO  
SCHEMATIC UTILITY PLAN

NO.	DATE	REVISIONS	BY	APP.
1	05/10/2017	PUD/SKETCH PLAN	AEI	

**SHEET**  
U-1



- LEGEND**
- PROPOSED WATERLINE
  - PROPOSED SANITARY SEWER
  - PROPOSED SEWER FORCEMAIN
  - PROPOSED ELECTRIC

**SEWER PROFILE**  
SCALE: HORIZONTAL = 100'  
VERTICAL = 100'

**SCHEMATIC**  
May 09, 2017  
**NOT FOR CONSTRUCTION**

Station	Material	Length (LF)	Slope (%)	Notes
6609.1	8" SDR35 PVC	173.2	0.7%	
6608.9	8" SDR35 PVC	71.0	0.7%	
6607.9	8" SDR35 PVC	71.0	0.7%	
6609.4	8" SDR35 PVC	282.8	0.7%	
6610.1	8" SDR35 PVC	43.2	3.4%	
6608.5	8" SDR35 PVC	134.5	1.7%	
6606.3	8" SDR35 PVC	49.1	0.7%	
6604.2	8" SDR35 PVC	121.6	2.81%	
6603.6	8" SDR35 PVC	66.9	0.7%	
6603.7	8" SDR35 PVC	80.2	1.33%	
6610.2	8" SDR35 PVC	173.0	3.92%	
6610.9	8" SDR35 PVC	112.9	5.03%	
6611.8	8" SDR35 PVC	135.6	8.52%	
6610.2	8" SDR35 PVC	43.2	3.4%	
6611.0	8" SDR35 PVC	43.2	3.4%	
6615.5	8" SDR35 PVC	43.2	3.4%	
6615.2	8" SDR35 PVC	43.2	3.4%	
6614.0	8" SDR35 PVC	43.2	3.4%	
6617.7	8" SDR35 PVC	43.2	3.4%	
6617.0	8" SDR35 PVC	43.2	3.4%	
6617.5	8" SDR35 PVC	43.2	3.4%	
6618.9	8" SDR35 PVC	43.2	3.4%	
6621.3	8" SDR35 PVC	43.2	3.4%	
6623.1	8" SDR35 PVC	43.2	3.4%	
6625.6	8" SDR35 PVC	43.2	3.4%	
6628.1	8" SDR35 PVC	43.2	3.4%	
6634.0	8" SDR35 PVC	43.2	3.4%	
6637.5	8" SDR35 PVC	43.2	3.4%	
6640.0	8" SDR35 PVC	43.2	3.4%	



