Development for Rent or Lease Application and Supplemental Information

Regal Community Park
Laurel, Montana

Owner and Developer:
Regal Land Development, Inc.
P.O. Box 80445
Billings, MT 59108

Prepared By:

Engineering and Surveying Inc.
1091 Stoneridge Drive • Bozeman, MT 59718
Phone (406) 587-1115 • Fax (406) 587-9768
www.chengineers.com • info@chengineers.com

August 2016

Project: 15949

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APPENDIX E
Preliminary Plat Application

Subdivision Name: Regal Community Park
Date of Preapplication Meeting: October 6, 2015
Type: Major _____ **First Minor** _____ **Subsequent Minor** _____
Tax Code: 000D026490
Location:
Legal Description: Nutting Brothers 2nd Filing
1/4 Section: NW Sec 10, **Township:** 2 S, **Range:** 24 E
General Location: East of Date Avenue, North of 8th St, South of Maryland Lane, West of City Park

Subdivider Information:
Name (Include a list of officers if corporation): Regal Land Development, Inc - Dan Wells
Address: PO Box 80445, Billings, MT 59108
Telephone: (406) 656-1301 **Email:** dan@wellsbuilthomes.com

Owner Information:
Name: Same as Subdivider
Address: _____
Telephone: _____ **Email:** _____

Plat Data:
Gross Area: 7.8576 Acres
Net Area: 6.0431 Acres
Number of Lots: 54
Maximum Lot Size: 11,567 sq. ft.
Minimum Lot Size: 5,168 sq. ft
Linear Feet of Streets: 1880 feet
Existing Zoning: RMH
Surrounding Zoning:
North: Residential Tracts
South: RMH
East: Residential Tracts
West: RMH
Existing Land Use: Vacant
Proposed Land Use: RMH

APPENDIX E

Parkland Requirement:
Land: X **Acres:** 0.0872
Cash: x **Cash: $** to be determined

Variances Requested (list and attach Variance Request):
1. please see enclosed request
2.
3.

Service Providers for Proposed Subdivision
Gas: Montana Dakota Utilities
Electric: Northwestern
Telephone: Century Link
School (Elementary, Middle, High): Laurel, Laurel, Laurel; District 7
Irrigation District: None
Cable Television: Charter

List of Materials Submitted with Application
1. Preliminary Plat Supplements
2. Environmental Assessment
3. Community Impact Report
4. Summary of Probable Impacts
5.
6.

Agent Information
Name: Mike Balch - C&H Engineering and Surveying, Inc.
Address: 1091 Stoneridge Dr, Bozeman, MT 59718
Telephone: (406) 587-1115 **Email:** mbalch@chengineers.com
I declare that I am the owner of record of the above-described property, and have examined all statements and information contained herein, and all attached exhibits, and to the best of my knowledge and belief, is true and correct.

_____
Owner of Record Date

_____
Owner Under Contract Date

The submission of a preliminary plat application constitutes a grant of permission by the subdivider to enter the subject property.

(Ord. 07-01 (part), 2007)

INTRODUCTION

The proposed Regal Community Park is a 54-space manufactured home park located on a 7.853 acre parcel of land currently known as Lot 7 and Lot 8 of the Nutting Brothers Subdivision, 2nd Filing. The proposed manufactured home park is located east of Date Avenue, north of 8th Street, south of Maryland Lane, and west of the City Park/Soccer Field.

The project will improve the existing neighborhood and provide high quality affordable housing for the City of Laurel. Numerous road improvements and a critical road easements will be provided with this application. These improvements and easement will ensure the existing street network in Laurel will be maintained and improved. A variance is included in this application to allow the sites along Date Avenue to access the street. A 27 foot easement will be provided along Date to provide adequate right-of-way for Date and the road will be improved with curb, gutter, and sidewalk. This easement is critical to the homes along Date Avenue as currently the curb is located 18 feet from the property line and the existing gravel road encroaches on the property. If this easement was not given, the road would not meet the requirements of the International Fire Code and would be narrowed to the property line. A paved turn out will be added to 8th Street to provide a safe area for a mailbox that is easily accessible to the post office. A forty foot wide easement will be provided along Maryland Lane to provide adequate width for the future widening of the road as well. A linear park will also be dedicated from the end of Ninth Street to the public park to provide a mid-block pedestrian sidewalk route to the public park. This will improve the park access for the project as well as provide nice location for the residents in the subdivision to the west of the project to access the park as well.

The 54 spaces proposed with this project will be developed as single family residential manufactured homes. The proposed spaces will range in size from 5,168 square feet to 11,567 square feet. Parkland will be provided by a cash-in-lieu donation as well as a linear park trail corridor that will connect the existing neighborhood to the park. Open Space is provided in the southeast corner of the property for the stormwater retention pond.

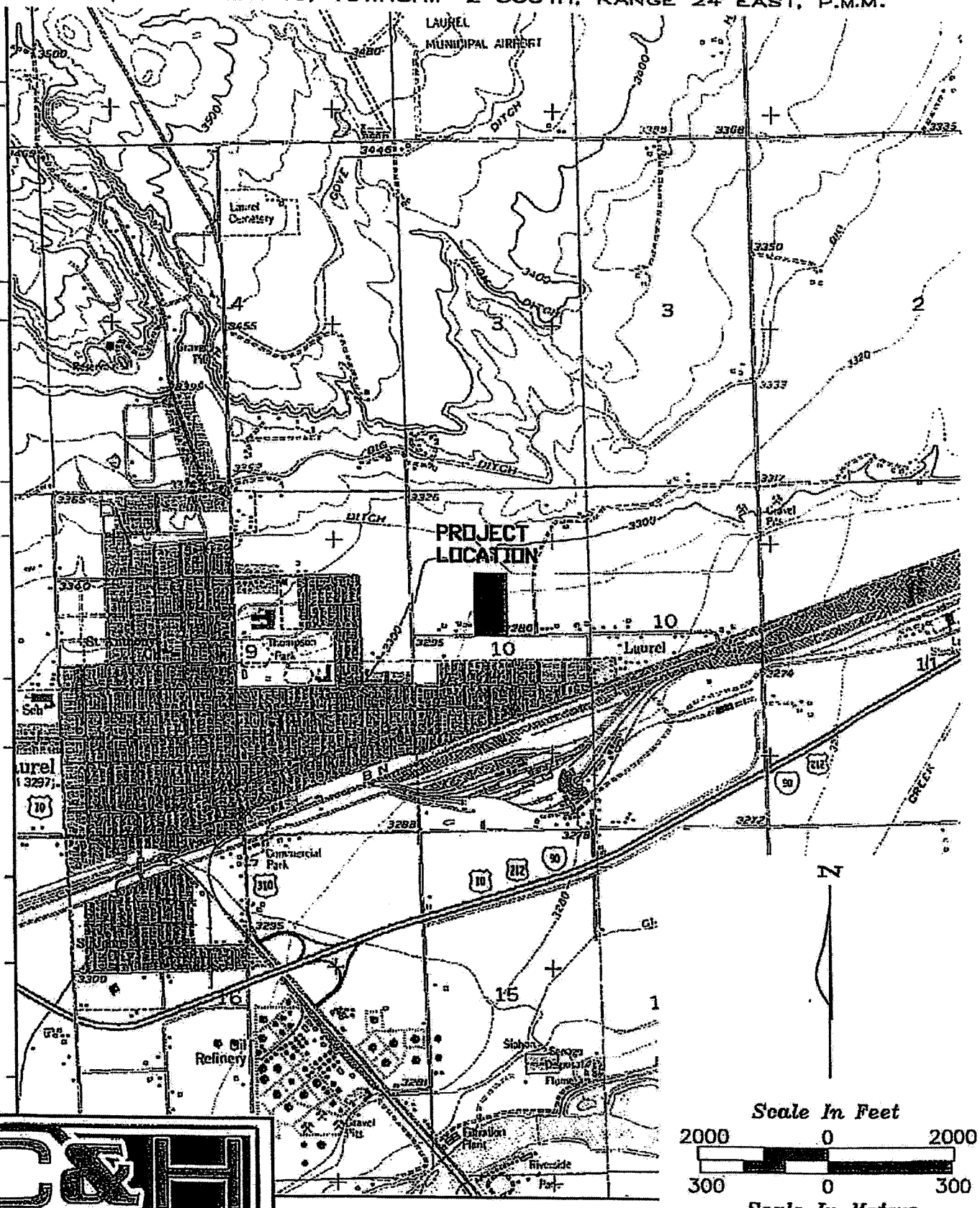
Adjoining Property Owners
Nutting Brothers 2nd Filing, Lots 7-8
Laurel, MT

Yellowstone County (Parks) PO Box 35000 Billings, MT 59107-5000	High Point Subd, S10, T02 S, R24 E, Lot Park (Small) High Point Subd, S10, T02 S, R24 E, High Point Park
City of Laurel PO Box 10 Laurel, MT 59044-0010	Nutting Bros 2nd Filing, S10, T02 S, R24 E, Lot 9-10
Steven Gray c/o US Bank as Trustee Saint Paul, MN 55164-0142	High Point Subd, S10, T02 S, R24 E, Block 2, Lot 1
NSV Corp PO Box 370 Laurel, MT 59044-0370	Nutting Bros Subd, S10, T02 S, R24 E, Block 5, Lot 1, AMD Nutting Bros Subd, S10, T02 S, R24 E, Block 3 Lot 1-45, AMND BLK 3-4
Sunhaven Mobile Home Park PO Box 370 Laurel, MT 59044-0370	Sunhaven MHP, S10, T02 S, R24 E
Jennifer Henman 1114 E 8th St Laurel, MT 59044-2216	Sunhaven MHP, S10, T02 S, R24 E
Adrienne Raczkowski 2928 Stinson Ave Billings,MT 59102-1349	Sunhaven MHP, S10, T02 S, R24 E
Thomas Raczkowski 2928 Stinson Ave Billings,MT 59102-1349	Sunhaven MHP, S10, T02 S, R24 E
Marguerite Roberts 1108 E 8th St Laurel, MT 59044-2216	Sunhaven MHP, S10, T02 S, R24 E
Curtis & Bonnie Bradley 813 E. 4th St. Laurel, MT 59044-2801	Sunhaven MHP, S10, T02 S, R24 E
Lucas Hoots 5335 King Ave E Billings, MT 59101-4663	Sunhaven MHP, S10, T02 S, R24 E
Scott Blaylock 1102 E 8th St Laurel, MT 59044-2216	Sunhaven MHP, S10, T02 S, R24 E
Samuel Boggess 4906 Pryor Rd Billings, MT 59101-9009	Sunhaven MHP, S10, T02 S, R24 E
William & Renee Rawhouser 2737 N Ramshorn Dr Laurel, MT 59044-8345	Mogan Subd, S10, T02 S, R24 E, Block 2, Lot 3A, AMND Lots 3-13 Mogan Subd, S10, T02 S, R24 E, Block 2, Lot 14-15 Date Ave MHP, S10, T02 S, R24 E Date Ave MHP, S10, T02 S, R24 E
Glenn LaFurge 804 Date Ave Laurel, MT 59044	Date Ave MHP, S10, T02 S, R24 E
Thomas & Doris Trenholm 806 Date Ave Laurel, MT 59044-2259	Date Ave MHP, S10, T02 S, R24 E
Robbie & Kerrie Seaman 808 Date Ave Laurel, MT 59044-2259	Date Ave MHP, S10, T02 S, R24 E

Pablo Hernandez 478 E Norton St Long Beach, CA 90805-4630	Date Ave MHP, S10, T02 S, R24 E
Robert McCaslin 814 Date Ave Laurel, MT 59044-2259	Date Ave MHP, S10, T02 S, R24 E
Mark & Gina Avila 816 Date Ave Laurel, MT 59044-2259	Date Ave MHP, S10, T02 S, R24 E
Tysie & Alan Johnson 1011 E 9th Ave Laurel, MT 59044-1622	Mogan Subd, S10, T02 S, R24 E, Block 2, Lots 1-2
Myrtle Halvorson 902 Date Ave Laurel, MT 59044-2261	Mogan Subd, S10, T02 S, R24 E, Block 1, Lot 10 Mogan Subd, S10, T02 S, R24 E, Block 1, Lot 11
Arnold & Cheryl Ott PO Box 343 Laurel, MT 59044-0343	Mogan Subd, S10, T02 S, R24 E, Block 1, Lot 9 Mogan Subd, S10, T02 S, R24 E, Block 1, Lot 8
John Kerr 910 Date Ave Laurel, MT 59044-2261	Mogan Subd, S10, T02 S, R24 E, Block 1, Lots 6-7
James & Donna Whitford PO Box 1227 Laurel, MT 59044-1227	Mogan Subd, S10, T02 S, R24 E, Block 1, Lots 4-5
Leroy Haack 918 Date Ave Laurel, MT 59044-2261	Mogan Subd, S10, T02 S, R24 E, Block 1, Lots 1-3

VICINITY MAP

NW 1/4, SECTION 10, TOWNSHIP 2 SOUTH, RANGE 24 EAST, P.M.M.



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SOURCE: USGS TOPOGRAPHIC QUADRANGLE MAP

#12033.2

DEVELOPMENT FOR RENT OR LEASE CONSISTING OF 54 RESIDENTIAL MANUFACTURED HOME SITES, 2 PARKS, AND 1 OPEN SPACE AREA.

OWNER: REGAL LAND DEVELOPMENT, INC.
DEED REFERENCE: DOC. NO. 3757275

PRELIMINARY SITE PLAN FOR
REGAL COMMUNITY PARK
LAUREL, MONTANA

LOTS 7 & 8, NUTTING BROTHERS SUBDIVISION SECOND FILING
LOCATED IN THE NW 1/4 OF SEC. 10, T. 2 S., R. 24 E. OF P.M.M.,
YELLOWSTONE COUNTY, MONTANA

LEGEND

- ○ SET 5/8 INCH REBAR WITH 1 1/4 INCH PLASTIC CAP MARKED (C&H #9318ES)
- ● FD 5/8" REBAR AND YELLOW PLASTIC CAP (T. KELLEY #11289-S) UNLESS NOTED OTHERWISE
- PROPERTY LINE
- ADJOINING PROPERTY LINE
- EASEMENT LINE
- RETENTION POND CONTOURS/SWALE
- ROAD CENTERLINE
- EXISTING TELEPHONE BOX
- EXISTING SANITARY SEWER MANHOLE
- PROPOSED SANITARY SEWER MANHOLE
- EXISTING STORM SEWER MANHOLE
- PROPOSED STORM SEWER MANHOLE
- EXISTING FIRE HYDRANT
- PROPOSED FIRE HYDRANT
- EXISTING WATER VALVE
- PROPOSED WATER VALVE
- EXISTING CURB STOP
- PROPOSED CURB STOP
- EXISTING POWER POLE
- EXISTING WATER WELL
- EXISTING FENCE
- EXISTING OVERHEAD ELECTRIC LINE
- EXISTING 8" WATER MAIN
- EXISTING 8" SANITARY SEWER MAIN
- PROPOSED 8" WATER MAIN
- PROPOSED 8" SANITARY SEWER MAIN
- PROPOSED STORM SEWER
- PROPOSED CURB AND GUTTER
- EXISTING CURB AND GUTTER
- PAVED SURFACE
- GRAVEL SURFACE
- CONCRETE SURFACE

BASIS FOR AZIMUTHS FROM NORTH:
NORTH LINE OF NUTTING BROTHERS SUBD. 2ND FILING BEING 090°12'00"

SITE DATA

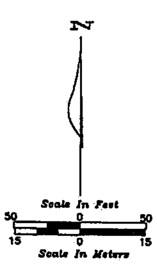
NUMBER OF SITES:	54
MAXIMUM SITE AREA:	6,476 SQ. FT.
MINIMUM SITE AREA:	4,487 SQ. FT.
LINEAR FEET OF STREETS:	1,680 FT.
GROSS AREA:	7.8578 Acres
NET AREA:	6.0493 Acres
EXISTING ZONING:	RMH
PROPOSED ZONING:	RMH
EXISTING LAND USE:	VACANT
PROPOSED LAND USE:	RMH
DEDICATED ROW AREA:	61,304 SQ. FT.
PRIVATE PARK AREA:	3,250 SQ. FT.
OPEN SPACE AREA:	14,218 SQ. FT.

PARKLAND CALCS

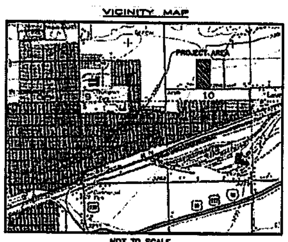
NUMBER OF SITES (MAXIMUM 9 UNITS PER NET AREA):	54
REQUIRED PARK AREA (4,000 SQ. FT. PLUS 100 PER SITE):	9,400 SQ. FT.
PROVIDED PARK AREA:	0 SQ. FT.
EQUIVALENT AREA PROVIDED THROUGH CASH-IN-LIEU:	9,400 SQ. FT.

PARKING SPACE CALCS

REQUIRED OFF-STREET PARKING:	54x2=108
REQUIRED GUEST PARKING:	54x10%=5
PROVIDED OFF-STREET PARKING:	108
PROVIDED GUEST PARKING:	54



VICINITY MAP



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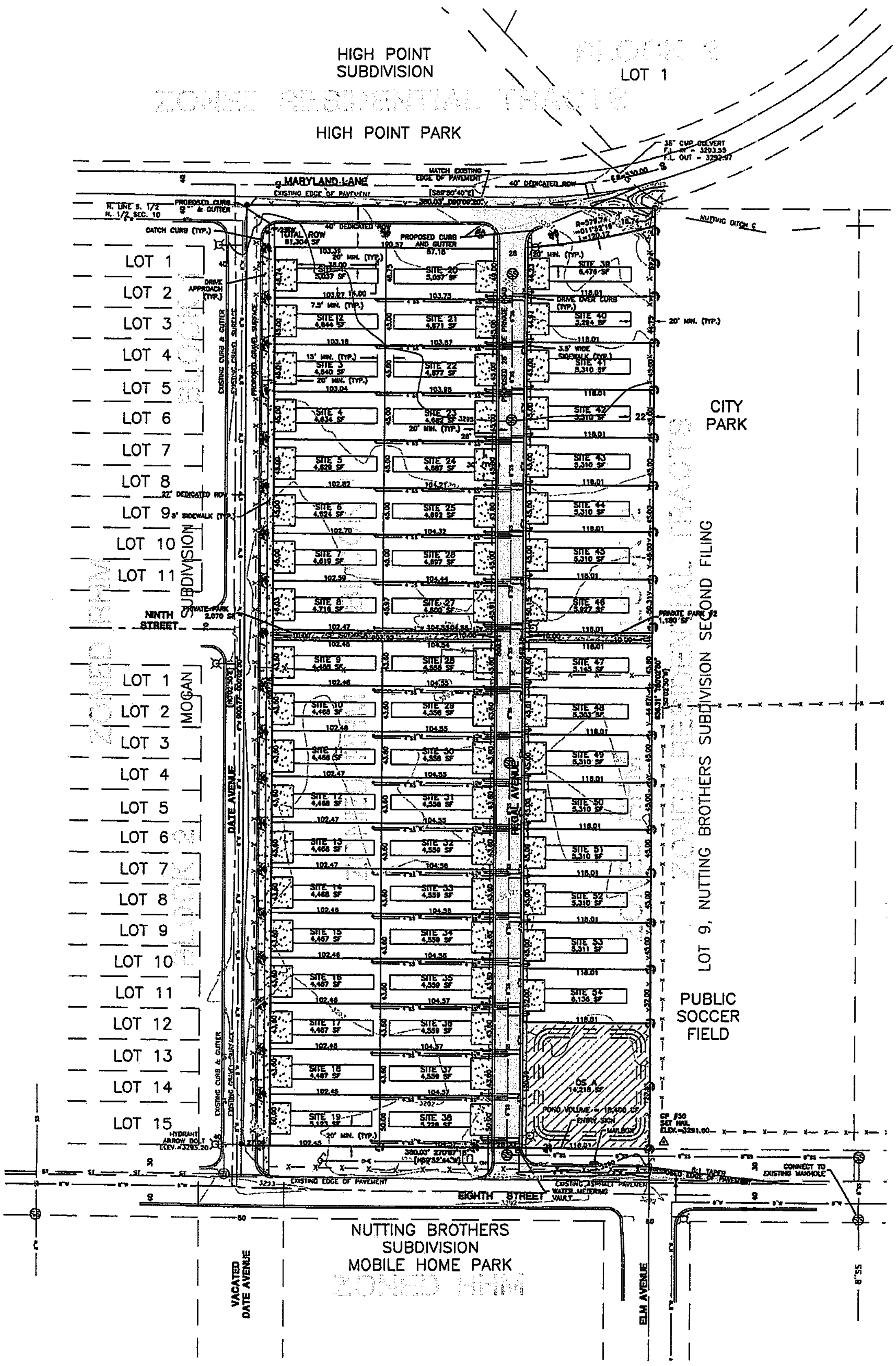
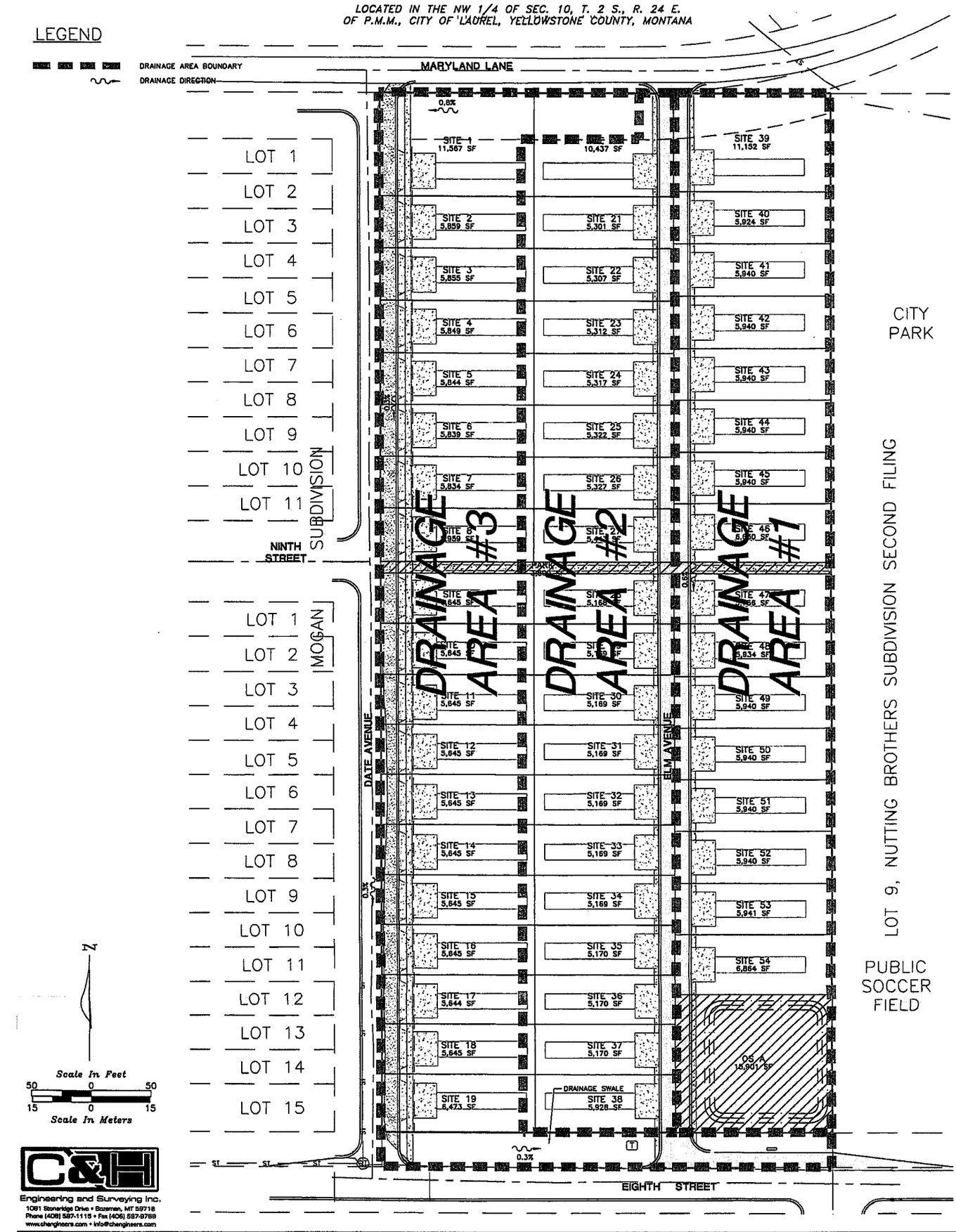


DATE PREPARED: 8/2/2016

C&H Engineering and Surveying Inc.