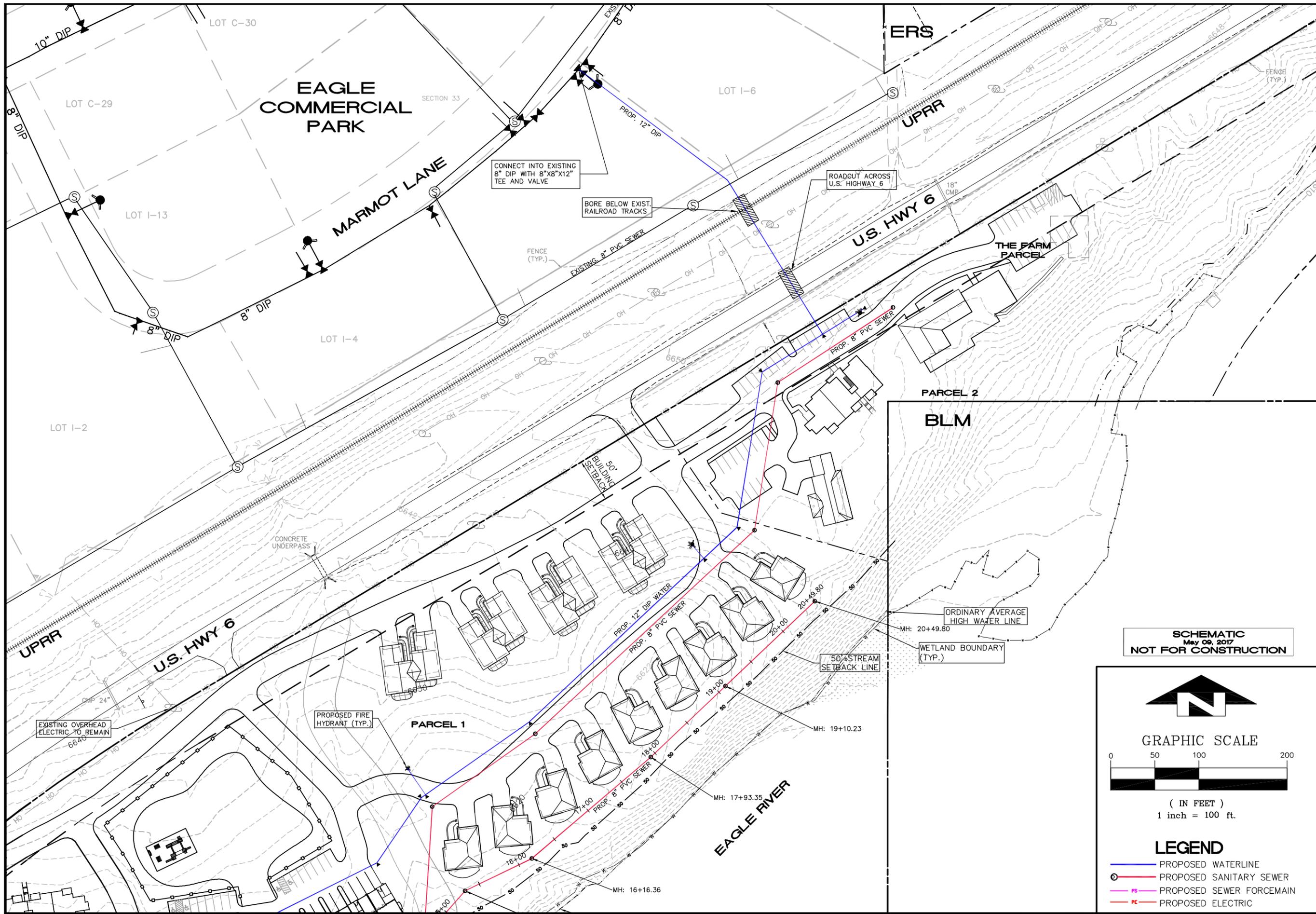
**RED MOUNTAIN RANCH**  
EAGLE COLORADO  
SCHEMATIC UTILITY PLAN

NO.	DATE	REVISIONS	BY	AEI
1	05/10/2017	PUD/SKETCH PLAN	AEI	

DESIGNED	GLB/HM
DRAWN	HM
CHECKED	GLB
JOB NO.	44069.4
DATE	05/08/2017

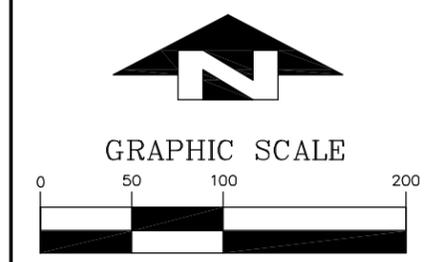
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D:\Eagle\Red Mountain Ranch-44069.4-2016.dwg Master Utility Plan.dwg, U49-UTILITY-11x17, 5/9/2017 6:58:45 AM, Mues



**RED MOUNTAIN RANCH**  
EAGLE COLORADO  
SCHEMATIC UTILITY PLAN

**SCHEMATIC**  
May 09, 2017  
NOT FOR CONSTRUCTION



( IN FEET )  
1 inch = 100 ft.

- LEGEND**
- PROPOSED WATERLINE
  - PROPOSED SANITARY SEWER
  - PROPOSED SEWER FORCEMAIN
  - PROPOSED ELECTRIC

NO.	DATE	REVISIONS	BY
1	05/10/2017	PUD/SKETCH PLAN	AEI

DESIGNED	GLB/HM	DRAWN	HM	CHECKED	GLB	JOB NO.	DATE
						44069.4	05/08/2017

**SHEET**  
**U-3**

**APPENDIX A – OFFSITE SEWER STUDY  
RED MOUNTAIN RANCH – PARCEL 1 AND THE FARM**



**ASSUMPTIONS:**

For preliminary information purposes, We assumed one (1) person per parking spot for all of the existing apartment and condo developments on Nogal Road (and the sewer main south of the RR tracks that runs west and crosses the Spur Road (Eby Creek ) north of Alpine Limber. We counted parking spots using google earth (which could vary a bit due to shade). We included roadway parking along the street (north side of road) as parking spots, and population. We had to make some assumptions on specific locations where the bldg. services connect to the main, but the overall picture should be a fairly accurate representation. (see Figure 1)