REGAL COMMUNITY PARK DRAINAGE PLAN

LOCATED IN THE NW 1/4 OF SEC. 10, T. 2 S., R. 24 E.
OF P.M.M., CITY OF LAUREL, YELLOWSTONE COUNTY, MONTANA



C&H
Engineering and Surveying Inc.
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www.chengineers.com • info@chengineers.com

#15949

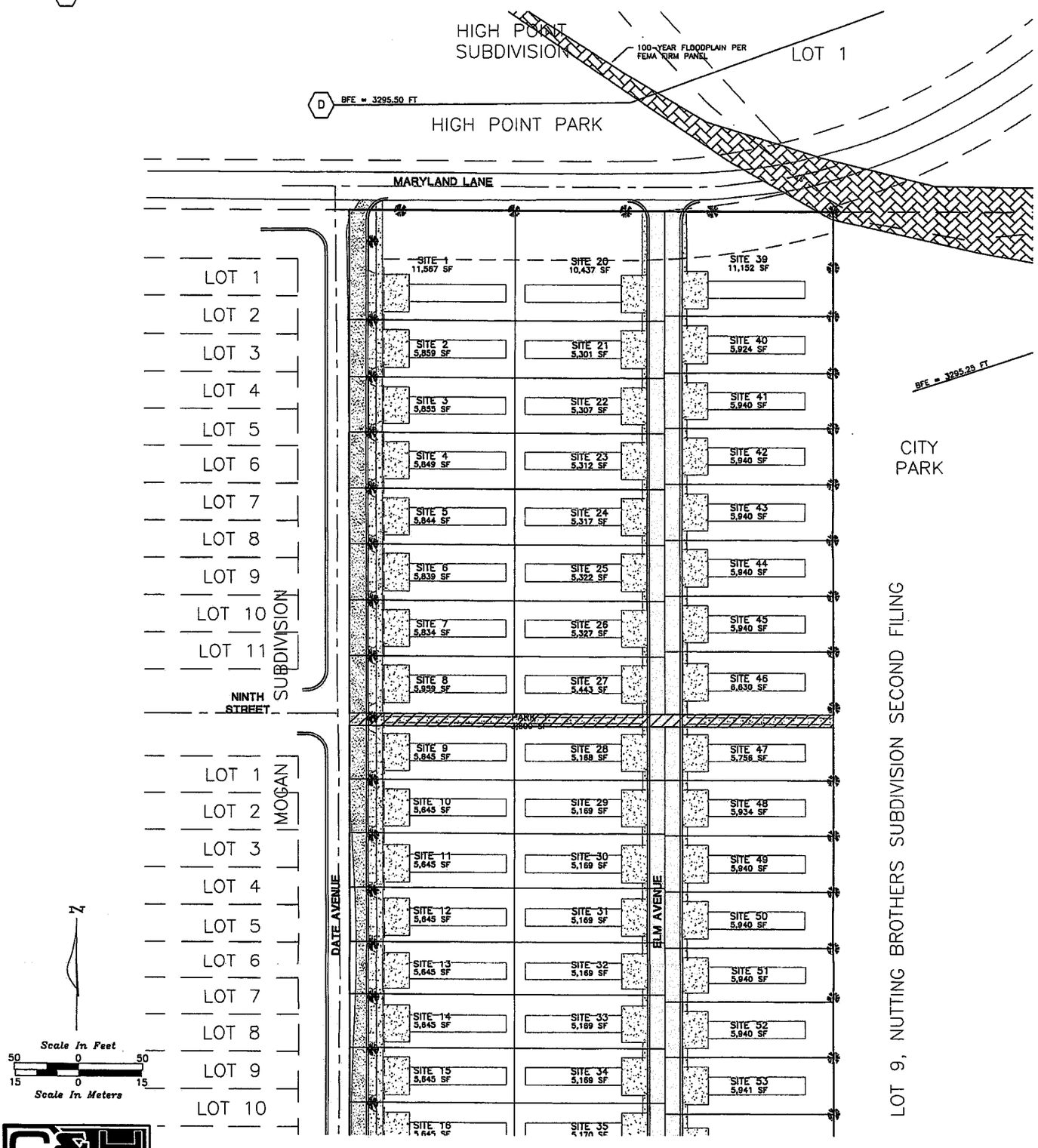
REGAL COMMUNITY PARK FLOODPLAIN MAP

LOCATED IN THE NW 1/4 OF SEC. 10, T. 2 S., R. 24 E.
OF P.M.M., CITY OF LAUREL, YELLOWSTONE COUNTY, MONTANA

LEGEND

FEMA 100-YEAR FLOODPLAIN

D FEMA FIRM PANEL CROSS-SECTION



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Scale In Feet
50 0 50

Scale In Meters
15 0 15

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APPENDIX K
Improvements Agreement

Regal Community Park

I. Variances (page #):

Section 16.24.020.B.2 of the Laurel Municipal Code states that "Private streets shall be designed to provide access to all sites. No site shall have vehicular access to a public street." The applicant would like to request a variance from this requirement for the sites shown along Date Avenue for multiple reasons.

The original Mogan Subdivision is located directly west of the project site and has lots fronting Date Avenue. When the Mogan Subdivision was platted 40 feet of right-of-way was dedicated for Date Avenue. At the time, 40 feet would have been typically half of the required right-of-way for a street in Laurel. A half section of Date Avenue was constructed with a concrete curb that is approximately 18 feet west of the property line. A water main serving the homes along Date Avenue was also installed in Date Avenue and is located approximately 4 feet from the property line. Currently, the east edge of the gravel base for Date Avenue encroaches on the property by as much as 5 feet in some areas. Upon review of the current conditions, it is apparent that when the City of Laurel reviewed the Mogan Subdivision, the intent for Date Avenue was to obtain the other half of the right-of-way when the applicant's property was developed.

If the current project were to follow the regulations, the property line along Date Avenue would be fenced or screened. This would create multiple issues for the property owners along Date Avenue. The road would only be 18 feet wide which would not meet City standards or the standards of the International Fire Code. This would create a public health and safety issue and would restrict emergency vehicle access. Additionally the water main in Date Avenue is located approximately 4 feet off the property line. If a fence was installed on the property line, it would be difficult to maintain and access the water main with a fence so close to the main.

The applicant would like to fulfill the original intent of Date Avenue and provide a 27 foot wide dedicated right-of-way along the existing Date Avenue right-of-way. The applicant would also construct concrete curb on the right-of-way and widen the existing Date Avenue 16 feet to create a road that is 34 feet wide. This would greatly improve public safety and access for the homes along Date Avenue. Please see the applicant's response to the variance criteria below.

1. The granting of the variance will not be detrimental to the public health, safety, or general welfare or injurious to other adjoining properties.

   Granting this variance will improve public health and safety. The existing road does not meet the City standards or the standards of the International Fire Code. Allowing this variance will ensure safe and adequate access for emergency vehicles and residents of Date Avenue.

2. Because of the particular physical surroundings, shape, or topographical conditions of the specific property involved, an undue hardship to the owner would result if the strict letter of the regulation was enforced.

The physical surroundings of the property include a street that is not constructed to the City standards or standards of the International Fire Code. By allowing this variance the applicant will provide a critical right-of-way and improve the existing road to provide safer access for all. Undue hardship would result from not approving this variance for the property owner as well as the property owners in the Mogan Subdivision along Date Avenue.

3. The variance will not result in the increase in taxpayer burden.

   Granting this variance will not cost taxpayers additional money. The applicant will maintain the section of roadway on their property. Additionally, the right-of-way and road construction costs will be provided to the City at no cost.

4. The variance will not in any manner place the subdivision in nonconformance with the adopted zoning regulations or growth policy.

   Granting this variance will not place this property in nonconformance with the adopted zoning regulation or growth policy.

5. The subdivider must prove that the alternative design is equally effective and the objectives of the improvements are satisfied.

   The applicant's alternative design is the best solution for Date Avenue and provides a critical easement for the City of Laurel as well as provides improved access for the existing residents along Date Avenue. Furthermore, numerous other parks in the area have been allowed to have sites access public streets including the Sunhaven Park to the south as well as the Pine Lane Park.

II. Conditions that Run with the Land: n/a

III. Transportation:

A. Streets
B. Sidewalks
C. Street Lighting
D. Traffic Control Devices
E. Access
F. Heritage Trail Plan
G. Public Transit

IV. Emergency Services:

V. Storm Drainage:

VI. Utilities:

A. Water
B. Sanitary Sewer
C. Power, Telephone, Gas, and Cable Television

VII. Parks/Open Space:

VIII. Irrigation:

IX. Soils/Geotechnical Study:

X. Phasing of Improvements:

XI. Financial Guarantees:

XII. Legal Provisions:

This agreement is made and entered into this ____ day of _____, 201__, by and between *(Regal Land Development, Inc. – Dan Wells)*, whose address for the purpose of this agreement is P.O Box 80445 Billings, MT 59108, hereinafter referred to as "Subdivider," and the **CITY OF LAUREL or COUNTY OF YELLOWSTONE**, Montana, hereinafter referred to as "City/County."

WITNESSETH:

WHEREAS, at a regular meeting conducted on _____ day of _____, 201__, the City-County Planning Board recommended conditional approval of a preliminary plan of Regal Community Park; and

WHEREAS, at a regular meeting conducted on _____ day of _____, 201__, the City Council/County Commissioners conditionally approved a preliminary plan of Regal Community Park; and

WHEREAS, a Subdivision Improvements Agreement is required by the City/County prior to the approval of the final plan.

WHEREAS, the provisions of this agreement shall be effective and applicable to Regal Community Park upon the filing of the final plan thereof in the Office of the Clerk and Recorder of Yellowstone County, Montana. The project shall comply with all requirements of the City of Laurel Subdivision Regulations, the rules, regulations, policies, and resolutions of the City of Laurel, Yellowstone County, and the laws and administrative rules of the State of Montana.

THEREFORE, THE PARTIES TO THIS AGREEMENT, for and in consideration of the mutual promises herein contained and for other good and valuable consideration, do hereby agree as follows:

I. VARIANCES

A. Subdivider has requested, and the City/County hereby grants, the following variances from the strict interpretation of these Subdivision Regulations:

1. Section 16.24.020.B.2 of the Laurel Municipal Code states that "Private streets shall be designed to provide access to all sites. No site shall have vehicular access to a public street." The applicant would like to request a variance from this requirement for the sites shown along Date Avenue for multiple reasons.

The original Mogan Subdivision is located directly west of the project site and has lots fronting Date Avenue. When the Mogan Subdivision was platted 40 feet of right-of-way was dedicated for Date Avenue. At the time, 40 feet would have been typically half of the required right-of-way for a street in Laurel. A half section of Date Avenue was constructed with a concrete curb that is approximately 18 feet west of the property line. A water main serving the homes along Date Avenue was also installed in Date Avenue and is located approximately 4 feet from the property line. Currently, the east edge of the gravel base for Date Avenue encroaches on the property by as much as 5 feet in some areas. Upon review of the current conditions, it is apparent that when the City of Laurel reviewed the Mogan Subdivision, the intent for Date Avenue was to obtain the other half of the right-of-way when the applicant's property was developed.

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   The applicant's alternative design is the best solution for Date Avenue and provides a critical easement for the City of Laurel as well as provides improved access for the existing residents along Date Avenue. Furthermore, numerous other parks in the area have been allowed to have sites access public streets including the Sunhaven Park to the south as well as the Pine Lane Park.

II. CONDITIONS THAT RUN WITH THE LAND

A. Lot owners will be required to construct that segment of the required sidewalk that fronts their property at the time of lot development.

B. Lot owners should be aware that this subdivision is being built in close proximity to prime deer and antelope habitat and it is likely that homeowners will experience problems with damage to landscaped shrubs, flowers, and gardens. The Montana Fish, Wildlife, and Parks Department does not provide damage assistance unless there is damage to commercial crops and/or a threat to public health and safety.

C. Lot owners should be aware that soil characteristics within the area of this subdivision, as described in the 1972 Yellowstone County Soil Survey, indicate that there could be potential limitations for proposed construction on the lots, which may require a geotechnical survey prior to construction.

D. No water rights have been transferred to the lot owners. Irrigation ditches that exist on the perimeter of this development are for the benefit of other properties. Perimeter ditches and drains shall remain in place and shall not be altered by the Subdivider or subsequent owners.

E. There is attached hereto a Waiver waiving the right to protest the creation of the special improvement district or districts, which by this reference is expressly incorporated herein and made as much a part hereof as though fully and completely set forth herein at this point. The Waiver will be filed with the plat, shall run with the land, and shall constitute the guarantee by the Subdivider and property owner or owners of the developments described herein. Said Waiver is effective upon filing and is not conditioned on the completion of the conditions set forth in this Agreement. The Subdivider and owner specifically agree that they are waiving valuable rights and do so voluntarily.

F. Lot owners should be aware that portion(s) of this property lie within the floodplain/floodway, as depicted on the Flood Insurance Rate Maps (FIRM) for this area. Please be advised that special development restrictions may apply within these specified areas.

III. TRANSPORTATION

A. Streets

MARYLAND LANE
40 feet of right-of-way will be dedicated to the City along the north portion of the property. Concrete curb will be installed to align with the subdivision to the west. Gravel will be installed from the curb to the existing pavement similar to what was done on the project to the west.

DATE AVENUE
Date Avenue will have a 27' wide right-of-way dedicated to the City along the property line. The existing gravel road will be widened to 34 feet wide, concrete curb installed, and a 5 foot sidewalk will be installed along the east side.

8TH STREET
Concrete curb and gutter as well as asphalt paving will be added to 8th Street to provide a safe area for the mailbox.

REGAL AVENUE
Regal Avenue will be a private street that will be paved 28 feet wide. 3.5 foot wide sidewalks will be provided on both sides of the road.

B. Sidewalks

Sidewalks will be installed along Regal Avenue, through the linear private park, and along the east side of Date Avenue.

C. Street Lighting

No additional street lighting proposed. Currently there are streetlights at the intersections of Date and 8th and Regal and 8th. An SID can be created at a later date to install street lighting if desired.

B. Traffic Control Devices
Stop signs will be installed at the north end of Date Avenue and at the north and south end of Regal Avenue.

C. Access
See street and sidewalk sections on access.

D. Bike or Pedestrian Trail Plans

The proposed project will have a bike and pedestrian trail constructed in the linear private park. The trail will be 5' wide concrete sidewalk. This trail will be a great benefit for the project and surrounding area and will help children safety access the park.

E. Public Transit

No accommodations for public transit have been made.

IV. EMERGENCY SERVICE

The project will provide additional right-of-way width to Date Avenue that will improve access to the area. The project will at all times maintain two points of access for emergency services

V. STORM DRAINAGE

All drainage improvements shall comply with the provisions of the *Stormwater Management Manual*, and a storm water management plan shall be submitted to and approved by the MDEQ.

Storm drainage for the subdivision will be conveyed to a retention pond located in the southeast corner of the site. This retention basin is designed per DEQ requirements and will limit the post development runoff to the same volume as the pre-development runoff volume.

VI. UTILITIES

The SIA does not constitute an approval for extension of or connection to water mains and sanitary sewers. The property owner shall make application for extension/connection of water mains and sanitary sewers to the Public Works Department. The extension/connection of/to water mains and sanitary sewers is subject to the approval of the applications and the conditions of approval. Applications shall be submitted for processing prior to the start of any construction and prior to review and approval of any project plans and specifications. The appropriate water and wastewater hookup fees in effect shall be submitted with the applications.

Fees shall be paid for the lots in each phase as applied for in the extension application and as per the first paragraph above. The Developer/Owner acknowledges that the subdivision shall be

subject to the applicable System Development Fees in effect at the time new water and/or sanitary sewer service connections are made. The design/installation of sanitary sewers and appurtenances, and water mains and appurtenances (fire hydrants, etc) shall be in accordance with design standards, specifications, rules, regulations of and as approved by the City of Laurel Public Works Department, Fire Department, and the Montana Department of Environmental Quality.

A. Water

6-inch PVC water mains will be installed in the project. The water main will extend to the north end of Regal Avenue and terminate at a hydrant. See exhibit in Section 5 of this submittal.

B. Sanitary Sewer

6-inch PVC sanitary sewer lines will be installed to serve the project. Sanitary sewer mains will be installed in Regal Avenue. A main will be run in 8th Street to connect the main to the existing main that is located on 8th Street. A manhole will be installed at the junction. See exhibit in Section 5 of this submittal.

C. Power, Telephone, Gas, and Cable Television

Services will be installed during project. 10' front yard easements on all spaces and 10' easement along public right-of-ways are provided for service.

VII. PARKS/OPEN SPACE

Cash-in-lieu will be used to satisfy the parkland requirement. The current City of Laurel code requires the parkland dedication to be 4,000 square feet plus 100 square feet for every space. This totals to 9,400 square feet land to provide with cash-in-lieu. The final amount of cash-in-lieu will be determined at final site plan based on the current land value.

VIII. IRRIGATION

The proposed subdivision is not in an irrigation district and will not have an effect on irrigation.

IX. SOILS/GEOTECHNICAL STUDY

The subdivision site is located in an area that consists of mildly-sloping topography (1.0 – 2.0%), therefore, there are no potential geologic hazards present with respect to slope stability, mass movement, surface subsidence, or soils bearing capacity.

The following protective measures will be taken to ensure that the existing geology is not a problem:

- All cut and fill slopes shall be placed in uniform lifts compacted to 95% of the maximum dry density as determined by ASTM D698.
- All topsoil, including organic material, will be removed from building and

pavement areas.

- Design of all streets and parking areas shall use accepted engineering practices to determine structural sections and the use of separation fabrics based on soil conditions and traffic loading.
- Buildings will be designed for seismic design category A as outlined in the 2012 International Residential Code.

Fills within the right-of-way will be primarily composed of imported fill material. Where cuts and fills are required outside of the right-of-way, material will generally be moved from cut areas to fill areas. The proposed roadways will generally follow the existing grade on this site. There are no areas on this site that will require large cuts or fills. The construction contract for each lot shall provide for landscaping, seeding, and fertilizing of all cut and fill slopes. Mulching or placement of erosion control mats shall be investigated for use as needed. The overall storm water master plan/erosion control plan required by MDEQ will detail all necessary erosion control measures. "Best Management Practices" will be utilized to minimize erosion and any down gradient impacts. The Covenants and Weed Control Plan shall include provisions to ensure that re-seeding and erosion control is provided as individual buildings are being constructed.

X. PHASING OF IMPROVEMENTS

No phasing is proposed. All improvements will be made in one phase.

XI. FINANCIAL GUARANTEES

Except as otherwise provided, the Subdivider shall install and construct said required improvements with cash or by utilizing the mechanics of a special improvement district or private contracts secured by letters of credit or a letter of commitment to lend funds from a commercial lender. All engineering and legal work in connection with such improvements shall be paid by the contracting parties pursuant to said special improvement district or private contract, and the improvements shall be installed as approved by the Public Works and Public Utilities Department.

XII. LEGAL PROVISIONS

A. Subdivider agrees to guarantee all public improvements for a period of one year from the date of final acceptance by the AGB.

B. The owners of the properties involved in this proposed Subdivision by signature subscribed herein below agree, consent, and shall be bound by the provisions of this Agreement.

C. The covenants, agreements, and all statements in this Agreement apply to and shall be binding on the heirs, personal representatives, successors and assigns of the respective parties.

D. In the event it becomes necessary for either party to this Agreement to retain an attorney to enforce any of the terms or conditions of this Agreement or to give any notice required herein,

then the prevailing party or the party giving notice shall be entitled to reasonable attorney fees and costs.

E. Any amendments or modifications of this Agreement or any provisions herein shall be made in writing and executed in the same manner as this original document and shall after execution become a part of this Agreement.

F. Subdivider shall comply with all applicable federal, state, and local statutes, ordinances, and administrative regulations during the performance and discharge of its obligations. Subdivider acknowledges and agrees that nothing contained herein shall relieve or exempt it from such compliance.

IN WITNESS WHEREOF, the parties hereto have set their hands and official seals on the date first above written.

"SUBDIVIDER" *(Regal Land Development, Inc. – Dan Wells)*
By:
Its:

STATE OF MONTANA)
: ss
County of Yellowstone)

On this day _____of, 20__, before me, a Notary Public in and for the State of Montana, personally appeared, _____, known to me to be the subdivider who executed the foregoing instrument and acknowledged to me that he/she executed the same.