1. Population vs Parking Requirement:
  - a. 1 bdr unit requires 2 spaces vs 2 person per bdr for sewer study: (same)
  - b. 2 bdr = 2.5 spaces vs 2.5 to 3 pers bedroom sewer study
  - c. 3 bdr requires 2.5 spaces vs 3.5 person/bdr for sewer study population
  - d. 1 guest parking per 6 units

**CRITERIA:**

1. Sewage generation (see Table 1)
  - a. 1+ 2 bdr mix of units= 2.8 person/unit at 85 gpd/person= 38gpd/unit
  - b. 4-6plex 2 BR units = 3 person/unit x 85 gpd/p = 255 gpd/unit
  - c. 2 br townhomes, Duplexes 3.5 pers/unit x 85gpd/p= 298gpd/unit
  - d. Single Family = 4 person per unit x 85 gpd/p x 85gpd/p = 340 gpd/unit
  - e. Restaurant= 35 parking spots x 4 seatings per dayx 10 gal/seat=1320 gpd
  - f. Lumber Yard = 10 employees at 15 gpd/person
2. Average flow = 85 gpd /person, including infiltration
3. Peak Flow Factor (from State of Co Domestic Wastewater treatment works)  
=  
[18+ P<sup>0.5</sup>] / [ 4 +P<sup>0.5</sup>] where P = population in thousands (PF ranges from 3.9 to 4.5 for this sewer leg: (see Table 1)
4. Depth of flow not to exceed 0.5 D

**INFORMATION NEEDED:**

1. What size pipes were installed under the new Spur Road (Eby Creek) for new roundabouts?
2. Consider getting flow data vs time immediately prior to where all three sewer lines converge at NE corner of Chambers and Eby Creek Rd  
What time are the peak flow in each? North of the railrail; some uses are motels, a jail, but mostly commercial. Probably relatively low flows.
3. Or get water bills for winter months, when there is no irrigation.
4. Not sure how the force main works at the Lofts, but assume there is minimal or no attenuation (storage or holding back of peak flows).

## **OBSERVATIONS:**

1. How accurate are sewer inverts on the plan. Sometimes they are different datums, due to different dates of const. A3 to A2 on Chelsea Rd is very flat .02% Or uphill.
2. A6 to A5 Christian road is also very flat (.07%). This is one of the few sections that will have a d/D > 50% (but still < 75%).  
Recommend test flowing the proposed peak sewer flows thru this section.  
Review the other critical sections.
3. The existing 8" sewer main starts/begins at the east of Nogal Road. At the start of the sewer, there isn't enough flow to provide 2 fps flushing flows for average flows, nor 2 fps at peak flows: the sewer is too flat. In fact, the hydraulic study predicts that 2 fps velocities aren't provided for Peak flows until after (west of) the Villas.
4. If Red Mountain flows are added to the existing sewer, (model assumes the force main pumps at the same rate as the actual flows generated (i.e. as if there is no force main), the flushing velocities get closer to 2 fps sooner, and are improved. The depth of flows are .74 at the flat section (A6 to A5) and the railroad bore NB4 to NB3 is .68. These are considered acceptable depths in many municipalities. We wouldn't expect much additional future growth on this line. This is with no equalization at the Red Mountain Ranch force main vault: just a starting point to see what it means.
5. The sewer leg from Chelsea Drive to Chambers and Eby Creek (where the 3 sewers combine) is approx. 3600 ft long. The average existing peak sewer velocity is about 1.5 fps (Need to do detailed weighted average). So it takes 40 minutes to get to where the 3 sewers converge. Including the new development, the peak velocity increases to 2 fps, or about 30 minutes to the same point. Not a big difference.