_____
Notary Public in and for the State of Montana
Printed Name: _____
Residing at: _____
My commission expires: _____

This agreement is hereby approved and accepted by the City/County, this ____ day of _____, 20__.

"CITY"
CITY OF LAUREL, MONTANA

By: _____
Mayor
Attest: _____
City Clerk

Regal Community Park
Section 16.24.020.B.2 Site Access to Public Street
Facts of Hardship

Section 16.24.020.B.2 of the Laurel Municipal Code states that "Private streets shall be designed to provide access to all sites. No site shall have vehicular access to a public street." The applicant would like to request a variance from this requirement for the sites shown along Date Avenue for multiple reasons.

The original Mogan Subdivision is located directly west of the project site and has lots fronting Date Avenue. When the Mogan Subdivision was platted 40 feet of right-of-way was dedicated for Date Avenue. At the time, 40 feet would have been typically half of the required right-of-way for a street in Laurel. A half section of Date Avenue was constructed with a concrete curb that is approximately 18 feet west of the property line. A water main serving the homes along Date Avenue was also installed in Date Avenue and is located approximately 4 feet from the property line. Currently, the east edge of the gravel base for Date Avenue encroaches on the property by as much as 5 feet in some areas. Upon review of the current conditions, it is apparent that when the City of Laurel reviewed the Mogan Subdivision, the intent for Date Avenue was to obtain the other half of the right-of-way when the applicant's property was developed.

If the current project were to follow the regulations, the property line along Date Avenue would be fenced or screened. This would create multiple issues for the property owners along Date Avenue. The road would only be 18 feet wide which would not meet City standards or the standards of the International Fire Code. This would create a public health and safety issue and would restrict emergency vehicle access. Additionally the water main in Date Avenue is located approximately 4 feet off the property line. If a fence was installed on the property line, it would be difficult to maintain and access the water main with a fence so close to the main.

The applicant would like to fulfill the original intent of Date Avenue and provide a 27 foot wide public access easement along the existing Date Avenue right-of-way. The applicant would also construct concrete curb on the easement and widen the existing Date Avenue 16 feet to create a road that is 34 feet wide. This would greatly improve public safety and access for the homes along Date Avenue. Please see the applicant's response to the variance criteria below.

1. The granting of the variance will not be detrimental to the public health, safety, or general welfare or injurious to other adjoining properties.

   Granting this variance will improve public health and safety. The existing road does not meet the City standards or the standards of the International Fire Code. Allowing this variance will ensure safe and adequate access for emergency vehicles and residents of Date Avenue.

2. Because of the particular physical surroundings, shape, or topographical conditions of the specific property involved, an undue hardship to the owner would result if the strict letter of the regulation was enforced.

The physical surroundings of the property include a street that is not constructed to the City standards or standards of the International Fire Code. By allowing this variance the applicant will provide a critical easement and improve the existing road to provide safer access for all. Undue hardship would result from not approving this variance for the property owner as well as the property owners in the Mogan Subdivision along Date Avenue.

3. The variance will not result in the increase in taxpayer burden.

   Granting this variance will not cost taxpayers additional money. The applicant will maintain the section of roadway on their property. Additionally, the easement and road construction costs will be provided to the City at no cost.

4. The variance will not in any manner place the subdivision in nonconformance with the adopted zoning regulations or growth policy.

   Granting this variance will not place this property in nonconformance with the adopted zoning regulation or growth policy.

5. The subdivider must prove that the alternative design is equally effective and the objectives of the improvements are satisfied.

   The applicant's alternative design is the best solution for Date Avenue and provides a critical easement for the City of Laurel as well as provides improved access for the existing residents along Date Avenue. Furthermore, numerous other parks in the area have been allowed to have sites access public streets including the Sunhaven Park to the south as well as the Pine Lane Park.

Environmental Description Report

(per Section 16.36.030 of the Laurel Subdivision Regulations)

A. Surface Water

1. Floodplains

The proposed Regal Community Park is shown on FEMA FIRM Panel 30111C1420E. A copy of the FIRM map is included in Section 11. The property is in "zone x" of the floodplain created by the Nutting Ditch that is located to the north of the property. A 100-year floodplain delineation was completed and is included in Section 5. No structures or construction will occur in the delineated floodplain and the 100-year floodplain will be shown on the final plan.

2. Description

The Nutting Ditch runs to the north of the property and will not be affected by the proposed project.

3. Proximity to surface water to proposed construction

There is a 36-inch culvert located near the northeast corner of the property that carries water from the Nutting Ditch under Maryland Lane. No disruption to the culvert will occur during the construction of the subdivision.

4. Water Quality Permits

None of the following water quality permits are required because the existing surface water will not be disturbed.

Permit	Required?
310 Permit - Local Conservation District	N
SPA 124 Permit - Department of Fish, Wildlife and Parks	N
Floodplain Permit - County Floodplain Administrator	N
Section 404 Permit, Section 10 Permit - US Army Corps of Engineers	N
318 Authorization - Department of Environmental Quality	N
Navigable Rivers Land Use License or Easement - Department of Natural Resources and Conservation	N

B. Groundwater

The information regarding groundwater for this site was obtained from two soil test pits, dug on July 19, 2012, NRCS Depth to Water Table Map, and well logs from the surrounding area. The test pit profiles can be found in Section 12 and the well logs from surrounding wells and NRCS Depth to Water Table Map can be found in Section 11.

1. Depth

Of the two test pits dug on site, only one found the groundwater table at a depth of 13.6 feet. The other pit was dug to 12.8 feet deep and groundwater was not found.

The NRCS Depth to Water Table map of the site is based on soil type. The majority of the site is classified as Lohmiller soils, seeped, 0 to 2 percent slopes, which has a depth to groundwater of approximately 4.5 feet. Other on site soil types have depths to groundwater ranging from 1.5 to 6.5 feet. Sage Clay makes up a small portion of the northwest corner of the site and has a depth to groundwater of approximately 1.5 feet. Bone silty clay, 0 to 1 percent slopes, and Lohmiller silty clay, 0 to 1 percent slopes, are found on the northern portion of the site and have depth to groundwater greater than 6.5 feet. Based on the test pit information, the NRCS soils data regarding groundwater location is somewhat conservative, showing a higher groundwater table than what actually exists.

Well logs from the surrounding area show the groundwater table depths varying from 4 to 12 feet deep. A map showing the surrounding well locations and the corresponding well logs is included in Section 11.

2. Steps to Avoid Degradation

The project will be connected to the City of Laurel's public drinking water and sanitary sewer system. On-site wastewater treatment systems are not part of this project and the project will not have an adverse impact on groundwater quality due to impacts from domestic wastewater. Surface runoff will be controlled by channeling flows into a retention basin which will allow for percolation and aquifer recharge. The basin will also filter sediments and oil reducing the potential for contamination of down gradient aquifers.

C. Geology/Soils/Slopes

1. Geologic Hazards

The project site is located in an area that consists of flat-sloping topography (1.0 – 2.0%), therefore, there are no potential geologic hazards present with respect to slope stability, mass movement, surface subsidence, or soils bearing capacity.

2. Protective Measures

The following protective measures will be taken to ensure that the existing geology is not a problem:

- All cut and fill slopes shall be placed in uniform lifts compacted to 95% of the maximum dry density as determined by ASTM D698.
- All topsoil, including organic material, will be removed from building and pavement areas.
- Design of all streets and parking areas shall use accepted engineering practices to

determine structural sections and the use of separation fabrics based on soil conditions and traffic loading.

- Buildings will be designed for seismic zone 1 as outlined in the International Building Code.

Fills within the right-of-way will be primarily composed of imported fill material. Where cuts and fills are required outside of the right-of-way, material will generally be moved from cut areas to fill areas. The proposed roadways will generally follow the existing grade on this site. There are no areas on this site that will require large cuts or fills.

The construction contract for each lot shall provide for landscaping, seeding, and fertilizing of all cut and fill slopes. Mulching or placement of erosion control mats shall be investigated for use as needed. The overall storm water master plan/erosion control plan required by MDEQ will detail all necessary erosion control measures. "Best Management Practices" will be utilized to minimize erosion and any down gradient impacts. The Covenants and Weed Control Plan shall include provisions to ensure that re-seeding and erosion control is provided as individual buildings are being constructed.

3. Unusual Features

The site contains no unusual topographic, geologic or hydrogeologic conditions limiting its capability to be developed using standard engineering or construction practices.

4. Soils Map

According to NRCS soils data (see Section 12), there are four mapped soil types within the boundary of the site. These soil types are defined by a different map unit. For convenience, a summary of the site's soils are presented in the following table.

Map Unit	Soil Name	Coverage W/I Subdivision (%)	Typical Slope Of Ground Surface (%)	Approximate Depth To Watertable (Ft.)
Bt	Bone silty clay	18.6	0.0-1.0	6.5
Lr	Lohmiller silty clay	1.7	0.0-1.0	6.5
Ls	Lohmiller soils, seeped	78.4	0.0-2.0	4.5
Sa	Sage clay	1.3	0.0-1.0	1.5

For a visual reference of the distribution of different soil types within the site, see the NCRC soils report cover page map (Section 12). Detailed soils reports, obtained from the NRCS database, and are also enclosed in Section 12. The information contained herein

includes descriptions of each soil type's physical, chemical and engineering index properties, water features, hydric characteristics, and site development limitations.

D. Vegetation

1. Vegetation Map

The property is currently lightly vegetated with grasses and weeds. For the specific lists of common vegetation for each NRCS soil type on the property, see the soil report titled "Rangeland and Forest Vegetation Classification Productivity, and Plant Composition" in Section 12.

2. Protective Measures

Much of the site will be disturbed during the construction of the proposed project, either during construction of the roads and other infrastructure, or during the development of each lot. No critical plant communities will be disturbed.

E. Wildlife

1. Species

There are no known endangered species or critical game ranges on site. Due to the history of agricultural use near the site, and the adjacent residential use, it provides little wildlife habitat. Wildlife species consist mainly of rodents and common birds. Little cover and shelter is available for wildlife species in the area.

Community Impact Report

(per Section 16.36.040 of the Laurel Subdivision Regulations)

A. Impact on Agriculture and Agricultural Water Use Facilities

The 7.85-acre Regal Community Park site is currently a vacant, unused lot. It is surrounded on three sides by land that has been annexed into the City of Laurel; therefore, the site is no longer considered a viable farming unit. Areas to the south and west are currently mobile home parks and the area to the east and north are parkland and open space.

There are no existing irrigation rights with the property and no modification to existing ditches will occur with the development.

B. Impact on Local Services and Public Health and Safety

1. Water Supply

Water for domestic use and fire protection will be provided by connections to the City of Laurel water system. A plan of the water main connections is shown on the preliminary plan and a preliminary design report is included in Section 13.

2. Sewage Disposal

The Regal Community Park will require connection to the City of Laurel's existing sanitary sewer collection system. The nearest existing sewer manhole is found near the intersection of Eighth Street and Pine Lane. Sanitary sewage will be conveyed to and treated at the City of Laurel's Wastewater Treatment Plant. A plan of the sanitary sewer main connections is shown on the preliminary plan and a preliminary design report is included in Section 13.

3. Solid Waste Disposal

Solid Waste Disposal will be contracted through the City of Laurel Solid Waste Department.

4. Stormwater

Stormwater runoff from the site will be conveyed to one retention pond located in open space in the southeast corner of the site. A plan view of the site highlighting the drainage area, the storm water features, and a preliminary stormwater design report is included in Section 14.

5. Roads

Access to the site will be provided by the construction of a new section of Regal Avenue that will run north between Eighth Street and Maryland Lane. Access to the sites along Date Avenue will be provided by Date Avenue. An access easement will be provided for 27 feet along the west side of the property to provide enough room for a road that meets the fire code to be constructed. The applicant proposes to construct curb, gutter and sidewalk along the east side of Date as well as widen the existing road. This will provide better access for the existing residents. A turnout will be provided on 8th Street to allow the post office a safe place to access the mailbox. In addition, a forty foot wide easement will be provided along Maryland Lane for future widening of the road.

Road maintenance for all streets will be provided by the property manager after the improvements have been accepted by the City. Erosion and siltation control will be exercised during construction by using the appropriate best management practices as outlined in "Montana Sediment and Erosion Control Manual" (May 1993) prepared by the MDEQ Water Quality Bureau.

6. Utilities

Letters requesting comments on their ability to service this subdivision have been sent to the following service providers on November 11, 2015:

> Century Link, Charter Communications, U.S. Postal Service, Laurel School District, and Northwestern Energy

Response letters from all of those who chose to comment are enclosed in Section 15. Natural gas, electricity, and telephone service will be installed with the site improvements. All utilities will be installed underground. There is currently an overhead power line in the Eighth Street right-of-way.

7. Emergency Services

Based on US Census Data the City of Laurel has approximately 2.43 people per household. This means that the proposed project can be expected to increase the City's population by 131 people. (2.43 x 54 = 141) Based on 911 call data from Billings, there is approximately one call to 911 per two people per year. This data indicates that the City of Laurel can expect 66 more emergency calls per year.

All roads will be built to the City of Laurel standards which will provide adequate access for emergency vehicles. All phases of the project will have two points of access. There are no known health or safety hazards in or near the proposed subdivision.

8. Schools

A letter requesting comments on their ability to service this subdivision was sent to the Laurel School District on November 11, 2015. An email was received from Tim Bronk, the Superintendent of the Laurel School District. The email is included in Section 15.

Based on data from the US Census Bureau, the proposed project will generate approximately 24 additional school aged children. Laurel has approximately 2.43 persons per household and 18.1% of the population is between the ages of 5 and 18.

9. Parks and Recreation Facilities

The parkland requirement will be met with the combination of the linear park trail corridor shown on the plan as well as a cash-in-lieu donation. The linear trail will provide better park access for the entire neighborhood and the cash-in-lieu donation can be used to help improve and maintain the current park located directly east of the project. Parkland will be provided in accordance with Section 17.24.070.F. at a rate of 100 square feet per site plus 4,000 square feet. With the 54 spaces proposed this is a total area of 9,400 square feet. The linear park area is 3,800 square feet so cash-in-lieu will be provided for 5,600 square feet of land. The final amount will be determined based on the market value of the land at the time of the site plan approval.

C. Land Use

The proposed Regal Community Park will contain 54 spaces for single family mobile homes. The property has a zoning designation of "residential manufactured home" (RMH) and will be annexed into the city concurrent with the preliminary plan approval.

The project will improve access to public land by installing sidewalks along Date Avenue and by constructing a linear park trail corridor. This will allow residents in the area to safely walk to the park. The proposed land use will not create any unpleasant odors, unusual noises, or dust and smoke.

D. Historical Features

There is no evidence of historic homesteads or structures on the property. If in the course of construction the proposed development any sites are uncovered, the State Historic Preservation Office will be notified. As long as no historic sites turn up during the course of construction, a cultural resource inventory is unwarranted for this site. See letter from Damon Murdo of the Montana Historical Society included in Section 15.

E. Visual Impact

The proposed Regal Community Park will consist of 54 mobile homes. The covenants provide measures to enforce upkeep on the homes. Given the surrounding residential areas consist primarily of manufactured homes; the proposed project will be compatible with the surrounding neighborhoods.

All boulevard areas along public streets will be seeded and maintained after construction of the streets.

Summary of Probable Impacts

(per Section 16.36.050 of the Laurel Subdivision Regulations)

A. Agriculture

The proposed Regal Community Park project will have no impact on agriculture. The 7.85-acre site is currently a vacant, unused lot. It is surrounded on three sides by land that has been annexed into the City of Laurel; therefore, the site is no longer considered a viable farming unit. Areas to the south and west are currently mobile home parks and the area to the east and north are parkland and open space.

B. Agricultural Water User Facilities

There are no existing irrigation rights with the property and no modification to existing ditches will occur with the development.

C. Local Services

The Regal Community Park is a 54 space mobile home park. The property has a zoning designation of RMH and is being annexed into the city concurrent with the preliminary plan. The proposed subdivision will have minimal impact on local services as it is surrounded on three sides by existing city land.

D. The Natural Environment

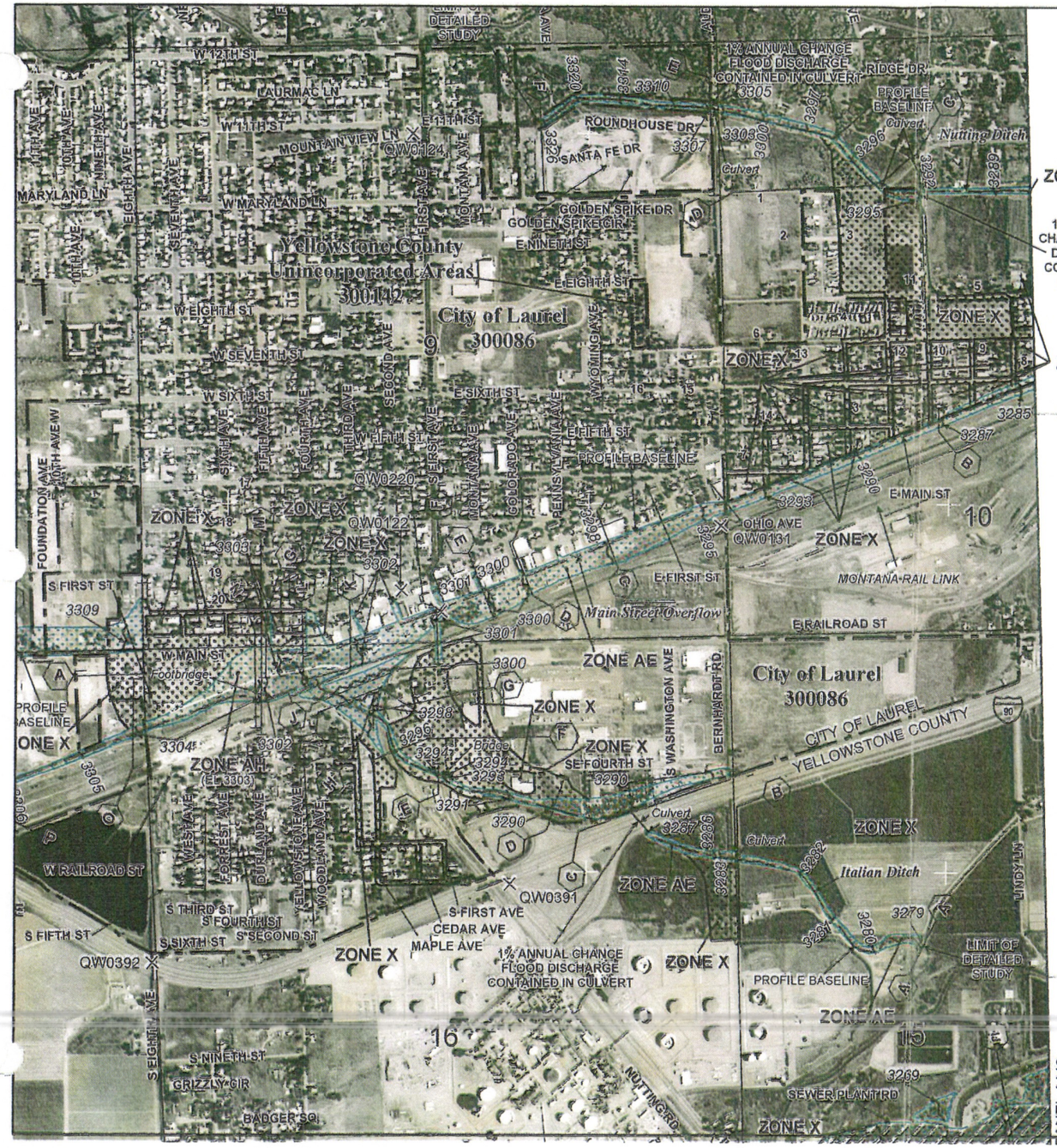
The proposed site plan will improve the natural environment. The property is currently vacant land with no public access. The project will create a beautiful area for residents and will complement the surrounding properties and improve access to the public park located directly to the east.

E. Wildlife and Wildlife Habitat

There are no known endangered species or critical game ranges on site. Due to the history of agricultural use near the site, and the adjacent residential use, it provides little wildlife habitat. Wildlife species consist mainly of rodents and common birds. Little cover and shelter is available for wildlife species in the area.

F. Public Health and Safety

The project will improve the public health and safety in the City of Laurel. Cash-in-lieu donation for the parkland will be able to be used to better maintain city parks. Also, the project will improve access for the public by installing sidewalks along Date Avenue and the linear park trail corridor. This will allow residents in the area to safely walk to the park.



KEY TO NUMBERED STREETS

1. E MARYLAND LN
2. E NINETH ST
3. DATE AVE
4. SUNHAVEN DR
5. EIGHTH ST
6. E SEVENTH ST
7. FOURTH ST
8. JUNIPER AVE
9. HAZEL AVE
10. FIR AVE
11. PINE LN
12. ELM AVE
13. COTTONWOOD AVE
14. BIRCH AVE
15. IDAHO AVE
16. WASHINGTON AVE
17. W FOURTH ST
18. W THIRD ST
19. W SECOND ST
20. W FIRST ST

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 M

NFIP

PANEL 1420E

FIRM

FLOOD INSURANCE RATE MAP

YELLOWSTONE COUNTY, MONTANA AND INCORPORATED AREAS

PANEL 1420 OF 1875

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LAUREL, CITY OF	300086	1420	E
YELLOWSTONE COUNTY, Unincorporated Areas	300142	1420	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

NATIONAL FLOOD INSURANCE PROGRAM

MAP NUMBER
30111C1420E

EFFECTIVE DATE
NOVEMBER 6, 2013

Federal Emergency Management Agency

Depth to Water Table—Yellowstone County, Montana
(Moore Subdivision)

Map Scale: 1:1,710 if printed on A portrait (8.5" x 11") sheet.

N

0 25 50 100 150 Meters

0 50 100 200 300 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Rating Polygons
  - 0 - 25
  - 25 - 50
  - 50 - 100
  - 100 - 150
  - 150 - 200
  - > 200
  - Not rated or not available
- Soil Rating Lines
  - 0 - 25
  - 25 - 50
  - 50 - 100
  - 100 - 150
  - 150 - 200
  - > 200
  - Not rated or not available
- Soil Rating Points
  - 0 - 25
  - 25 - 50
  - 50 - 100
  - 100 - 150
  - 150 - 200
  - > 200
  - Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Yellowstone County, Montana
Survey Area Data: Version 12, Dec 4, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 29, 2011—Aug 17, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Depth to Water Table

Depth to Water Table— Summary by Map Unit — Yellowstone County, Montana (MT111)				
Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
Bt	Bone silty clay, 0 to 1 percent slopes	>200	1.7	18.6%
Lr	Lohmiller silty clay, 0 to 1 percent slopes	>200	0.2	1.7%
Ls	Lohmiller soils, seeped, 0 to 2 percent slopes	137	7.2	78.4%
Sa	Sage clay, 0 to 1 percent slopes	46	0.1	1.3%
Totals for Area of Interest			9.2	100.0%

Description

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

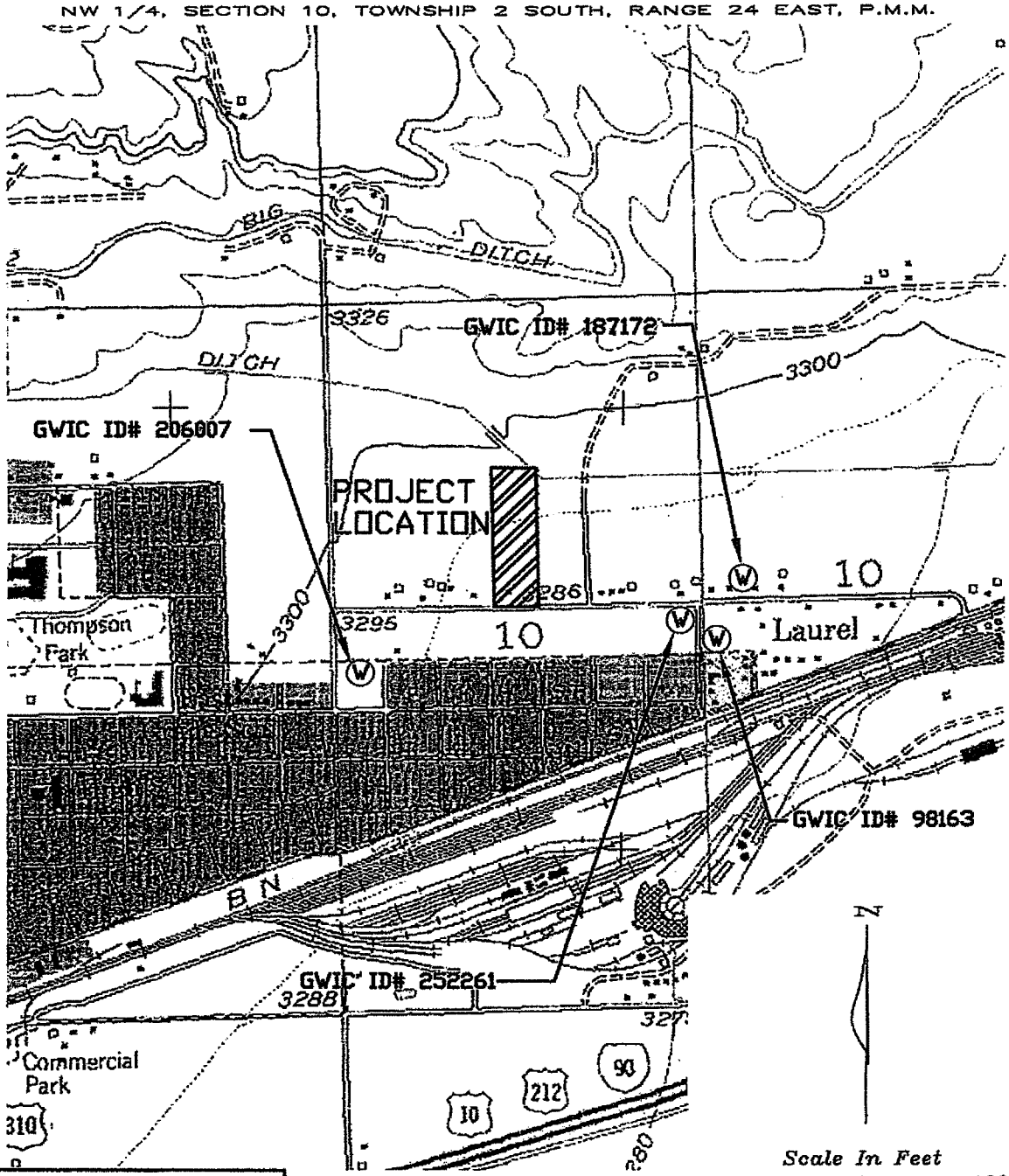
Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

WELL LOCATION MAP

NW 1/4, SECTION 10, TOWNSHIP 2 SOUTH, RANGE 24 EAST, P.M.M.



C&H
Engineering and Surveying Inc.
1091 Stoneridge Drive • Bozeman, MT 59718
Phone (406) 587-1115 • Fax (406) 587-9768
www.chengineers.com • info@chengineers.com

WATER SAMPLE TAKEN FROM MONITORING WELL

SOURCE: USGS TOPOGRAPHIC QUADRANGLE MAP
MONTANA'S GROUND—WATER INFORMATION CENTER

#12033.1

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Return to menu
Plot this site on a topographic map
View scanned well log (6/10/2010 11:54:34 AM)

Site Name: KING MICHAEL AND JOY
GWIC Id: 206007

Section 1: Well Owner(s)

1) KING, MICHAEL (MAIL)
502 DATE AVE
LAUREL MT 59044 [08/11/2003]

Section 2: Location

Township	Range	Section	Quarter Sections
02S	24E	10	NW¼ NW¼ NW¼ SW¼

County: YELLOWSTONE
Geocode:

Latitude	Longitude	Geomethod	Datum
45.67514	108.760515	TRS-SEC	NAD83

Ground Surface Altitude	Method	Datum	Date

Addition	Block	Lot
NUTTINGSUN		11 AND 12

Section 3: Proposed Use of Water

IRRIGATION (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Monday, August 11, 2003

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	40	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-1.5	38.5	6	0.250		WELDED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
40	40	6			OPEN BOTTOM

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	38	8 CASING SEAL	Y

Section 7: Well Test Data

Total Depth: 38.5
Static Water Level: 8.08
Water Temperature:

Pump Test *

Depth pump set for test 32 feet.
100 gpm pump rate with 4 feet of drawdown after 3 hours of pumping.
Time of recovery 0.25 hours.
Recovery water level 8.09 feet.
Pumping water level 12.1 feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

Section 9: Well Log

Geologic Source

111TRRC - TERRACE DEPOSITS (HOLOCENE)

From	To	Description
0	2	TOPSOIL
2	6	DRY CLAY
6	14	DAMP SANDY CLAY
14	38.7	COARSE GRAVEL WITH LOTS OF SAND
38.7	40	SHALE/BLUE

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: MARVIN W. JEWETT

Company: A-1 DRILLING/BILLINGS DRILLING

License No: WWC-532
Date Completed: 8/11/2003

MONTANA WELL LOG REPORT

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Other Options

Return to menu

Plot this site on a topographic map

Site Name: VECHES JOSEPH P
GWIC Id: 252261

Section 1: Well Owner(s)

1) VECHES, JOSEPH (MAIL)
915 E 8TH STREET
LAUREL MT 59044 [09/26/2009]
2) VECHES, JOSEPH (WELL)
915 E 8TH STREET
LAUREL MT 59044 [09/26/2009]

Section 2: Location

Township	Range	Section	Quarter Sections
02S	24E	10	SE¼ SE¼ SE¼ NW¼

County	Geocode
YELLOWSTONE	03082110208160000

Latitude	Longitude	Geomethod	Datum
45.676048	108.751458	TRS-SEC	NAD83

Ground Surface Altitude	Method	Datum	Date

Addition	Block	Lot
NUTTING BROTHERS 3ND FILING		4

Section 3: Proposed Use of Water

DOMESTIC (1)
IRRIGATION (2)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Saturday, September 26, 2009

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	41	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-1.6	38.6	6.5	0.25		WELDED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
38.6	38.6	6			OPEN BOTTOM

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	38	#8 CASING SEAL	Y

Section 7: Well Test Data

Total Depth: 41
Static Water Level: 4.2
Water Temperature:

Air Test *

200 gpm with drill stem set at 38.2 feet for 2 hours.
Time of recovery 0.25 hours.
Recovery water level 4.2 feet.
Pumping water level _ feet.

Pump Test *

Depth pump set for test 38 feet.
150 gpm pump rate with 4 feet of drawdown after 1 hours of pumping.
Time of recovery 0.33 hours.
Recovery water level 4.1 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

Section 9: Well Log

Geologic Source

Unassigned

From	To	Description
0	1	TOPSOIL
1	17	DENSE CLAY
17	19	PURE SAND
19	41	COARSE SAND & GRAVEL

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name:	MARVIN W. JEWETT
Company:	
License No:	WWC-532
Date Completed:	9/26/2009

MONTANA WELL LOG REPORT

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Other Options

Return to menu
Plot this site on a topographic map
View scanned well log (6/10/2010 11:14:30 AM)

Site Name: STRECKER GERALD
GWIC Id: 98163
DNRC Water Right: 32283

Section 1: Well Owner(s)

1) STRECKER, GERALD (MAIL)
RTE 2 LAUREL
N/A N/A N/A [03/16/1981]

Section 2: Location

Township	Range	Section	Quarter Sections
02S	24E	10	

County: YELLOWSTONE
Geocode:

Latitude	Longitude	Geomethod	Datum
45.675594	108.750811	TRS-SEC	NAD83

Ground Surface Altitude: Method: Datum: Date:

Addition	Block	Lot
NUTTING 2ND		2

Section 3: Proposed Use of Water

UNKNOWN (1)

Section 4: Type of Work

Drilling Method: FORWARD ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Monday, March 16, 1981

Section 6: Well Construction Details

There are no borehole dimensions assigned to this well.

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	31	6				STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
26	29	6		1/8	SLOTS

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	14	BENTONITE	

Section 7: Well Test Data

Total Depth: 31
Static Water Level: 12
Water Temperature:

Pump Test *

Depth pump set for test _ feet.
30 gpm pump rate with _ feet of drawdown after 2 hours of pumping.
Time of recovery _ hours.
Recovery water level _ feet.
Pumping water level 16 feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

Section 9: Well Log

Geologic Source

111TRRC - TERRACE DEPOSITS (HOLOCENE)

From	To	Description
0	2	TOPSOIL
2	7	CLAY
7	30	SAND GRAVEL
30	31	SHALE

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: CURTIS SCHELLE
Company: BILLINGS DRILLING

License No: WWC-344

Date Completed: 3/16/1981

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Return to menu
Plot this site on a topographic map
View scanned well log (6/10/2010 11:24:23 AM)

Site Name: BLOM DALE
GWIC Id: 187172

Section 1: Well Owner(s)

1) BLOM, DALE (MAIL)
1812 E 8TH
LAUREL MT 59044 [04/13/2000]

Section 2: Location

Township	Range	Section	Quarter Sections
02S	24E	10	SW¼ SW¼ NE¼

County: YELLOWSTONE
Geocode:

Latitude	Longitude	Geomethod	Datum
45.676503	108.749518	TRS-SEC	NAD83

Ground Surface Altitude: Method: Datum: Date:

Addition	Block	Lot
NUTTING BROS SUB		27

Section 3: Proposed Use of Water

DOMESTIC (1)
IRRIGATION (2)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Thursday, April 13, 2000

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	40	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	40	6	0.250			STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
40	40	6			OPEN BOTTOM

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	18	BENTONITE	

Section 7: Well Test Data

Total Depth: 40
Static Water Level: 10.5
Water Temperature:

Air Test *

60 gpm with drill stem set at _ feet for 4 hours.
Time of recovery 0.25 hours.
Recovery water level 10.5 feet.
Pumping water level 17.5 feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

Section 9: Well Log

Geologic Source

111TRRC - TERRACE DEPOSITS (HOLOCENE)

From	To	Description
0	12	TOPSOIL/CLAY
12	40.5	GRAVEL/SAND

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: AL HICKS
Company: PRO PUMP & EQUIPMENT INC
License No: WWC-508
Date

Completed: 4/13/2000

Engineering and Surveying Inc.
1091 Stoneridge Drive • Bozeman, Montana • Phone (406) 587-1115 • Fax (406) 587-9768
www.chengineers.com • E-Mail: info@chengineers.com

June 24, 2016

City of Laurel
City Planner
Attn: Noel Eaton
P.O. Box 10
Laurel, MT 59044

RE: Geotechnical Report – Regal Community Park

Dear Noel,

C&H Engineering and Surveying, Inc. (C&H Engineering) is responding to your letter regarding the Development for Rent or Lease Application & Supplemental Information, dated May 27, 2016. You requested several modifications to this application including a change to the site name in the included geotechnical report prepared by C&H Engineering in 2012.

Currently, the site is named, Regal Community Park, but was previously named, Moore Subdivision at the time that geotechnical report was prepared in 2012. This geotechnical report has since been finalized and, therefore, cannot be changed. For the purposes of this application, the referenced Moore Subdivision in the geotechnical report refers to the Regal Community Park.

Please contact me if you have any questions about this letter or if we can provide you with more information.

Sincerely,

Mike Balch, P.E.

1.0 Introduction

C&H Engineering and Surveying Inc., (C&H Engineering) has conducted a geotechnical investigation for the proposed subdivision improvements to be constructed on Lot 7 and Lot 8 of the Nutting Brothers 2nd Filing Subdivision. The subject property is found in the Northwest Quarter of Section 10, Township 2 South, Range 24 East, in Yellowstone County, Montana.

The scope of services was to conduct a site investigation, evaluate the site, and provide a geotechnical investigation report. The report documents the sites' soil and groundwater conditions, subsurface soil properties, and provides construction recommendations.

2.0 Proposed Improvements

The proposed improvements include; widening of the street, adding curb, gutter, and sidewalk in the right-of-way of Date Avenue, Maryland Lane, and 8th Street. Water mains and sanitary sewer mains will be installed in the streets as well. Stormwater will flow down the curb lines to a curb inlet located in the southeast corner of the site and pipe the runoff to a retention pond located in the Open Space Tract. Mobile homes are proposed for each lot.

Detailed plans regarding the proposed residential structures was not provided prior to the completion of this report. It has been assumed that a residential mobile home structure will be supported by footings and piers and garages will be a slab-on-grade foundation system. It has also been assumed that the foundation elements will not be subject to eccentric loading.

3.0 Investigation

The investigation is separated into two parts; the field investigation and the laboratory analysis. While the scope of this project focuses more on the field investigation, we feel it is important to spend time verifying our field observations and conducting tests that will aid in the geotechnical analysis.

3.1 Field Investigation

On July 19, 2012 a site visit was made to the subject property to conduct a subsurface soils investigation and to observe ground features. The subsurface soils investigation consisted of examining two test pit excavations. The exploratory test pits were excavated with a backhoe provided by Bangert Construction and Excavation, Inc.

The relative density of each soil layer was estimated based on the amount of effort required to excavate the material, probing of the excavation sidewalls with a rock hammer and the overall stability of the excavation. Any evidence of seepage or other groundwater conditions were also noted. The locations of the test pits are shown on the Test Pit Location Map included in at the end of this report. The subsurface soil conditions encountered in the test pits are described in Section 4.2.

4.0 Site Evaluation

The site evaluation is based on both the field investigation and research of the sites' surface geology, soil survey information, and seismic history.

4.1 Site Description

The subject property has a total area of 7.853 acres. Access is provided by Date Avenue, Maryland Lane, and 8th Street. Please see the attached Test Pit Location Map for the exact location of the test pit locations. The slope across the designated building envelope is slight, with slope towards the southeast corner of the property. The property is lightly vegetated with grass and smaller trees.

4.2 Subsurface Soils and Conditions

The two test pits (TP) excavated for the field investigation exhibited very similar soil profiles. The following paragraphs briefly summarize the subsurface soils and conditions observed in the test pits excavated for the field investigation. The soil horizons are described as they were encountered in the test pit excavations, starting with the horizon nearest the surface and proceeding with each additional horizon encountered with depth. Please refer to "Test Pit Logs" at the end of this report for more detailed descriptions.

The test pits revealed approximately 22 -24 inches of a *Lean Clay* (CL), followed by *Fat Clay* (CH) to the end of excavation, 13.6 feet below grounds surface (bgs) in TP-1 and 12.8 feet bgs in TP-2. The Lean clay exhibited medium plasticity upon becoming wetted and was relatively dry and firm. The fat clay exhibited high plasticity upon becoming wetted and was relatively moist.

Both clay soils encountered are moisture sensitive and must be kept at a constant moisture condition to prevent from shrinking and swelling. It is recommended that a minimum of 2 feet of structural fill be placed and compacted beneath all load bearing foundation elements. It will also be important that an overall site grading and drainage plan be developed and properly implemented to keep the onsite sites at as near a constant moisture content as is possible.

4.3 Natural Resources Conservation Service Soil Survey

The Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. The NRCS has determined the physical characteristics and engineering properties, among other data, of near surface soils across the United States. The NRCS soil report is included at the end of this report. These data are reviewed against our observations and analysis of the subsurface soils encountered during the field investigation to determine if a correlation is present. If a strong correlation is determined, it is likely that other engineering properties or characteristics described by the NRCS regarding the soils present on the subject property are accurate as well. It should be noted that the NRCS typically only describes the soils located within 5 feet of the surface.

NRCS Soil Survey information of the area was taken from the NRCS WSS, Version 2.0. For more information please visit the NRCS Web Soil Survey on the World Wide Web, at http://websoilsurvey.nrcs.usda.gov/app/. The NRCS Soils Survey identifies two primary soil types across the subject property. The soil types are Bt – Bone Silty Clay, and Ls – Lohmiller Soils. The NRCS describes the upper soil horizons of these complexes alluvium. The NRCS gives both of these soils types a very limited soil rating for building site development due to their shrink-swell properties.

The two test pits excavated correlate well with both soil descriptions. Both test pits revealed clay soils are present that have medium to high plasticity and likely medium to high shrink-swell potential.

4.4 Groundwater

Groundwater was encountered in TP-1 at a depth of 13.6 feet bgs. It was also observed that the groundwater elevation was approximately 4 to 5 feet below grounds surface in a groundwater monitoring well that had been installed on the southern end of Lot 7. Groundwater should not be an issue for the construction of the roadways and trailer foundations, but may be problematic for the installation of underground utilities, especially on the southern end of the subject property.

5.0 Geotechnical Analysis

The geotechnical analysis takes into account the field investigation and site evaluation to make engineering recommendations pertaining to bearing capacity, lateral pressures, settlement, and slope stability.

5.1 Allowable Bearing Capacity

The allowable bearing capacity of a soil is defined as the maximum pressure that can be permitted on a foundation soil, giving consideration to all pertinent factors (such as settlement and seismic considerations), with adequate safety against rupture of the soil mass or movement of the foundation of such magnitude that the structure is impaired. The allowable bearing capacity is determined from the geotechnical analysis, the field investigation, available soil and geology information, and our experience in the project area.

Based on the site investigation, it recommended that all loads from the proposed structure be transmitted to a structural fill pad overlying lean or fat clay. For this scenario an allowable bearing capacity of **1,500 pounds per square foot (psf)** may be used to dimension all foundation elements.

The allowable bearing capacity may be increased by one third for short term loading conditions such as those from wind or seismic forces.

5.2 Settlement

While the soil at the site may be able to physically support the footings, it is also important to analyze the possible settlement of the structure. In many cases, settlement determines the allowable bearing capacity.

When a soil deposit is loaded by a structure, deformations within the soil deposit will occur. The total vertical deformation of the soil at the surface is called total settlement. Total settlement is made up of two components: elastic settlement and consolidation settlement. Elastic settlement is the result of soil particles rearranging themselves into a denser configuration due to a load being imposed on them and usually occurs during the construction process and shortly after. Consolidation settlement occurs more slowly and over time as water within the pore spaces of a soil are forced out and the soil compresses as the stress from the load is transferred from the water molecules to the soil particles. Consolidation settlement is more of a concern with fine-grained soils with low permeability and high in-situ moisture contents. The degree of settlement is a function of the type of bearing material, the bearing pressure of the foundation elements, local groundwater conditions, and in some cases determines the allowable bearing capacity for a structures' footings.

In addition to analyzing total settlement, the potential for differential settlement must also be considered. Differential settlement occurs in soils that are not homogeneous over the length of the foundation or in situations where the foundation rests on cut and fill surfaces. If the foundation rests on structural fill overlaying properly prepared soils with rock, differential settlement is expected to be well within tolerable limits. Areas that have significantly more fill under the foundation footings (four feet of more) create greater potential for differential settlement. In these cases the structural fill must be installed properly and tested frequently. Compaction efforts and structural fill consistence are vital in minimizing differential settlement. For this project it is not anticipated that significant quantities of structural fill will be required. For this project, total settlement is expected to consist of elastic settlement.

A settlement analysis based on conservative soil parameter estimates, the allowable bearing capacity recommended in Section 5.1, and the assumption that all recommendations made in this report are properly adhered to, indicates the total and differential settlement are expected to be 1-inch or less. Structures of the type assumed can generally tolerate this amount of movement, however, these values should be checked by a structural engineer to verify that they are acceptable.

Please note that the settlement estimates are based on loads originating from the proposed structure. If additional loads are introduced, such as the placement of large quantities of fill, our office should be contacted to re-evaluate the settlement estimates.

5.2.1 Collapsible Soils

Collapsible soils are soils that compact and collapse after wetting. The soil particles are originally loosely packed and barely touch each other before moisture infiltrates into the soil. As water infiltrates into the soil it reduces the friction between the soil particles and allows them to slip past each other and become more tightly packed, often resulting in a radical reduction in

volume; this radical reduction in volume can occur without any additional loading of the soil. Another term for collapsible soils is "hydrocompactive soils" because they compact after water is added. The amount of collapse depends on how loosely the particles are packed originally and the thickness of the soil layer susceptible to collapse.

Soils with dry densities of less than 80 pounds per cubic foot (pcf), generally silts deposited by the wind, are considered to be susceptible to collapse. Soils with dry unit weights greater than 90 pcf are not considered susceptible to collapse. Using this correlation, it is our opinion that the proposed structure is not at risk of sustaining damage due to collapsible soils.

6.0 Recommendations

The following recommendations are given as guidance to assure for a safe and effective foundation for the proposed structure. These recommendations are determined by the geotechnical analysis, code requirements, our experience, and local construction practices.

6.1 Structural Fill

Structural fill is defined as all fill that will ultimately be subjected to structural loadings, such as those imposed by footings, floor slabs, pavements, etc. It is anticipated that structural fill will not be required for this project below the footings. The native soils encountered during the field investigation are not suitable as structural fill for this project. If structural fill is required it will need to be imported. Imported structural fill is recommended to be a well graded gravel with sand that contains less than 20 percent material that will pass a No. 200 sieve and that has a maximum particle size of 3 inches.