## **PRELIMINARY FORCE MAIN AND VAULT CRITERIA:**

1. Force Main:
  - a. Delta H = about 82 feet
  - b. L= 730 feet
  - c. Q pump= 80-100 gpm
  - d. 4' diameter force main at 100 gpm= 2.6 fps > 2 (ok)
  - e. Friction loss = .33 psi/100' = 6 ft +3 ft bends= 9 ft
  - f.  $V^2/2g$  = (energy head) = .2 ft
  - g. 4" at 100 gpm TDH= 82+9= 91 ft
  - h. 3" at 85 gpm TDH = 82+ 19=101 ft
  - i. Proposing 3 each 4 " force mains. If two pumps run at the same time, the capacity doubles. (Don't have the bigger head loss) it also provides back up protection:
  - j. Pipe volume 4" = 0.65 gal/ft x 730 ft = 476 gallons (Too much)
  - k. Pipe volume 3" diameter = 0.367 gal/ft x 730ft= 268 gallons
2. Pumps:
  - a. submersible Zoeller grinder pumps. 2" discharge, passes a 3" sphere. Probably 5 HP  
3 pumps at 84gpm gpm each: one pump can be out, and still have capacity for Q(peak)
  - b. Pumps need about 3 ft NPSH (verify)

3. Vault:
  - a. Provide back-up generator.
  - b. Slide rails
  - c. Bilco Hatch
  - d. Sloped hopper
  - e. Alarms
  - f. 6' x 6' vault = 269 gallons per ft> use 1.25 vertical ft per pump cycle= 336 gallons per pump run event. Min pump run time = 336 gal/72 gpm= 4.6 minutes (ok)
  - g. Emergency storage for 4 hrs average flow +5 ft elev in 6x6 vault = 3500 gallon sand oil trap ( 6285 gallons)
4. Velocity Dissipation of Force main outlet
  - a. Each 3" force main to connect to a 4" or 6" standard sewer saddle tap/wye.

**TABLE 1 – EXISTING SEWER SYSTEM**

	Line No.	MH	MH	Pop.	Total Pop.	Average	Peak	Peak	Sewer Slope %	Diam inch	Capacity	Velocity	q/Q	Peak	d/D	v/V	
						Flow, cfs	Flow	Flow, cfs			Full		Qavg/Q(full)	full	Qpeak	Veloc	d(peak)
						Infiltr	Factor	infiltr				fps	Qfull	fps	D(full)	V(full)	
	RedMtnRanch	New Lift Station		0	0	0	0	4.50	0.00	0.3	8"	0.66	0.00	1.90	0.00		
				0	0	0	0	4.50	0.00			0.00					
O F F S I T E	Christian Rd	A9	A8	15	15	0.001972	4.40	0.01	0.3		0.66	0.00	1.90	0.01	0.49	0.06	0.26
	Christian Rd	A8	A6	120	135	0.017748	4.21	0.07	0.3		0.66	0.03	1.90	0.11	1.20	0.23	0.63
	Christian Rd	A6	A5	15	150	0.01972	4.19	0.08	0.07		0.32	0.06	0.92	0.26	0.77	0.36	0.84
		A5	A4		150	0.01972	4.19	0.08	0.49		0.85	0.02	2.43	0.10	1.46	0.22	0.60
	Chelsea Rd	A4	A3	30	45	0.005916	4.32	0.03	1.71		1.58	0.00	4.54	0.02	1.50	0.1	0.33
	Chelsea Rd	A3	A2	85	130	0.01709	4.21	0.07	0.02		0.17	0.10	0.49	0.42	0.47	0.45	0.95
	Chelsea Rd	A2	A1	30	160	0.021034	4.18	0.09	0.31		0.67	0.03	1.93	0.13	1.29	0.24	0.67
	Park area	A1	NB10		160	0.021034	4.18	0.09	0.32		0.69	0.03	1.96	0.13	1.32	0.24	0.67
	Eagle Villas	NB10	NB9	60	220	0.028922	4.13	0.12	0.54		0.89	0.03	2.55	0.13	1.71	0.24	0.67
	Eagle Villas	NB9	NB8	120	340	0.044698	4.05	0.18	0.38	8"	0.75	0.06	2.14	0.24	1.71	0.34	0.80
	MidwayEagle Villas	NB8	NB7	60	400	0.052586	4.02	0.21	0.37		0.74	0.07	2.11	0.29	1.79	0.38	0.85
	Eagle Villas	NB7	NB6	60	460	0.060474	3.99	0.24	0.41		0.78	0.08	2.22	0.31	1.96	0.39	0.88
	Eagle Villas	NB6	NB5	60	520	0.068362	3.97	0.27	0.31		0.67	0.10	1.93	0.40	1.80	0.44	0.93
	LoftsOnEagleRiver	NB5	3		520	0.068362	3.97	0.27	0.73		1.04	0.07	2.97	0.26	2.49	0.36	0.84
	(force main)	3	NB4	76	596	0.078353	3.93	0.31	1.36		1.41	0.06	4.05	0.22	3.16	0.32	0.78
	RR bore	NB4	NB3		596	0.078353	3.93	0.31	0.26		0.62	0.13	1.77	0.50	1.77	0.5	1.00
	Alpine Lumber	NB3	NB2	2	598	0.078616	3.93	0.31	0.39		0.76	0.10	2.17	0.41	2.06	0.45	0.95
New Spur Rd	NB2	NB50		598	0.078616	3.93	0.31	0.5	8"	0.86	0.09	2.45	0.36	2.21	0.42	0.90	