Structural fill must be placed in lifts no greater than 12 inches (uncompacted thickness) and be uniformly compacted to a minimum of 97 percent of its theoretical maximum dry density, as determined by ASTM D698, at $\pm$ 3 percent of the materials optimum moisture content. The structural fill must be compacted with a large vibratory smooth drum roller; a sheeps foot roller will not be adequate for this purpose. Please note that if a moisture-density relationship test (commonly referred to as a proctor) needs to be performed for a proposed structural fill material to determine its theoretical maximum dry density, a sample of the material must be delivered to this office a minimum of three full working days prior to beginning placement of the structural fill.

Achieving proper compaction is imperative, as it will insure no additional settlement of the structure occurs. Therefore, it is required that C&H Engineering verifies proper compaction in all structural fill lifts.

6.2 Exterior Slabs-on-Grade

For exterior areas to be paved with concrete slabs, it is recommended that, at a minimum, the topsoil and any organics be removed. The subgrade soils then need to be compacted to an unyielding condition. Then for non-vehicular traffic areas, a minimum of 6 inches of ¾-inch

minus rock needs to be placed, and 4 inches of 4000 pounds per square inch concrete placed over the ¾-inch minus rock. For areas with vehicular traffic, a minimum of 9 inches of ¾-inch minus rock should be placed, followed by 4 inches of 4000 pounds per square inch concrete.

Exterior slabs that will be located adjacent to the foundation walls need to slope away from the structure at a minimum grade of 2 percent and should not be physically connected to the foundation walls. If they are connected, any movement of the exterior slab will be transmitted to the foundation wall, which may result in damage to the structure. Additionally, any exterior columns (such as those for patios or decks) should not bear on exterior slabs. Any movement of the exterior slab will be transmitted to the column, which may also result in damage.

If concrete slabs are to be placed on foundation wall backfill, the backfill must be compacted to 95 percent of its maximum dry density, as determined by ASTM D698. It is recommended the backfill be placed in uniform lifts and compacted as described in Section 6.4.

6.3 Asphalt Paving Improvements

For areas to be paved with asphalt, it is recommended that, as a minimum, the topsoil and any organics be removed. The native subgrade then needs to be rolled at ± 2 percent of its optimum moisture content to 95 percent of its maximum dry density, as determined by ASTM D698. Next a 12-inch layer of compacted 6-inch minus gravel needs to be placed (sub-base layer), followed by a 3-inch layer of compacted 1-inch minus road mix (base layer). Both gravel courses must be compacted at ± 3 percent of their optimum moisture content to 95 percent of their maximum dry density. A 3-inch thick layer of asphalt pavement can then be placed and compacted over this cross-section.

It is recommended that following compaction of the native subgrade, a loaded dump truck or other heavy piece of equipment be driven over it to determine the stability of the subgrade. If any isolated soft spots are found, these areas should be sub-excavated and replaced with compacted fill. If widespread unstable conditions are present (i.e. significant rutting or pumping is observed) the sub-base component of the road section will need to be increased and a geotextile may also be required, especially if moisture related issues are the cause of the instability.

If asphalt paving is to be placed on foundation wall backfill, it is imperative that the backfill be compacted to 95 percent of its maximum dry density, as determined by ASTM D698. It is recommended the backfill be placed in uniform lifts and compacted as described in Section 6.4.

6.4 Site Grading

Surface water should not be allowed to accumulate and infiltrate the soil near the foundation. Proper site grading will ensure surface water runoff is directed away from the foundation elements and will aid in the mitigation of excessive settlement. Please find the following as general site grading recommendations:

- Finished grade must slope away from the building a minimum of 5 percent within the first 10 feet, in order to quickly drain ground surface and roof runoff away from the

foundation walls. Please note that in order to maintain this slope; it is imperative that any backfill placed against the foundation walls be compacted properly. If the backfill is not compacted properly, it will settle and positive drainage away from the structure will not be maintained.

- Permanent sprinkler heads for lawn care should be located a sufficient distance from the structure to prevent water from draining toward the foundation or saturating the soils adjacent to the foundation.

- Rain gutter down spouts are to be placed in such a manner that surface water runoff drains away from the structure.

- All roads, walkways, and architectural land features must properly drain away from all structures.

6.5 Underground Utilities

The onsite soils contain clayey material. Clayey material can be moderately corrosive to metallic conduits. We recommended specifying non corrosive materials or providing corrosion protection unless additional tests are performed to verify the onsite soils are not corrosive.

It is recommended that ¾-inch minus gravel be used as a bedding material. The bedding material should be thoroughly compacted around all utility pipes. Trench backfill shall be compacted to a minimum of 95 percent of its maximum dry density in landscaped areas and a minimum of 97 percent of its maximum dry density beneath foundation footings. Backfilling around and above utilities should meet the requirements of Montana Public Works Standard Specifications.

6.6 Construction Administration

The foundation is a vital element of a structure; it transfers all of the structures dead and live loads to the native soil. It is imperative that the recommendations made in this report are properly adhered to. A representative from C&H Engineering should observe the construction of any foundation or drainage elements recommended in this report and should verify proper compaction has been achieved in all structural fill lifts. The recommendations made in this report are contingent upon our involvement. If the soils encountered during the excavation differ than those described in this report or any unusual conditions are encountered, our office should be contacted immediately to examine the conditions and re-evaluate our recommendations.

If construction and site grading take place during cold weather, it is recommended that approved winter construction practices be observed. All snow and ice shall be removed from cut and fill areas prior to site grading taking place. No fill should be placed on soils that are frozen or contain frozen material. No frozen soils can be used as fill under any circumstances. Please note that not following the preceding recommendations may potentially result in foundation settlement issues in the spring when the frost thaws and the snow melts.

Additionally, concrete should not be placed on frozen soils and should meet the temperature requirements of ASTM C 94. Any concrete placed during cold weather conditions shall be protected from freezing until the necessary compressive strength has been attained. Once the footings are placed, frost shall not be permitted to extend below the foundation footings, as this could heave and crack the foundation footings and/or foundation walls.

It is the responsibility of the contractor to provide a safe working environment with regards to excavations on the site. All excavations should be sloped or shored in the interest of safety and in accordance with local and federal regulations, including the excavation and trench safety standards provided by the Occupational Safety and Health Administration (OSHA). According to OSHA regulations (29 CFR 1926 Subpart P Appendix A) the subsurface soils encountered in the test pit excavations can be generally classified as Type B. For Type B soils, OSHA regulations state that cut slopes shall be no steeper than 1.0H:1V for excavations less than 20 feet deep. A trench box may also be used, provided the system extends at least 18 inches above the top of the trench walls. Please understand the preceding OSHA soil classification is provided for planning purposes only and the actual classification of the onsite soils will need to be determined by the contractor onsite during excavation.

7.0 Conclusions

The soils present at the site will be adequate to support the proposed structure, provided the recommendations made in this report are properly followed. Please find the following recommendations as particularly crucial:

- All foundation elements are to bear on a minimum of 2 feet of compacted structural fill overlying lean or fat clay. The foundation footings may be dimensioned for an allowable bearing capacity of 1,500 psf.
- All site grading and drainage recommendations must be properly implemented.
- The exposed subgrade must remain in a **dry condition** throughout construction of the foundation elements.
- If construction takes place during the colder months of the year, the subgrade must be protected from freezing until all foundation elements are properly covered with the required 48 inches of soil.

8.0 Report Limitations

This report is for the exclusive use of Raymond E. Moore and his authorized agents. In the absence of our written approval, we make no representation and assume no responsibility to other parties regarding the use of this report. The recommendations made in this report are based upon data obtained from test pits excavated at the locations indicated on the attached Test Pit Location Map. It is not uncommon that variations will occur between these locations, the nature and extent of which will not become evident until additional exploration or construction is

conducted. These variations may result in additional construction costs, and it is suggested that a contingency be provided for this purpose. If the soils encountered during the excavation differ than those described in this report or any unusual conditions are encountered, our office should be contacted immediately to examine the conditions and re-evaluate our recommendations if necessary.

This report is applicable to the subject property only and is not applicable to other construction sites. Under no circumstances shall a portion of this report be removed or be used independently of the rest of the document, this report is applicable as a full document only. The preparation of this report has been performed in a manner that is consistent with the level and care currently practiced by professionals in this area under similar budget and time restraints. No warranty, expressed or implied, is made.

9.0 References

International Code Council, Inc., "2009 International Building Code (IBC)," International Code Council, Inc., 2009.

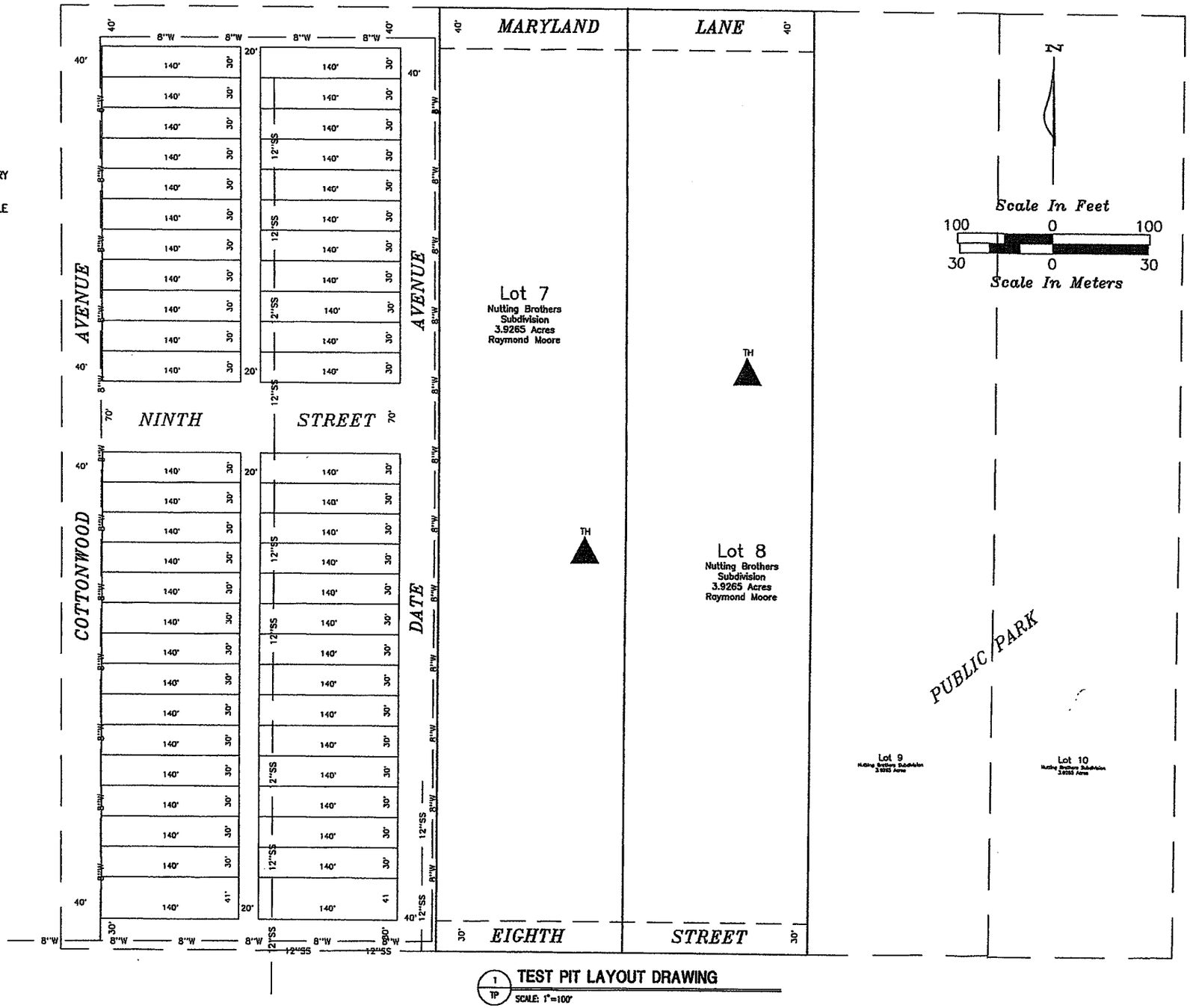
Kehew, Alan, "Geology for Engineers and Environmental Scientists," 3rd ed., Prentice Hall, 2006.

Das, Braja M., "Principles of Geotechnical Engineering," 3rd ed., Boston, MA, PWS Publishing Company, 1994.

LEGEND

- TEST HOLE
- EXISTING SANITARY SEWER MAIN
- EXISTING WATER MAIN
- PROPERTY BOUNDARY
- SURROUNDING PROPERTY BOUNDARY
- EXISTING SANITARY SEWER MANHOLE
- EXISTING WATER VALVE

LEGAL DESCRIPTION:
NUTTING BROTHERS SUBDIVISION
SEC. 10, T. 2S., R. 24E., P.M.M.
YELLOWSTONE COUNTY, MONTANA



1 TP TEST PIT LAYOUT DRAWING
SCALE: 1"=100'

PROJECT #12033.2

Sheet 1 of 1

Engineering and Surveying Inc.
1091 Stonebridge Drive • Bozeman, MT 59718
Phone: (406) 587-1115 • Fax: (406) 587-9758
www.cesengineers.com • info@cesengineers.com

DESIGN:
ENGINEER:
DRAWN:

TEST PIT LAYOUT DRAWING
LOT 7 & 8, NUTTING BROTHERS SUBDIVISION
YELLOWSTONE COUNTY, MONTANA

Drawing Date: 8/13/2012

TP
PROJECT #12033.2

C&H Engineering and Surveying Inc.

TEST PIT LOG

PROJECT: RAY MOORE		PROJECT #: 12033.1
PROJECT LOCATION: LOT 7, NUTTING BROTHERS SUB., YELLOWSTONE COUNTY, MT		DATE: 07/19/2012
TEST PIT LOCATION: SEE SITE PLAN	START: 10:30	FINISH: 11:00
DRILL TYPE: BACKHOE	DRILLER: BANGERT CONSTRUCTION & EXCAVATION	LOGGED BY: MICHAEL J. WELCH, P.E.
TEST PIT ID: TH-1	ELEVATION:	TOTAL DEPTH: 163" / DEPTH TO GW: 163"

DEPTH (ft)	GRAPHIC LOG	SOIL DESCRIPTION	USDA SOIL DESCRIPTION	MUNSELL SOIL COLOR
1		(0–22") Light Olive Gray; organics present; moderate medium blocky structure; medium high density; trace gravel; friable; no mottling; strong reaction with dilute Hydrochloric Acid.	CLAY LOAM	5Y 6/2
2–13		(22"–163") Olive Gray; no dominant structure; no mottling; trace gravel; reduction in shear strength and increase in moisture content observed at a depth of 108"; strong reaction with dilute hydrochloric acid; groundwater encountered at 163". GROUNDWATER ELEVATION	CLAY	5Y 4/2
14		End of Excavation Groundwater Encountered.		

REMARKS: Munsell soil color determined from moist soil samples.
Seasonally high groundwater elevation estimated at 108" based on decrease in shear strength and increase in moisture content.

C&H Engineering and Surveying Inc.

TEST PIT LOG

PROJECT: RAY MOORE	PROJECT #: 12033.1
PROJECT LOCATION: LOT 8, NUTTING BROTHERS SUB., YELLOWSTONE COUNTY, MT	DATE: 07/19/2012
TEST PIT LOCATION: SEE SITE PLAN	START: 11:10 / FINISH: 11:30
DRILL TYPE: BACKHOE / DRILLER: BANGERT CONSTRUCTION & EXCAVATION	LOGGED BY: MICHAEL J. WELCH, P.E.
TEST PIT ID: TH-1 / ELEVATION: / TOTAL DEPTH: 154"	DEPTH TO GW: N/E

DEPTH (ft)	GRAPHIC LOG	SOIL DESCRIPTION	USDA SOIL DESCRIPTION	MUNSELL SOIL COLOR
1–2		(0–24") Light Olive Gray; organics present; moderate medium blocky structure; medium high density; trace gravel; friable; no mottling; strong reaction with dilute Hydrochloric Acid.	CLAY LOAM	5Y 6/2
2–12		(24"–154") Olive Gray; no dominant structure; no mottling; trace gravel; reduction in shear strength and increase in moisture content observed at a depth of 120"; strong reaction with dilute hydrochloric acid.	CLAY	5Y 4/2
13–14		End of Excavation		

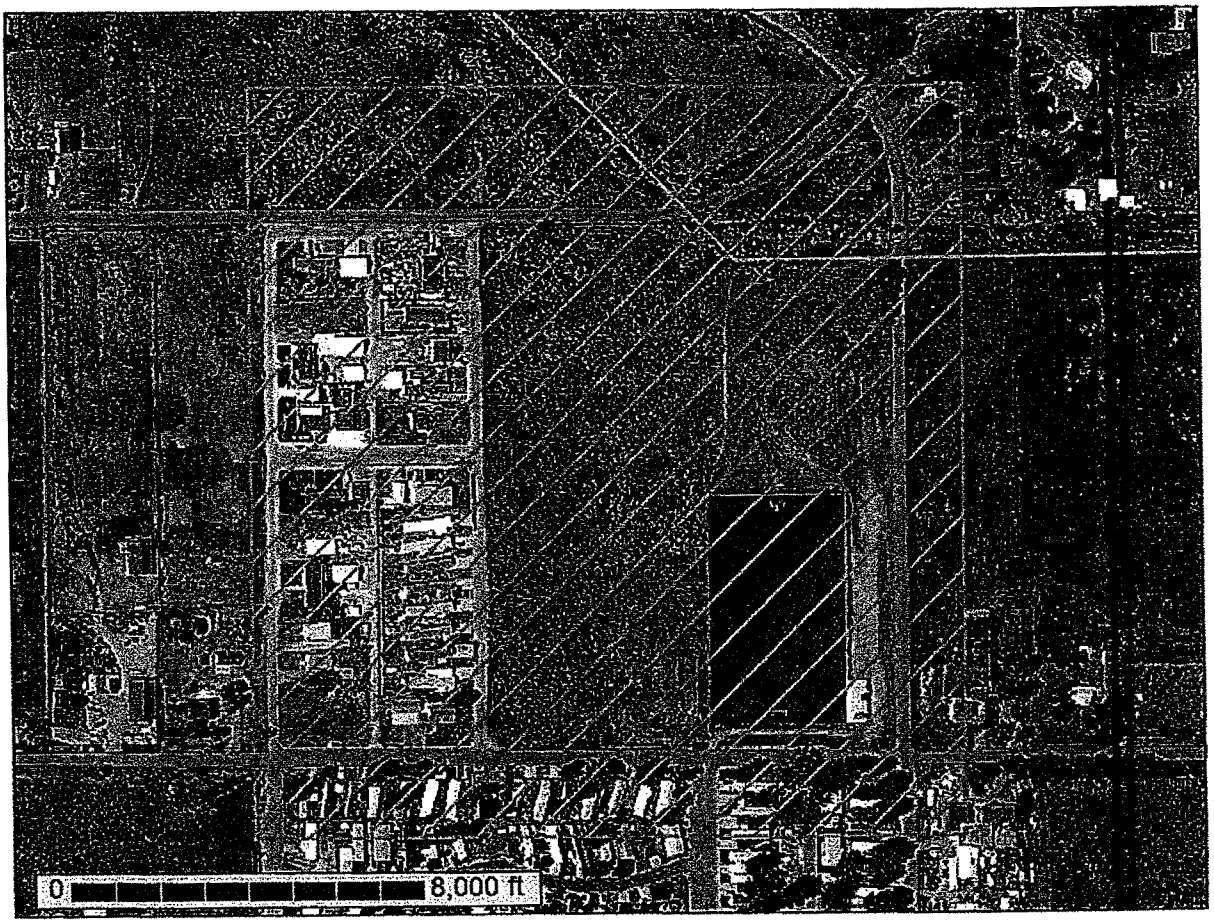
REMARKS: Munsell soil color determined from moist soil samples.
Seasonally high groundwater elevation estimated at 120" based on decrease in sheor strength and increase in moisture content.

USDA United States Department of Agriculture

NRCS Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Yellowstone County, Montana



March 17, 2014

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

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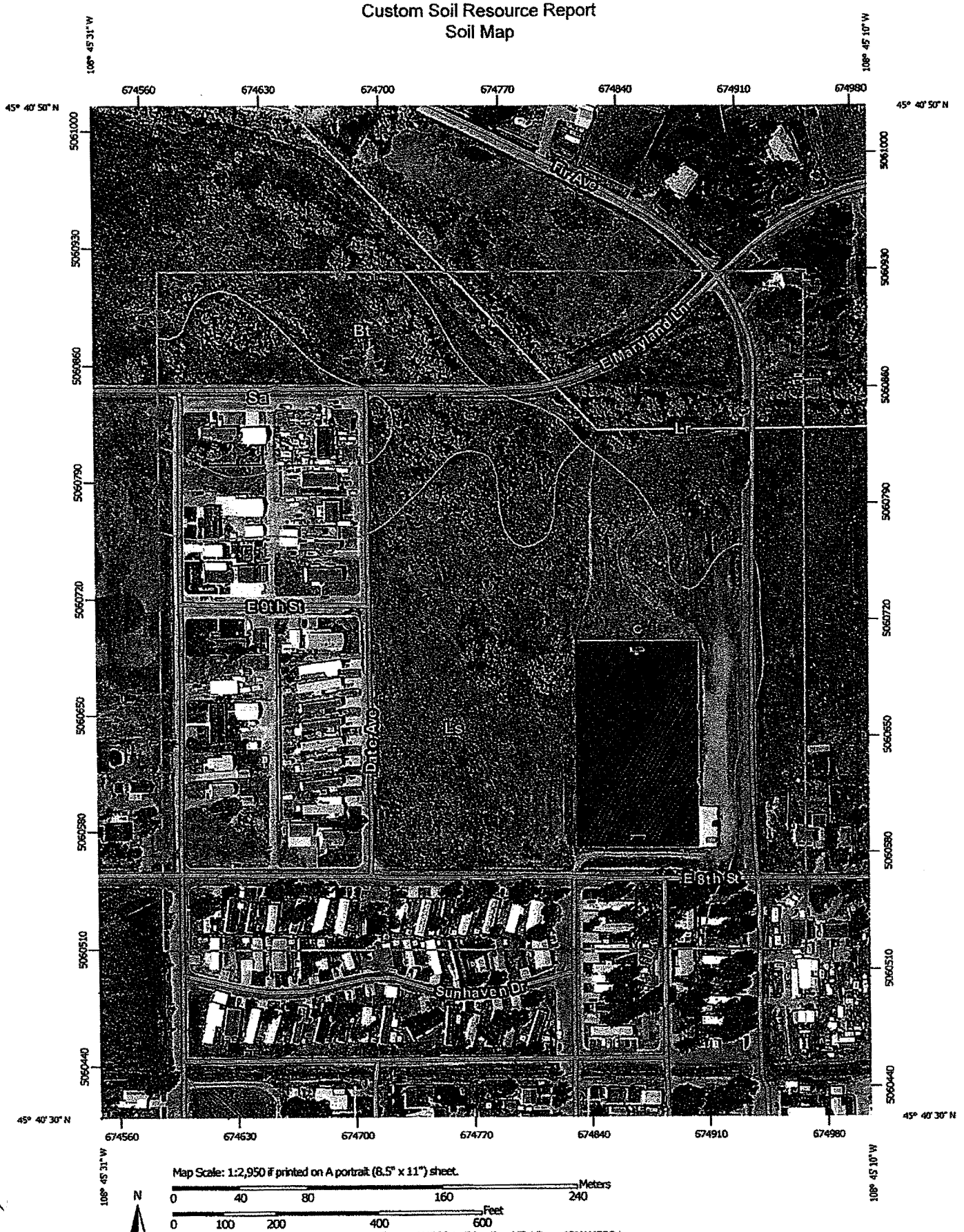
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Yellowstone County, Montana
Survey Area Data: Version 12, Dec 4, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 29, 2011—Aug 17, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Yellowstone County, Montana (MT111)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Bt	Bone silty clay, 0 to 1 percent slopes	4.9	12.8%
Lr	Lohmiller silty clay, 0 to 1 percent slopes	8.8	23.0%
Ls	Lohmiller soils, seeped, 0 to 2 percent slopes	22.1	57.6%
Sa	Sage clay, 0 to 1 percent slopes	2.5	6.6%
Totals for Area of Interest		38.4	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that

have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Yellowstone County, Montana

Bt—Bone silty clay, 0 to 1 percent slopes

Map Unit Setting

Elevation: 1,900 to 4,500 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 39 to 46 degrees F
Frost-free period: 115 to 135 days

Map Unit Composition

Bone and similar soils: 85 percent
Minor components: 15 percent

Description of Bone

Setting

Landform: Terraces, fans, lakebeds (relict)
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Moderately saline (16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 70.0
Available water capacity: Low (about 4.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Saline Upland (SU) RRU 58A-C 11-14" p.z. (R058AC050MT)

Typical profile

0 to 3 inches: Silty clay
3 to 52 inches: Silty clay
52 to 62 inches: Stratified loam to clay

Minor Components

Arvada

Percent of map unit: 9 percent
Landform: Fans, terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Ecological site: Clayey (Cy) RRU 58A-C 11-14" p.z. (R058AC041MT)

Vananda

Percent of map unit: 6 percent
Landform: Fans, lakebeds (relict), terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) RRU 58A-C 11-14" p.z. (R058AC041MT)

Lr—Lohmiller silty clay, 0 to 1 percent slopes

Map Unit Setting

Elevation: 1,900 to 6,000 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 120 to 135 days

Map Unit Composition

Lohmiller and similar soils: 85 percent
Minor components: 15 percent

Description of Lohmiller

Setting

Landform: Flood plains, terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave, linear
Parent material: Alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water capacity: High (about 9.0 inches)

Interpretive groups

Farmland classification: Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Land capability classification (irrigated): 4s
Land capability (nonirrigated): 4s
Hydrologic Soil Group: C

Ecological site: Clayey (Cy) RRU 58A-C 11-14" p.z. (R058AC041MT)

Typical profile

0 to 9 inches: Silty clay
9 to 42 inches: Stratified clay to silty clay loam
42 to 60 inches: Stratified silty clay loam to fine sandy loam

Minor Components

Haverson

Percent of map unit: 6 percent
Landform: Flood plains, terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave, linear
Ecological site: Clayey (Cy) RRU 58A-C 11-14" p.z. (R058AC041MT)

Hysham

Percent of map unit: 5 percent
Landform: Terraces, flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear, concave

Glenberg

Percent of map unit: 4 percent
Landform: Terraces, flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear, concave
Ecological site: Silty (Si) RRU 58A-C 11-14" p.z. (R058AC040MT)

Ls—Lohmiller soils, seeped, 0 to 2 percent slopes

Map Unit Setting

Elevation: 900 to 6,000 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 34 to 48 degrees F
Frost-free period: 120 to 135 days

Map Unit Composition

Lohmiller and similar soils: 80 percent
Minor components: 20 percent

Description of Lohmiller

Setting

Landform: Flood plains, terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave, linear

Parent material: Alluvium

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 48 to 60 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (2.0 to 4.0 mmhos/cm)
Available water capacity: High (about 9.6 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): 4w
Land capability (nonirrigated): 4w
Hydrologic Soil Group: C

Typical profile

0 to 3 inches: Silty clay loam
3 to 60 inches: Stratified silty clay to silty clay loam

Minor Components

Haverson

Percent of map unit: 15 percent
Landform: Terraces, flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear, concave
Ecological site: Clayey (Cy) RRU 58A-C 11-14" p.z. (R058AC041MT)

Hydro

Percent of map unit: 3 percent
Landform: Fans, low hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Linear
Ecological site: Clayey (Cy) RRU 58A-C 11-14" p.z. (R058AC041MT)

Lallie

Percent of map unit: 2 percent
Landform: Oxbows
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: Subirrigated (Sb) RRU 58A-E 10-14" p.z. (R058AE008MT)

Sa—Sage clay, 0 to 1 percent slopes

Map Unit Setting

Elevation: 2,300 to 4,500 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 39 to 48 degrees F
Frost-free period: 120 to 135 days

Map Unit Composition

Sage and similar soils: 90 percent
Minor components: 10 percent

Description of Sage

Setting

Landform: Terraces, fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Moderately saline to strongly saline (16.0 to 32.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Low (about 3.6 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7s
Hydrologic Soil Group: C/D

Typical profile

0 to 3 inches: Silty clay
3 to 21 inches: Clay
21 to 60 inches: Clay

Minor Components

Bone

Percent of map unit: 5 percent
Landform: Terraces, fans, lakebeds (relict)

Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Saline Upland (SU) RRU 58A-C 11-14" p.z. (R058AC050MT)

Pierre

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) RRU 58A-C 11-14" p.z. (R058AC041MT)

Lismas

Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: Shale (Sh) RRU 58A-C 11-14" p.z. (R058AC052MT)

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Building Site Development

This folder contains a collection of tabular reports that present soil interpretations related to building site development. The reports (tables) include all selected map units and components for each map unit, limiting features and interpretive ratings. Building site development interpretations are designed to be used as tools for evaluating soil suitability and identifying soil limitations for various construction purposes. As part of the interpretation process, the rating applies to each soil in its described condition and does not consider present land use. Example interpretations can include corrosion of concrete and steel, shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping.

Dwellings and Small Commercial Buildings

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. This table shows the degree and kind of soil limitations that affect dwellings and small commercial buildings.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome

without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Information in this table is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this table. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Report—Dwellings and Small Commercial Buildings

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range

from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Dwellings and Small Commercial Buildings–Yellowstone County, Montana							
Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Bt—Bone silty clay, 0 to 1 percent slopes							
Bone	85	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
Arvada	9	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
Vananda	6	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
Lr—Lohmiller silty clay, 0 to 1 percent slopes							
Lohmiller	85	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	0.93	Shrink-swell	1.00
Haverson	6	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
Hysham	5	Not limited		Somewhat limited		Not limited	
				Depth to saturated zone	0.61		
Glenberg	4	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
Ls—Lohmiller soils, seeped, 0 to 2 percent slopes							
Lohmiller	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.35		
Haverson	15	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
Hydro	3	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
Lallie	2	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00

Dwellings and Small Commercial Buildings--Yellowstone County, Montana							
Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Sa—Sage clay, 0 to 1 percent slopes							
Sage	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.98	Shrink-swell	1.00	Depth to saturated zone	0.98
Bone	5	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
Pierre	3	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.35	Slope	0.50
Lismas	2	Somewhat limited		Very limited		Very limited	
		Slope	0.84	Depth to soft bedrock	1.00	Slope	1.00
		Depth to soft bedrock	0.50	Slope	0.84	Depth to soft bedrock	1.00

Roads and Streets, Shallow Excavations, and Lawns and Landscaping

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. This table shows the degree and kind of soil limitations that affect local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are

based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Information in this table is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this table. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Report—Roads and Streets, Shallow Excavations, and Lawns and Landscaping

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–Yellowstone County, Montana							
Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Bt—Bone silty clay, 0 to 1 percent slopes							
Bone	85	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	0.51	Sodium content	1.00
		Low strength	1.00	Too clayey	0.28	Too clayey	1.00
				Dusty	0.28	Salinity	0.50
						Droughty	0.46
						Dusty	0.28
Arvada	9	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	0.51	Sodium content	1.00
		Low strength	1.00	Dusty	0.42	Dusty	0.42
				Too clayey	0.13		
Vananda	6	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	0.51	Too clayey	1.00
		Low strength	1.00	Too clayey	0.50	Sodium content	1.00
				Dusty	0.45	Salinity	0.50
						Dusty	0.45
						Droughty	0.05

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–Yellowstone County, Montana							
Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Lr—Lohmiller silty clay, 0 to 1 percent slopes							
Lohmiller	85	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Dusty	0.28	Too clayey	1.00
		Low strength	1.00	Too clayey	0.13	Dusty	0.28
				Unstable excavation walls	0.01		
Haverson	6	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Dusty	0.08	Dusty	0.08
		Flooding	0.40	Unstable excavation walls	0.01		
Hysham	5	Somewhat limited		Somewhat limited		Very limited	
		Frost action	0.50	Depth to saturated zone	0.61	Salinity	1.00
				Dusty	0.05	Dusty	0.05
				Unstable excavation walls	0.01		
Glenberg	4	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Unstable excavation walls	0.07		
		Flooding	0.40				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Yellowstone County, Montana							
Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Ls—Lohmiller soils, seeped, 0 to 2 percent slopes							
Lohmiller	80	Very limited		Somewhat limited		Somewhat limited	
		Shrink-swell	1.00	Unstable excavation walls	0.51	Dusty	0.28
		Low strength	1.00	Depth to saturated zone	0.35		
		Flooding	0.40	Dusty	0.28		
Haverson	15	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Dusty	0.08	Dusty	0.08
		Flooding	0.40	Unstable excavation walls	0.01		
Hydro	3	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	0.51	Sodium content	1.00
		Low strength	1.00	Dusty	0.37	Dusty	0.37
Lallie	2	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Frost action	1.00	Flooding	0.80	Too clayey	1.00
		Flooding	1.00	Unstable excavation walls	0.51	Depth to saturated zone	0.99
		Low strength	1.00	Too clayey	0.28	Dusty	0.08
		Depth to saturated zone	0.99	Dusty	0.08		

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Yellowstone County, Montana							
Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Sa—Sage clay, 0 to 1 percent slopes							
Sage	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Salinity	1.00
		Frost action	1.00	Unstable excavation walls	1.00	Too clayey	1.00
		Low strength	1.00	Too clayey	0.50	Droughty	0.82
		Depth to saturated zone	0.75	Dusty	0.37	Depth to saturated zone	0.75
						Dusty	0.37
Bone	5	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	0.51	Sodium content	1.00
		Low strength	1.00	Too clayey	0.28	Too clayey	1.00
				Dusty	0.28	Salinity	0.50
						Droughty	0.46
						Dusty	0.28
Pierre	3	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	0.51	Too clayey	1.00
		Low strength	1.00	Depth to soft bedrock	0.35	Depth to bedrock	0.35
				Too clayey	0.28	Dusty	0.26
				Dusty	0.26		
Lismas	2	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Droughty	1.00
		Low strength	1.00	Slope	0.84	Depth to bedrock	1.00
		Slope	0.84	Dusty	0.42	Too clayey	1.00
				Unstable excavation walls	0.01	Slope	0.84
						Dusty	0.42

Soil Chemical Properties

This folder contains a collection of tabular reports that present soil chemical properties. The reports (tables) include all selected map units and components for each map unit. Soil chemical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil chemical properties include pH, cation exchange capacity, calcium carbonate, gypsum, and electrical conductivity.

Chemical Soil Properties

This table shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable cations plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. It is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced saturated hydraulic conductivity and aeration, and a general degradation of soil structure.

Chemical Soil Properties--Yellowstone County, Montana								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
Bt—Bone silty clay, 0 to 1 percent slopes								
Bone	0-3	25-30	—	6.6-8.4	1-5	0	4.0-8.0	10-15
	3-52	25-30	—	7.8-9.6	1-5	0	16	15-70
	52-62	25-30	—	7.8-9.6	1-5	0	16	15-70
Arvada	0-4	20-25	—	6.6-7.8	0	0	0.0-2.0	0
	4-28	25-35	—	7.4-9.0	0	0	1.0-8.0	10-20
	28-60	20-25	—	7.9-9.0	5-15	0	8.0-16.0	13-30
Vananda	0-3	20-30	—	7.9-8.4	0-5	0	4.0-8.0	1-12
	3-17	20-30	—	8.5-9.0	1-5	0	8.0-16.0	1-12
	17-62	15-25	—	8.4-9.6	5-10	0	8.0-16.0	10-20
Lr—Lohmiller silty clay, 0 to 1 percent slopes								
Lohmiller	0-9	30-35	—	6.6-8.4	1-5	0	0.0-3.0	0-4
	9-42	25-35	—	7.4-8.4	5-10	0	0.0-3.0	4-10
	42-60	15-20	—	7.9-9.0	5-10	0	0.0-8.0	4-10
Haverson	0-12	20-25	—	7.4-8.4	1-5	0	0.0-2.0	0
	12-68	15-25	—	7.4-8.4	1-5	0	0.0-4.0	0
Hysham	0-7	15-20	—	7.4-9.0	1-5	0	8.0-16.0	0-4
	7-60	15-20	—	7.4-9.0	1-5	0	8.0-16.0	0-13
Glenberg	0-10	10-15	—	6.6-9.0	1-5	0	0.0-4.0	0
	10-48	5.0-10	—	7.4-9.0	1-5	0	2.0-8.0	0
	48-60	0.0-1.0	—	7.4-9.0	1-5	0	2.0-8.0	0

Chemical Soil Properties--Yellowstone County, Montana								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
Ls—Lohmiller soils, seeped, 0 to 2 percent slopes								
Lohmiller	0-3	20-25	—	7.4-8.4	0	0	0.0-4.0	0
	3-60	20-25	—	7.9-8.4	5-15	0	2.0-4.0	0
Haverson	0-12	20-25	—	7.4-8.4	1-5	0	0.0-2.0	0
	12-68	15-25	—	7.4-8.4	1-5	0	0.0-4.0	0
Hydro	0-5	15-20	—	6.1-7.3	0	0	0	0
	5-19	20-30	—	7.4-8.4	0	0	4.0-8.0	5-13
	19-60	15-20	—	7.9-9.0	5-15	0	4.0-16.0	13-30
Lallie	0-6	25-30	—	6.6-7.8	5-10	0	0.0-8.0	0
	6-60	20-30	—	7.4-9.0	5-10	0	0.0-8.0	0
Sa—Sage clay, 0 to 1 percent slopes								
Sage	0-3	20-35	—	6.1-8.4	0	0	16.0-32.0	0-1
	3-21	20-30	—	5.1-9.0	0-5	0	16.0-32.0	0-5
	21-60	20-30	—	5.1-9.0	0-5	0	8.0-32.0	0-5
Bone	0-3	25-30	—	6.6-8.4	1-5	0	4.0-8.0	10-15
	3-52	25-30	—	7.8-9.6	1-5	0	16	15-70
	52-62	25-30	—	7.8-9.6	1-5	0	16	15-70
Pierre	0-4	30-40	—	7.4-8.4	1-5	0	0.0-4.0	0
	4-31	25-40	—	7.4-9.0	5-15	0	0.0-4.0	0-2
	31-60	—	—	—	—	—	—	—
Lismas	0-2	25-30	—	6.6-7.8	0	0	0	0
	2-10	20-25	—	7.4-8.4	5-10	0	0	0
	10-60	—	—	—	—	—	—	—

Soil Physical Properties

This folder contains a collection of tabular reports that present soil physical properties. The reports (tables) include all selected map units and components for each map unit. Soil physical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic group is a group of soils having similar runoff potential under similar storm and cover conditions. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash.

Engineering Properties--Yellowstone County, Montana														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
Bt—Bone silty clay, 0 to 1 percent slopes														
Bone	85	D	0-3	Silty clay	CH, CL	A-7	0	0	100	100	90-100	80-95	40-55	15-30
			3-52	Silty clay, clay, silty clay loam	CH, CL	A-7	0	0	100	100	95-100	90-95	40-60	20-35
			52-62	Stratified loam to clay	CH, CL	A-6, A-7	0	0	100	100	85-100	75-90	35-55	15-30
Arvada	9	D	0-4	Loam	CL	A-6	0	0	80-100	75-100	65-95	60-90	25-40	10-20
			4-28	Clay, silty clay, silty clay loam	CH, CL	A-7	0	0	90-100	90-100	85-100	75-95	40-60	20-40
			28-60	Clay loam, sandy clay loam, clay	SC, CH, CL	A-6, A-7	0	0	90-100	90-100	80-95	45-75	35-55	15-35
Vananda	6	D	0-3	Silty clay	CH, CL	A-7	0	0	100	100	95-100	80-100	40-65	20-40
			3-17	Clay	CH, CL	A-7	0	0	100	100	85-95	65-85	40-65	20-45
			17-62	Clay	CH, CL	A-7	0	0	100	100	85-95	65-85	40-65	20-45

Engineering Properties–Yellowstone County, Montana														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
Lr—Lohmiller silty clay, 0 to 1 percent slopes														
Lohmiller	85	C	0-9	Silty clay	CH, CL	A-7	0	0	100	100	90-100	75-90	40-65	20-40
			9-42	Stratified clay to silty clay loam	CH, CL	A-7	0	0	100	100	95-100	85-95	40-70	15-45
			42-60	Stratified silty clay loam to fine sandy loam	CL, CL-ML	A-4, A-6	0	0	100	100	85-95	60-75	20-40	5-15
Haverson	6	C	0-12	Clay loam	CL	A-6	0	0	100	100	85-100	75-95	25-40	10-20
			12-68	Stratified fine sandy loam to clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	80-95	50-70	20-35	5-15
Hysham	5	B	0-7	Loam	CL-ML, ML	A-4	0	0	100	100	85-95	60-75	20-30	NP-10
			7-60	Stratified fine sandy loam to clay loam	CL-ML, ML	A-4	0	0	100	100	75-100	50-70	15-25	NP-10
Glenberg	4	B	0-10	Sandy loam	ML	A-4	0	0	100	100	75-95	65-90	20-35	NP-10
			10-48	Loamy fine sand	SC-SM, SM	A-2, A-4	0	0	100	100	60-90	25-50	15-25	NP-10
			48-60	Very gravelly loamy sand, extremely gravelly sand	GP, GP-GM	A-1	0	0-5	30-45	20-35	10-25	0-10	—	NP

Engineering Properties–Yellowstone County, Montana														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
Ls—Lohmiller soils, seeped, 0 to 2 percent slopes														
Lohmiller	80	C	0-3	Silty clay loam	CL	A-6	0	0	100	95-100	95-100	85-95	30-40	15-20
			3-60	Stratified silty clay to silty clay loam	CL	A-7, A-6	0	0	100	95-100	90-95	90-95	35-45	15-25
Haverson	15	C	0-12	Clay loam	CL	A-6	0	0	100	100	85-100	75-95	25-40	10-20
			12-68	Stratified fine sandy loam to clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	80-95	50-70	20-35	5-15
Hydro	3	C	0-5	Clay loam	CL	A-6	0	0	100	100	75-95	70-90	30-35	10-15
			5-19	Silty clay loam, silty clay, clay	CH, CL	A-6, A-7	0	0	100	100	80-100	75-95	35-55	15-30
			19-60	Silty clay loam, silty clay, clay loam	CL	A-6, A-7	0	0	100	100	80-100	75-95	35-50	15-25
Lallie	2	C/D	0-6	Silty clay	CH, CL	A-7	0	0	100	95-100	90-100	85-100	40-95	20-60
			6-60	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	95-100	90-100	85-100	40-95	20-60

Engineering Properties--Yellowstone County, Montana														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
Sa—Sage clay, 0 to 1 percent slopes														
Sage	90	C/D	0-3	Silty clay	CH, MH	A-7	0	0	100	95-100	90-100	85-100	50-80	20-45
			3-21	Silty clay, clay, silty clay loam	CH, MH	A-7	0	0	100	95-100	90-100	80-100	50-80	20-45
			21-60	Clay, silty clay	CH	A-7	0	0-5	95-100	85-100	80-95	70-95	50-80	25-45
Bone	5	D	0-3	Silty clay	CH, CL	A-7	0	0	100	100	90-100	80-95	40-55	15-30
			3-52	Silty clay, clay, silty clay loam	CH, CL	A-7	0	0	100	100	95-100	90-95	40-60	20-35
			52-62	Stratified loam to clay	CH, CL	A-6, A-7	0	0	100	100	85-100	75-90	35-55	15-30
Pierre	3	D	0-4	Clay	CH, CL	A-7	0	0	95-100	90-100	80-100	75-95	40-60	20-35
			4-31	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	80-100	75-100	65-100	60-95	35-65	20-45
			31-60	Bedrock	—	—	—	—	—	—	—	—	—	—
Lismas	2	D	0-2	Clay	CH, CL	A-7	0	0	100	100	95-100	80-95	40-55	20-35
			2-10	Silty clay loam, clay loam, clay	CH, CL	A-7	0	0	100	100	90-100	70-95	40-60	15-35
			10-60	Bedrock	—	—	—	—	—	—	—	—	—	—

Physical Soil Properties

This table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (Ksat), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (Ksat) is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In this table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and Ksat. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook."

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion.