Note: yellow = less than 2.0 fps



## APPENDIX B – FIRE PROTECTION AND WATER SUPPLY



Design Basis: 4 to 5 bedroom residential houses.

### FIRE PROTECTION:

Use NFPA 1142 until a municipal water system is provided.

Provide 8" DIP and FH's to meet future IFC requirements.

1. 4800 sf bldg. Tye 5 const = 1750 gpm, 500 ft spacing.
2. At some time, near future, local agencies will require single family houses to be fire sprinkled. We believe the IFC already recommends it. Determine requirements. Consider water service sizes to accommodate fire flows.
3. NFPA 1142: assume a 4800 sf house with 9 ft ceiling, and trussed roof.
  - a. Volume house = 67,500 sf
  - b. Occupancy Hazard Classification =7
  - c. Type V const class = 1.5
  - d. Storage =  $[67,500 / 7] 1.5 = 14,500$  gallons
  - e. If exposure hazard <50' separation x 1.5 = 21,600 gallons (sects3.3.10, 4.3)
  - f. Need Fire Protect Consultant to verify interpretations.
  - g. If the houses are auto fire sprinkled, the storage volume can be reduced by 50% or more. We would try to use the domestic water for sprinkling.
4. Dry Standpipes are to be >100 ft from structure. If we have two FH's, the fire department can choose the FH that is >100 ft.
5. Determine best value for 14,500-22,000 gallon fire storage, refurbished steel, FRP, etc.
6. Note Sect B4.3 "Cisterns" Cisterns must be not more than 2200 ft from nearest lot line of furthest lot. Cistern capacity must be at least 30,000 gallons.
7. Cistern could be located along US6, so the hydrants near the houses could have (delta elev to FH = 16psi static) (18 psi residual required per IFC) 16 psi would work: Coordinate with local fire department for what is desired.

### WATER SUPPLY:

1. Water Well Permit required for new well. We assume it would be a "Subdivision well with Augmentation Plan"
2. Water Rights: Provided by Owner.
3. Augmentation: may need to provide on-site augmentation. If only indoor domestic use, should be relatively small volume (55,000 gallon at 10% consumptive loss?) Have to add evaporative losses, but otherwise about a 40x40x7 ft deep pond may accommodate required volume per parcel or augmentation rights could be acquired from existing storage.
4. Irrigation: To be non-potable diversion from the Eagle River using existing summer water rights.

**WATER SUPPLY AND TREATMENT:**

1. 70- 90 gpm peak flow rate based on 3-4 bathrooms per house (2 tubs, one shower), 1 washing machine, kitchen sink, dishwasher, ice maker.
2. Provide separate water systems for treated water versus the fire protection system (until connected to City water in future). Probably a 3" to 4" diameter domestic main line (70-90 gpm).
3. Water system would be classified as a small community system 6 units at 4-5 bdr at 2 person/rm (48 to 60 people ). Current water operator cost = \$200/month (includes costs for lab test results, monthly visits).
4. Each community water system would require a disinfection/treatment building with pumps and tanks.