There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (http://soils.usda.gov)

Physical Soil Properties--Yellowstone County, Montana														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
Bt—Bone silty clay, 0 to 1 percent slopes														
Bone	0-3	- 7-	-48-	40-45- 50	1.30-1.50	0.01-0.42	0.13-0.16	6.0-8.9	0.5-2.0	.32	.32	5	4	86
	3-52	- 6-	-47-	35-48- 60	1.30-1.50	0.01-0.42	0.06-0.07	6.0-8.9	0.5-1.0	.32	.32			
	52-62	-27-	-26-	26-48- 60	1.30-1.55	0.01-0.42	0.06-0.07	6.0-8.9	0.0-0.5	.28	.28			
Arvada	0-4	-38-	-36-	18-26- 40	1.20-1.40	1.40-4.00	0.14-0.18	3.0-5.9	1.0-3.0	.37	.37	2	6	48
	4-28	-26-	-29-	35-45- 55	1.30-1.55	0.01-0.42	0.10-0.13	6.0-8.9	0.5-1.0	.28	.28			
	28-60	-31-	-31-	30-38- 50	1.30-1.55	0.01-0.42	0.08-0.10	6.0-8.9	0.0-0.5	.32	.32			
Vananda	0-3	- 5-	-45-	40-50- 60	1.20-1.40	0.42-1.40	0.12-0.14	6.0-8.9	1.0-3.0	.20	.20	5	4	86
	3-17	-22-	-28-	40-50- 60	1.25-1.45	0.01-0.42	0.08-0.10	6.0-8.9	1.0-2.0	.24	.24			
	17-62	-22-	-28-	40-50- 60	1.30-1.50	0.01-0.42	0.08-0.09	6.0-8.9	0.5-1.0	.24	.24			
Lr—Lohmiller silty clay, 0 to 1 percent slopes														
Lohmiller	0-9	- 6-	-47-	40-48- 55	1.30-1.50	0.42-1.40	0.14-0.18	6.0-8.9	0.5-1.0	.32	.32	5	4	86
	9-42	-26-	-29-	35-45- 60	1.30-1.50	0.42-1.40	0.14-0.18	6.0-8.9	0.5-1.0	.24	.24			
	42-60	-19-	-58-	15-23- 30	1.30-1.55	0.42-1.40	0.12-0.14	0.0-2.9	0.5-1.0	.55	.55			
Haverson	0-12	-35-	-34-	27-31- 35	1.20-1.40	1.40-4.00	0.14-0.18	3.0-5.9	0.5-2.0	.32	.32	5	6	48
	12-68	-59-	-12-	15-29- 35	1.30-1.55	4.00-14.00	0.14-0.18	0.0-2.9	0.5-1.0	.20	.20			
Hysham	0-7	-42-	-37-	15-21- 27	1.30-1.50	1.40-14.00	0.10-0.12	0.0-2.9	1.0-2.0	.32	.32	5	6	48
	7-60	-61-	-13-	-27- 35	1.40-1.60	4.00-14.00	0.10-0.12	0.0-2.9	0.5-1.0	.20	.20			
Glenberg	0-10	-65-	-23-	10-12- 18	1.20-1.40	4.00-14.00	0.16-0.20	0.0-2.9	0.5-2.0	.28	.28	4	3	86
	10-48	-84-	- 5-	5-12- 18	1.35-1.60	14.00-42.00	0.12-0.14	0.0-2.9	0.5-1.0	.20	.20			
	48-60	-79-	-17-	0- 5- 10	1.50-1.70	42.00-141.00	0.02-0.04	0.0-2.9	0.5-1.0	.05	.15			

Physical Soil Properties--Yellowstone County, Montana														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
Ls—Lohmiller soils, seeped, 0 to 2 percent slopes														
Lohmiller	0-3	-19-	-44-	35-38- 40	1.20-1.40	1.40-4.00	0.16-0.20	3.0-5.9	1.0-2.0	.32	.32	5	4	86
	3-60	- 8-	-52-	35-40- 45	1.30-1.50	0.42-1.40	0.14-0.18	6.0-8.9	0.0-0.5	.37	.37			
Haverson	0-12	-35-	-34-	27-31- 35	1.20-1.40	1.40-4.00	0.14-0.18	3.0-5.9	0.5-2.0	.32	.32	5	6	48
	12-68	-59-	-12-	15-29- 35	1.30-1.55	4.00-14.00	0.14-0.18	0.0-2.9	0.5-1.0	.20	.20			
Hydro	0-5	-35-	-33-	28-32- 35	1.25-1.45	1.40-4.00	0.14-0.18	3.0-5.9	1.0-2.0	.32	.32	2	6	48
	5-19	-26-	-29-	35-45- 55	1.30-1.50	0.42-1.40	0.11-0.13	6.0-8.9	0.5-1.0	.24	.24			
	19-60	-31-	-31-	35-38- 45	1.30-1.55	0.42-1.40	0.10-0.12	6.0-8.9	0.0-0.5	.28	.28			
Lalile	0-6	- 5-	-45-	40-50- 60	1.20-1.40	0.42-1.40	0.15-0.18	6.0-8.9	3.0-7.0	.20	.20	5	4	86
	6-60	- 6-	-47-	35-48- 60	1.20-1.40	0.42-1.40	0.13-0.23	6.0-8.9	0.5-2.0	.28	.28			

Physical Soil Properties--Yellowstone County, Montana														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
Sa—Sage clay, 0 to 1 percent slopes														
Sage	0-3	- 5-	-45-	40-50- 60	1.25-1.35	0.42-1.40	0.05-0.09	9.0-25.0	1.0-2.0	.17	.17	5	4	86
	3-21	-23-	-29-	35-48- 60	1.25-1.40	0.42-1.40	0.06-0.09	9.0-25.0	0.0-1.0	.17	.17			
	21-60	-22-	-28-	40-50- 60	1.25-1.40	0.42-1.40	0.03-0.06	9.0-25.0	0.0-0.5	.24	.24			
Bone	0-3	- 7-	-48-	40-45- 50	1.30-1.50	0.01-0.42	0.13-0.16	6.0-8.9	0.5-2.0	.32	.32	5	4	86
	3-52	- 8-	-47-	35-48- 60	1.30-1.50	0.01-0.42	0.06-0.07	6.0-8.9	0.5-1.0	.32	.32			
	52-62	-27-	-26-	26-48- 60	1.30-1.55	0.01-0.42	0.06-0.07	6.0-8.9	0.0-0.5	.28	.28			
Pierre	0-4	-23-	-29-	40-48- 55	1.20-1.40	1.40-4.00	0.14-0.18	6.0-8.9	1.0-2.0	.20	.20	3	4	86
	4-31	-23-	-29-	35-48- 60	1.30-1.55	0.01-0.42	0.14-0.16	6.0-8.9	0.5-1.0	.28	.28			
	31-60	—	—	—	—	0.00-1.40	—	—	—					
Lismas	0-2	-26-	-29-	40-45- 50	1.10-1.30	0.42-1.40	0.15-0.18	6.0-8.9	0.5-1.0	.15	.15	2	4	86
	2-10	-28-	-29-	35-43- 50	1.20-1.40	0.42-1.40	0.15-0.18	6.0-8.9	0.0-0.5	.28	.28			
	10-60	—	—	—	—	0.00-1.40	—	—	—					

Particle Size and Coarse Fragments

This table shows estimates of particle size distribution and coarse fragment content of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (Ksat), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Total fragments is the content of fragments of rock and other materials larger than 2 millimeters in diameter on volumetric basis of the whole soil.

Fragments 2-74 mm refers to the content of coarse fragments in the 2 to 74 millimeter size fraction.

Fragments 75-249 mm refers to the content of coarse fragments in teh 75 to 249 millimeter size fraction.

Fragments 250-599 mm refers to the content of coarse fragments in the 250 to 599 millimeter size fraction.

Fragments >=600 mm refers to the content of coarse fragments in the greater than or equal to 600 millimeter size fraction.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (http://soils.usda.gov)

Particle Size and Coarse Fragments–Yellowstone County, Montana										
Map symbol and soil name	**Horizon**	**Depth**	**Sand**	**Silt**	**Clay**	**Total fragments**	**Fragments 2-74 mm**	**Fragments 75-249 mm**	**Fragments 250-599 mm**	**Fragments >=600 mm**
		In	*L-RV-H Pct*	*L-RV-H Pct*	*L-RV-H Pct*	*RV Pct*	*RV Pct*	*RV Pct*	*RV Pct*	*RV Pct*
Bt—Bone silty clay, 0 to 1 percent slopes										
Bone	Btk	0-3	- 7-	-48-	40-45- 50	—	—	—	—	—
	C1	3-52	- 6-	-47-	35-48- 60	—	—	—	—	—
	C2	52-62	-27-	-26-	26-48- 60	—	—	—	—	—
Arvada	E	0-4	-38-	-36-	18-26- 40	13	13	—	—	—
	Btn	4-28	-26-	-29-	35-45- 55	6	6	—	—	—
	Bkny	28-60	-31-	-31-	30-38- 50	6	6	—	—	—
Vananda	A	0-3	- 5-	-45-	40-50- 60	—	—	—	—	—
	B	3-17	-22-	-28-	40-50- 60	—	—	—	—	—
	C	17-62	-22-	-28-	40-50- 60	—	—	—	—	—
Lr—Lohmiller silty clay, 0 to 1 percent slopes										
Lohmiller	A	0-9	- 6-	-47-	40-48- 55	—	—	—	—	—
	C1	9-42	-26-	-29-	35-45- 60	—	—	—	—	—
	C2	42-60	-19-	-58-	15-23- 30	—	—	—	—	—
Haverson	A	0-12	-35-	-34-	27-31- 35	—	—	—	—	—
	C	12-68	-59-	-12-	15-29- 35	—	—	—	—	—
Hysham	A	0-7	-42-	-37-	15-21- 27	—	—	—	—	—
	C	7-60	-61-	-13-	-27- 35	—	—	—	—	—
Glenberg	Ap	0-10	-65-	-23-	10-12- 18	—	—	—	—	—
	C	10-48	-84-	- 5-	5-12- 18	—	—	—	—	—
	2C	48-60	-79-	-17-	0- 5- 10	44	42	2	—	—

Particle Size and Coarse Fragments--Yellowstone County, Montana										
Map symbol and soil name	Horizon	Depth	Sand	Silt	Clay	Total fragments	Fragments 2-74 mm	Fragments 75-249 mm	Fragments 250-599 mm	Fragments >=600 mm
		In	*L-RV-H Pct*	*L-RV-H Pct*	*L-RV-H Pct*	*RV Pct*	*RV Pct*	*RV Pct*	*RV Pct*	*RV Pct*
Ls—Lohmiller soils, seeped, 0 to 2 percent slopes										
Lohmiller	A	0-3	-19-	-44-	35-38- 40	2	2	—	—	—
	C	3-60	- 8-	-52-	35-40- 45	2	2	—	—	—
Haverson	A	0-12	-35-	-34-	27-31- 35	—	—	—	—	—
	C	12-68	-59-	-12-	15-29- 35	—	—	—	—	—
Hydro	EB	0-5	-35-	-33-	28-32- 35	—	—	—	—	—
	Btn	5-19	-26-	-29-	35-45- 55	—	—	—	—	—
	Bky	19-60	-31-	-31-	35-38- 45	—	—	—	—	—
Lallie	A	0-6	- 5-	-45-	40-50- 60	2	2	—	—	—
	C	6-60	- 6-	-47-	35-48- 60	2	2	—	—	—
Sa—Sage clay, 0 to 1 percent slopes										
Sage	Az	0-3	- 5-	-45-	40-50- 60	2	2	—	—	—
	Cz	3-21	-23-	-29-	35-48- 60	2	2	—	—	—
	Czg	21-60	-22-	-28-	40-50- 60	9	7	2	—	—
Bone	Btk	0-3	- 7-	-48-	40-45- 50	—	—	—	—	—
	C1	3-52	- 6-	-47-	35-48- 60	—	—	—	—	—
	C2	52-62	-27-	-26-	26-48- 60	—	—	—	—	—
Pierre	A	0-4	-23-	-29-	40-48- 55	5	5	—	—	—
	Bssy	4-31	-23-	-29-	35-48- 60	13	13	—	—	—
	Cr	31-60	—	—	—	—	—	—	—	—
Lismas	A	0-2	-26-	-29-	40-45- 50	—	—	—	—	—
	C	2-10	-28-	-29-	35-43- 50	—	—	—	—	—
	Cr	10-60	—	—	—	—	—	—	—	—

Soil Qualities and Features

This folder contains tabular reports that present various soil qualities and features. The reports (tables) include all selected map units and components for each map unit. Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Soil Features

This table gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage, or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel

or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Soil Features--Yellowstone County, Montana									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
Bt—Bone silty clay, 0 to 1 percent slopes									
Bone		—	—		—	—	Low	High	High
Arvada	Natric	0-8	—	Noncemented	—	—	Low	High	High
Vananda		—	—		—	—	Low	High	High
Lr—Lohmiller silty clay, 0 to 1 percent slopes									
Lohmiller		—	—		—	—	Low	High	High
Haverson		—	—		—	—	Moderate	High	Moderate
Hysham		—	—		—	—	Moderate	High	High
Glenberg		—	—		—	—	Moderate	High	Moderate
Ls—Lohmiller soils, seeped, 0 to 2 percent slopes									
Lohmiller		—	—		—	—	Low	High	Moderate
Haverson		—	—		—	—	Moderate	High	Moderate
Hydro		—	—		—	—	Low	High	High
Lallie		—	—		—	—	High	High	Moderate
Sa—Sage clay, 0 to 1 percent slopes									
Sage		—	—		—	—	High	High	High
Bone		—	—		—	—	Low	High	High
Pierre	Paralithic bedrock	20-40	—		—	—	Low	High	Moderate
Lismas	Paralithic bedrock	10-20	—		—	—	Low	High	Low

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DESIGN REPORT
WATER AND SEWER MAINS
REGAL COMMUNITY PARK

Prepared for:

Regal Land Development, Inc.
P.O. Box 80445
Billings, MT 59108

Prepared by:

C&H Engineering and Surveying, Inc.
1091 Stoneridge Drive
Bozeman, MT 59718
(406) 587-1115

Project Number: 15949

June 2016

INTRODUCTION

The proposed Regal Community Park is a 54-space manufactured home park located on a 7.853 acre parcel of land currently known as Lot 7 and Lot 8 of the Nutting Brothers Subdivision, 2nd Filing. The project is located east of Date Avenue, north of Eighth Street, south of Maryland Lane, and west of the City Park/Soccer Field.

The 54 spaces proposed with this project will be developed as single family residential manufactured homes. The spaces will range in size from 5,168 square feet to 11,567 square feet.

WATER SYSTEM LAYOUT

A new water main will be utilized for the Regal Community Park. The water main will be a 6-inch and 8-inch PVC pipe, which runs from south to north along Regal Avenue and services each of the 54 units on the proposed development.

A WaterCAD analysis is enclosed at the end of this report analyzing all mains installed with this project. The connection to the existing system is modeled as a pump with characteristics matching data measured by the City of Laurel Fire Department. Data was collected by the City of Laurel Fire Department in 2001. Since that time, mains in the area have been replaced and the city water system improved. Using this flow data will provide a conservative approximation of the available water flow and pressures.

WATER DISTRIBUTION SYSTEM SIZING

Input Data

Average Daily Residential Usage	=	170 gallons per capita per day
Average Population Density	=	2.43 persons/dwelling unit
Minimum Fire Hydrant Flow	=	500 gpm
Residual Pressure Required	=	60 psi for Fire Flow

Average Day Demand (Peaking Factor = 1)

Maximum Day Demand (Peaking Factor = 2.3)

Maximum Hour Demand (Peaking Factor = 3.0)

Water Demands (56 dwelling units)

Average Day Demand = 54 d.u. x 2.43 persons/d.u. x 170 gpcpd = 22,307 gpd = 15.49 gpm

Maximum Day Demand = 15.49 gpm x 2.3 = 35.63 gpm

Peak Hour Demand = 15.49 gpm x 3.0 = 46.47 gpm

Available Pressure: 8-inch main in Date/Eighth. (Hydrant #014)

Static = 75.00 psi

Pitot = 52.50 psi

HYDRAULIC ANALYSIS

A water distribution model was created using WaterCAD Version 6.5 for demand forecasting and describing domestic and fire protection requirements. In order to model the system, each junction node of the water distribution system was assessed a demand based on its service area. The most conservative water demand was used in the model. The table shown below quantifies the demands placed at the junction nodes and calculates the demands for Average Day, Maximum Day and Peak Hour within the subdivision. The peaking factor for each case is 1, 2.3 and 3.0 respectively.

JUNCTION NODE	# OF LOTS	AVG. DAY GPM	MAX. DAY GPM	PEAK HOUR GPM
J-6	0	0.00	0.00	0.00
J-7	24	7.46	17.16	22.38
J-8	30	9.18	21.11	27.54
J-9	0	0.00	0.00	0.00
J-10	0	0.00	0.00	0.00
Total	**54**	**16.64**	**38.27**	**49.92**

Static, residual and pitot pressures were obtained from fire hydrant #014 located at the intersection of Eighth Street and Date Avenue. Measurements obtained by the City of Laurel Fire Department

indicate a static pressure of 75.00 psi, a pitot pressure of 52.5 psi, and a residual pressure of 59.00 psi at this hydrant.

This flow/pressure information was used to develop relationships between static head and flow at the tie in point. This relationship was used in the model by simulation of a pump at the connection points. The pump is connected to a reservoir which acts as a source of water. The elevation of the reservoir is fixed at the elevation of the pump, which is also equivalent to the elevation of the tie in point. The reservoir does not create any head on the system; the head is generated entirely by the pumps. The input data and the pump curves are included in at the end of this report.

DISTRIBUTION MAIN

The 6-inch and 8-inch DIP water main provides capacity with regards to the Peak Hour Demands. The flows and pressures within the system for the Peak Hour Demands were generated with the WaterCAD program and can be found in at the end of this report.

The capacity of the system to meet fire flow requirements was tested by running a steady state fire flow analysis for all junctions at fire hydrant locations. The model shows that all hydrant junctions satisfy fire flow constraints (residual pressure > 60 psi, flow rate > 500 gpm), while providing service to lots at peak hour. The results of the analysis at peak hourly flow are given in at the end of this report.

SEWER SYSTEM

The proposed Regal Community Park will connect to the existing City of Laurel sanitary sewer system. A sanitary sewer main will run south in the Regal Avenue right-of-way and connect to an 8-inch sanitary sewer main that crosses Eighth Street. A manhole will be installed at the intersection point.

Design Requirements

The flow rates used herein are according to the Montana Department of Environmental Quality

(DEQ) Circular 2. The peaking factor for the design area is determined by figuring the equivalent population and inserting the population into the Harmon Formula. A 6-inch main is used because that is the minimum diameter allowed per DEQ and 10 State Standard requirements (section 33.1).

Using the city average of 2.43 persons per household the equivalent is calculated.

Equivalent Population = (2.43 persons/dwelling unit)(54 units) = 131 persons

Harmon Formula: Peaking Factor = $(18 + P^{0.5})/(4 + P^{0.5})$

where: P = Population in thousands

Peaking Factor = $(18 + 0.131^{0.5})/(4 + 0.131^{0.5})$

Peaking Factor = 4.21

The peak flow rate is calculated by multiplying the DEQ's design generation rate of 100 gallons per capita per day by the population, multiplying by the peaking factor:

Peak Flow Rate = 100 gpcpd (131 persons) (4.21) = 55,151 gpd

= 38.30 gpm

(0.0853 cfs)

The capacity of a 6-inch main is checked using Manning's Equation:

$Q_{full} = (1.486/0.013)AR^{2/3}S^{1/2}$

For the 6-inch main:

Manning's n = 0.013 for PVC Pipe

Minimum Slope = 0.006 ft/ft

A = area = $(3.14/4)d^2 = (3.14/4)(6/12)^2 = 0.19625$ ft^2

P = perimeter = 2(3.14)r = 2(3.14)(3/12) = 1.57 ft

R = hydraulic radius = A/P = 0.19625/1.57 = 0.125 ft

$R^{2/3} = 0.25$ ft

S = 0.006 ft/ft

$S^{1/2} = 0.0775$ ft/ft

$Q_{full} = (1.486/0.013)(0.19625)(0.25)(0.0775) = 0.4346$ cfs

Based on these calculations the percent of full capacity is calculated for the service area.

Connection:

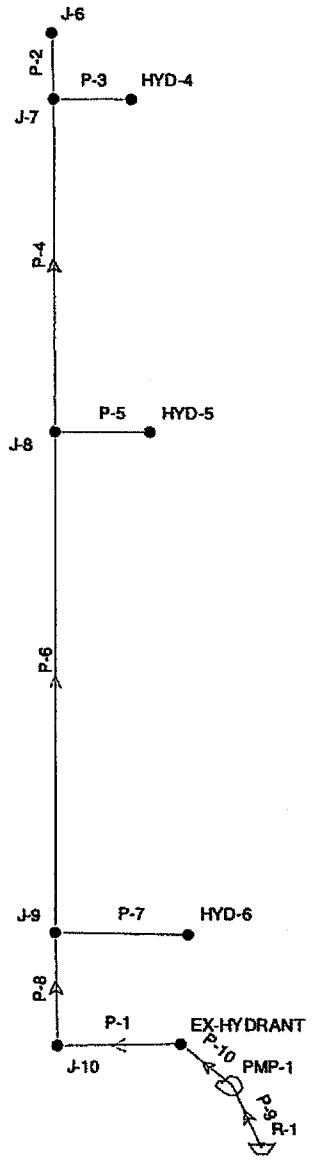
$Q/Q_{full} = 0.1142/0.4346 = 0.2628$ or 26.28% of the 6-inch pipe capacity.

Based on these calculations, a 6-inch sewer line is more than adequate to carry the design flows for the project.

Sewer Capacity Verification

The capacity of the sanitary sewer system within the City of Laurel needs to be evaluated to confirm whether the additional demand is feasible. Based on a letter dated March 11, 2014, Great West Engineering indicated to the City of Laurel that there is adequate capacity in the sewer mains and lift station to meet an additional peak flow of 0.212 cfs for the proposed development. The proposed development described herein will only generate an additional peak flow of 0.0853 cfs. Therefore, there is adequate capacity in the sanitary sewer system within the City of Laurel to meet this additional demand. Please see attached letter from Great West Engineering to the City of Laurel at the end of this report.

Scenario: Base



Scenario Summary Report
Scenario: Base

Scenario Summary	
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	Base-Average Daily
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Capital Cost Alternative	Base-Capital Cost
Energy Cost Alternative	Base-Energy Cost
User Data Alternative	Base-User Data

Hydraulic Analysis Summary	
Analysis	Steady State
Friction Method	Hazen-Williams Formula
Accuracy	0.001000
Trials	40

Quality Analysis Summary			
Analysis	Constituent	Quality Time Step	0.08 hr
Age Tolerance	0.01 hr	Constituent Tolerance	0.01 mg/l
Trace Tolerance	1.0 %		

Global Adjustments			
Demand Operation	<None>	Roughness Operation	<None>
Demand	0.00	Roughness	0.00

Created: 11/13/15 11:17:34 AM

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37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Base
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Iterations	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction
EX-HY	9	true	true	500.00	982.42	500.00	982.42	60.00	63.14	60.00	60.00	J-6
HYD-4	17	true	true	500.00	505.65	500.00	505.65	60.00	60.00	60.00	60.01	J-6
HYD-5	17	true	true	500.00	540.73	500.00	540.73	60.00	60.43	60.00	60.00	J-6
HYD-8	16	true	true	500.00	809.92	500.00	809.92	60.00	62.66	60.00	60.00	J-6
J-6	18	true	true	500.00	505.29	500.00	505.29	60.00	60.00	60.00	60.02	J-7
J-7	14	true	true	500.00	505.80	522.38	528.18	60.00	60.00	60.00	60.00	J-6
J-8	18	true	true	500.00	540.66	527.54	568.20	60.00	61.74	60.00	60.00	J-6
J-9	16	true	true	500.00	809.92	500.00	809.92	60.00	62.67	60.00	60.00	J-6
J-10	15	true	true	500.00	816.01	500.00	816.01	60.00	63.12	60.00	60.00	J-6

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37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Base
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-1	130.00	6.0	Ductile Iron	130.0	false	0.00	Open	49.93	3,461.90	3,461.86	0.04	0.29
P-2	2.00	6.0	Ductile Iron	130.0	false	0.00	Open	0.00	3,461.72	3,461.72	0.00	0.00
P-3	0.50	6.0	Ductile Iron	130.0	false	0.00	Open	0.00	3,461.72	3,461.72	0.00	0.00
P-4	432.00	8.0	Ductile Iron	130.0	false	0.00	Open	-22.39	3,461.72	3,461.72	0.01	0.02
P-5	0.50	6.0	Ductile Iron	130.0	false	0.00	Open	0.00	3,461.72	3,461.72	0.00	0.00
P-6	468.00	6.0	Ductile Iron	130.0	false	0.00	Open	-49.93	3,461.72	3,461.86	0.13	0.29
P-7	0.50	6.0	Ductile Iron	130.0	false	0.00	Open	0.00	3,461.86	3,461.86	0.00	0.00
P-8	6.00	6.0	Ductile Iron	130.0	false	0.00	Open	-49.93	3,461.86	3,461.86	0.00	0.33
P-9	1.00	99.0	Ductile Iron	130.0	false	0.00	Open	49.93	3,289.70	3,289.70	0.00	0.00
P-10	1.00	99.0	Ductile Iron	130.0	false	0.00	Open	49.93	3,461.90	3,461.90	0.00	0.00

Scenario: Base
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
EX-HYDRAN	3,289.70	Demand	0.00	Fixed	0.00	3,461.90	74.50
HYD-4	3,296.77	Demand	0.00	Fixed	0.00	3,461.72	71.36
HYD-5	3,295.76	Demand	0.00	Fixed	0.00	3,461.72	71.80
HYD-6	3,290.74	Demand	0.00	Fixed	0.00	3,461.86	74.04
J-6	3,296.77	Demand	0.00	Fixed	0.00	3,461.72	71.36
J-7	3,296.77	Demand	22.38	Fixed	22.38	3,461.72	71.36
J-8	3,292.76	Demand	27.54	Fixed	27.54	3,461.72	73.10
J-9	3,290.74	Demand	0.00	Fixed	0.00	3,461.86	74.04
J-10	3,289.70	Demand	0.00	Fixed	0.00	3,461.86	74.49

C & H Engineering & Surveying, Inc.
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario Summary

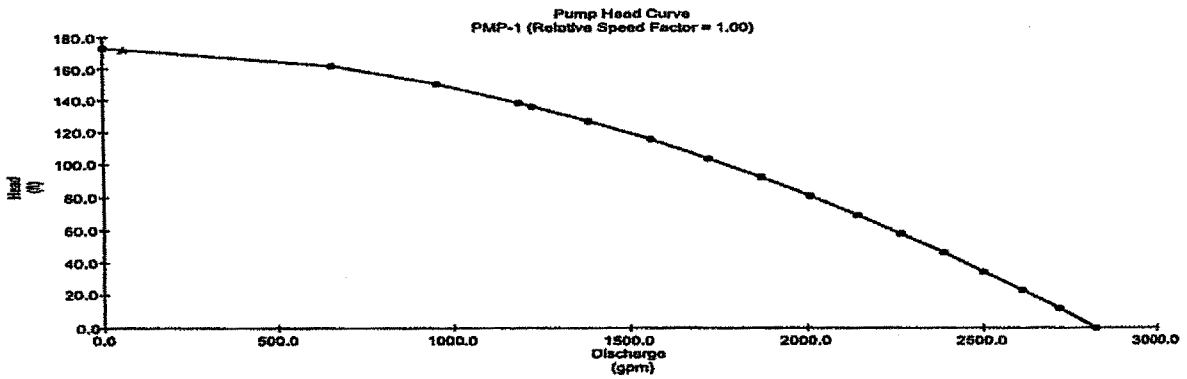
Scenario	Base
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	Base-Average Daily
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Capital Cost Alternative	Base-Capital Cost
Energy Cost Alternative	Base-Energy Cost
User Data Alternative	Base-User Data

Global Adjustments Summary

Demand	<None>	Roughness	<None>		
Geometric Summary					
X	15,712.78 ft		Upstream Pipe	P-1a	
Y	11,680.25 ft		Downstream Pipe	P-1b	
Elevation	3,293.21 ft				
Pump Definition Summary					
Pump Definition	LAUREL-J-1 (PMP-1)				
Initial Status					
Initial Pump Status	On		Initial Relative Speed Factor	1	

Calculated Results Summary

Time (hr)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Pump Head (ft)	Relative Speed	Calculated Water Power (Hp)
0	On	3,293.21	3,465.18	62.83	171.97	1	2.73



Pump Curve Calculations:

Pump #1 (Hydrant #14, 8th/Date)

Static Pressure (Ps) =	75
Pitot Pressure (Pp)=	52.5
Residual Pressure (Pr) =	59
Qf =	1225

$Q=Q_f*((Ps-P)/(Ps-Pr))^{(0.54)}$

BILLINGS
115 N. Broadway • Suite 500
Billings, MT 59101
406.652.5000 • Fax 406.248.1363

Great West engineering

March 11, 2014

Kurt Markegard
City of Laurel
115 West 1st Street
Laurel, MT 59044

RE: Moore Subdivision Sewer Capacity

Dear Kurt:

The purpose of this letter is to verify the sewer capacity available for the Moore Subdivision project located north of 8th Street.

Based on the plat provided by the developer's consultant, the proposed subdivision will create an additional peak flow of 0.212 cfs. At this time, there is adequate capacity in the sewer mains and the lift station to meet this additional demand. Should conditions change between now and their plat approval, this capacity may need to be revisited.

In addition, feel free to contact us with any questions and/or concerns, as always.

Sincerely,

Great West Engineering, Inc.

Greg Lukasik, PE
Project Manager

HELENA
PO Box 4847
3016 Bel View Drive
Helena, MT 59604
406.449.8627
FAX 406.449.8631

C:\Users\glukasik\Documents\Moore Subdivision Letter.docx

DESIGN REPORT
STORMWATER MANAGEMENT
REGAL COMMUNITY PARK

Prepared for:

Regal Land Development, Inc.
P.O. Box 80445
Billings, MT 59108

Prepared by:

C&H Engineering and Surveying, Inc.
1091 Stoneridge Drive
Bozeman, MT 59718
(406) 587-1115

Project Number: 15949

June 2016

INTRODUCTION

The proposed Regal Community Park is a 54-space manufactured home park located on a 7.853 acre parcel of land currently known as Lot 7 and Lot 8 of the Nutting Brothers Subdivision, 2nd Filing. The project is located east of Date Avenue, north of Eighth Street, south of Maryland Lane, and west of the City Park/Soccer Field.

The 54 spaces proposed with this project will be developed as single family residential mobile homes. The spaces will range in size from 5,168 square feet to 11,567 square feet.

STORMWATER MANAGEMENT

Stormwater runoff from the project will be conveyed to one retention facility. A plan view of the site highlighting the drainage area and the storm water features is included at the end of this report.

Drainage Area #1 will discharge into a Retention Basin #1 at the southeast end of the site in the Open Space area. Runoff will sheet flow from the lots to the east side of Regal Avenue and will flow down the curb to a curb inlet located on the north side of Eighth Street. Water will be retained in the pond while it is being absorbed into the ground and evaporates. Drainage Area #2 will also discharge into Retention Basin #1. Runoff will sheet flow off the lots to the west side of Regal Avenue and will flow down the curb, across Regal Avenue in a valley gutter to the curb inlet on Eighth Street. Drainage Area #3 will also discharge into Retention Basin #1. Water will sheet flow off the lots to the east side of Date Avenue and will flow down the curb line of Date Avenue and then flow down the north curb line of Eighth Street to the curb inlet located in Eighth Street.

PRE-DEVELOPED RUNOFF

Pre-developed runoff is calculated per Montana DEQ Circular 8 standard. The 2-year, 24-hour rainfall event for Billings is 1.44 inches per the City of Billings Stormwater Management Manual Table 3-4.

Pre-Developed Runoff Volume = "C"*Rainfall Total for 2-year, 24-hour event (ft)*Area (ft^2)

= (0.20)*(0.12 ft)*(341,946 ft^2) = 8,207 ft^3

POST DEVELOPED RUNOFF

RIGHT-OF-WAY COMPOSITE "C" CALCULATIONS

The composite "C" calculations for each of the right-of-ways is calculated below.

The Maryland Lane right-of-way (ROW) is 80 feet wide with 44 feet of street, 5 foot sidewalks, and 12 foot boulevards. Using "C" coefficients from Montana's DEQ circular 8.

[(0.95)*(54 ft) + (0.2)*(26 ft)]/80 ft = 0.71

The Date Avenue ROW is 29.2 feet wide with 15.2 feet of street, 5 foot sidewalks, and 1 foot boulevards. Using "C" coefficients from Montana's DEQ circular 8.

[(0.95)*(25.2 ft) + (0.2)*(4 ft)]/29.2 ft = 0.85

Regal Avenue ROW is 28 feet wide with 28 feet of street, no sidewalks, and no boulevards. Using "C" coefficients from Montana's DEQ circular 8.

[(0.95)*(28 ft) + (0.2)*(0 ft)]/28 ft = 0.95

The Eighth Street ROW is 70 feet wide with 40 feet of street, 5 foot sidewalks, and 9 foot boulevards. Using "C" coefficients from Montana's DEQ circular 8.

[(0.95)*(50 ft) + (0.2)*(20 ft)]/70 ft = 0.74

Drainage Area #1

The stormwater runoff surface areas for Drainage Area #1 are calculated as follows. All runoff "C" coefficients are from the State of Montana DEQ Circular 8.

Contributing Areas:

Maryland Right-of-way (C=0.71)	= 5,280 ft^2
Regal Right-of-way (C=0.95)	= 12,608 ft^2
Eighth Right-of-way (C=0.74)	= 4,550 ft^2

Lot Area (C=0.50)	= 86,100 ft^2
Total	= 108,538 ft^2
	= 2.4916 acres

The composite runoff coefficient for all of Drainage Area #1 is calculated as:

C_{comp} = [(0.71)*(5,280 ft^2) + (0.95)*(12,608 ft^2) + (0.74)*(4,550 ft^2) + (0.50)*(86,100 ft^2)] /108,538 ft^2 = 0.57

Drainage Area #2

The stormwater runoff surface areas for Drainage Area #2 are calculated as follows. All runoff "C" coefficients are from the State of Montana DEQ Circular 8.

Contributing Areas:

Maryland Right-of-way (C=0.71)	= 1,200 ft^2
Regal Right-of-way (C=0.95)	= 12,608 ft^2
Eighth Right-of-way (C=0.74)	= 4,550 ft^2
Lot Area (C=0.50)	= 86,100 ft^2
Total	= 104,458 ft^2
	= 2.3980 acres

The composite runoff coefficient for all of Drainage Area #2 is calculated as:

C_{comp} = [(0.71)*(1,200 ft^2) + (0.95)*(12,608 ft^2) + (0.74)*(4,550 ft^2) + (0.50)*(86,100 ft^2)] / 104,458 ft^2 = 0.57

Drainage Area #3

The stormwater runoff surface areas for Drainage Area #3 are calculated as follows. All runoff "C" coefficients are from the State of Montana DEQ Circular 8.

Contributing Areas:

Maryland Right-of-way (C=0.71)	= 9,200 ft^2
Date Right-of-way (C=0.85)	= 9,098 ft^2
Eighth Right-of-way (C=0.74)	= 9,100 ft^2
Lot Area (C=0.50)	= 86,100 ft^2

Total = 113,498 ft^2

= 2.6056 acres

The composite runoff coefficient for all of Drainage Area #1 is calculated as:

C_{comp} = [(0.71)*(9,200 ft^2) + (0.85)*(9,098 ft^2) + (0.74)*(9,100 ft^2) + (0.50)*(86,100 ft^2)] /113,498 ft^2 = 0.56

RETENTION POND SIZING

The minimum required storage is calculated per Montana DEQ Circular 8 standards assuming a 2 year, 24-hour storm. The 2-year, 24-hour rainfall event for Billings is 1.44 inches per the City of Billings Stormwater Management Manual Table 3-4.

Drainage Area #1

Required Volume = "C"*Rainfall Total (ft)*Area (ft^2)

= (0.57)*(0.12 ft)*(108,538 ft^2) = 7,424 ft^3

Drainage Area #2

Required Volume = "C"*Rainfall Total (ft)*Area (ft^2)

= (0.57)*(0.12 ft)*(104,458 ft^2) = 7,144 ft^3

Drainage Area #3

Required Volume = "C"*Rainfall Total (ft)*Area (ft^2)

= (0.56)*(0.12 ft)*(113,498 ft^2) = 7,763 ft^3

Total Runoff Volume Post Development = 7,424 ft^3 + 7,144 ft^3 + 7,763 ft^3 = 22,301 ft^3

Total Pre-Development Runoff Volume = 8,207 ft^3 (see page 1 of this report)

Total Retention Volume Required

= Post Development Runoff Volume – Pre-Development Runoff Volume

= 22,301 ft^3 - 8,207 ft^3

$= 14{,}094\ ft^3$

The stormwater retention pond will have a volume of 18,400 ft^3.

RETENTION POND LAYOUT

The retention pond for the proposed development will be located in the southeastern portion of the Site in the open space area. Based on the geology at the Site, the retention pond will be located in soil with high infiltration characteristics and will not encounter bedrock or seasonal high water table. The Site is sloped gently downgradient from north to south and the retention pond is designed to receive stormwater from multiple drainages. Runoff from Drainage Area #1 will enter the western portion of the retention pond from an outfall from Regal Avenue. Runoff from Drainage Area #2 and Drainage Area #3 will enter a culvert that parallels the southern border of the Site and discharge into the southern portion of the retention pond via a culvert and curb cut.

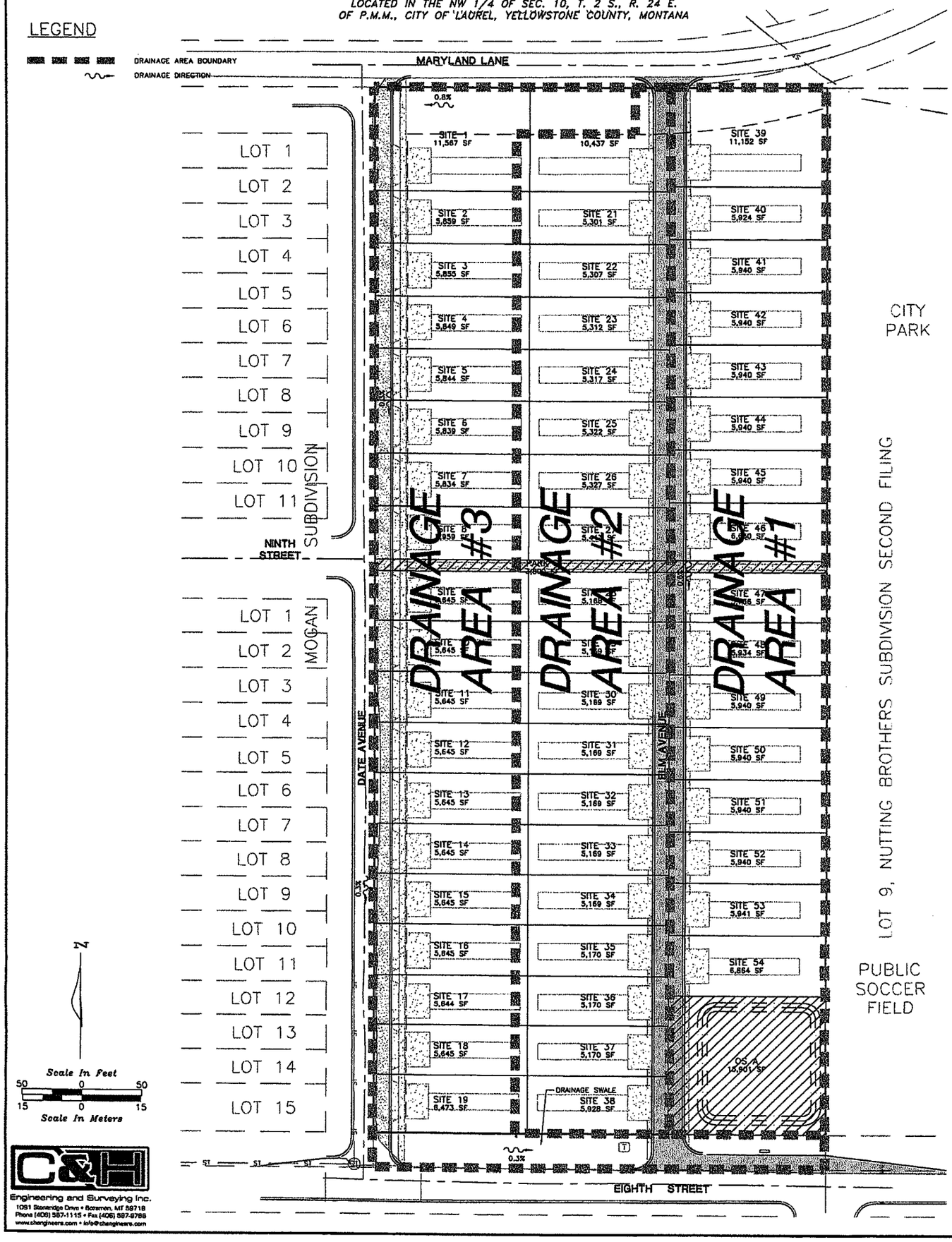
The stormwater retention pond is designed to contain of 18,400 ft^3 of stormwater at depth of 2 feet. The area calculation for this retention pond is below:

$(18{,}400\ ft^3) / (2) = 9{,}200\ ft^2$

The retention pond will be 2' feet deep, 103 feet wide and 103 feet long assuming a square design and a 4 to 1 grade on the perimeter. There is adequate space in the southeastern portion of the Site to accommodate the retention pond for the proposed development.

REGAL COMMUNITY PARK DRAINAGE PLAN

LOCATED IN THE NW 1/4 OF SEC. 10, T. 2 S., R. 24 E.
OF P.M.M., CITY OF LAUREL, YELLOWSTONE COUNTY, MONTANA



C&H
Engineering and Surveying Inc.
1091 Stonebridge Drive • Bozeman, MT 59718
Phone (406) 587-1115 • Fax (406) 587-8788
www.chengineers.com • info@chengineers.com

#15949

CenturyLink

November 13, 2015

Mike Balch
C & H Engineering and Surveying Inc.
1091 Stoneridge Dr.
Bozeman, MT 59718

RE: Regal Community Park

Mike,

The above mentioned project is located South of E Maryland LN between Date Ave and Elm Ave in Laurel MT.

In response to your request, this letter is to acknowledge that this property is within the CenturyLink serving area and services can be provided.

The Tariff Rates and Regulations prescribed for service for this area are on file with your state Utilities Commission and may be examined at your local CenturyLink Business Office.

Regards,

Paul Fendley

Engineer
2707 W Main St
Bozeman, Mt 59718
Ofc 406-585-2353
paul.fendley1@Centurylink.com

Mike Balch

From: Goodale, Gary L <Gary.Goodale@charter.com>
Sent: Wednesday, November 11, 2015 12:22 PM
To: Mike Balch
Subject: RE: project in Laurel

Mike,

I have drove this out and looked at my design. My only option will be to come off of the pole line in front of this location. We have strand built now, just no coax. Which means I would need to build 1 to 2 spans of mainline to service this lot location. And I assume, on that same pole line, power company has a transformer and they will come from the same location. We would riser done pole line and convert to underground. I will be following the same route, enclosure locations as the power company. Hope this helps, any other questions or concerns please feel free to reach out to me.

Thank you,

Gary

Charter
COMMUNICATIONS

Gary Goodale | Construction Supervisor
Office: 406.238.7734|Mobile: 406.672.0531
1860 Monad Rd. | Billings, MT 59102

From: Goodale, Gary L
Sent: Wednesday, November 11, 2015 9:43 AM
To: Mike Balch
Cc: Campbell, Thomas
Subject: RE: project in Laurel

Mike,

I will plan on doing a drive out on this and also look at our current design. I will follow up with you within a day or two with any concerns/comments. Thank you for your correspondence.

Gary

Charter
COMMUNICATIONS

Gary Goodale | Construction Supervisor
Office: 406.238.7734|Mobile: 406.672.0531
1860 Monad Rd. | Billings, MT 59102

From: Campbell, Thomas
Sent: Wednesday, November 11, 2015 9:20 AM
To: Goodale, Gary L
Cc: Mike Balch
Subject: FW: project in Laurel

Mike

I forwarded this to Gary he is the Construction Sup. for this area.

From: Mike Balch [mailto:mbalch@chengineers.com]
Sent: Wednesday, November 11, 2015 8:52 AM
To: Campbell, Thomas
Subject: project in Laurel

Hi Tom,

In early 2014 I was working on a project in Laurel at the corner of 8th and Date called the "Moore Subdivision". The project was never built and now a new owner is developing the property with a new layout. I've attached the new layout. Would you be able to provide a letter with any comments you may have on the project? The project is now called the "Regal Community Park". Thank you.

Mike Balch, P.E.

C&H Engineering and Surveying, Inc
1091 Stoneridge Drive, Bozeman, MT 59718
Phone: 406-587-1115 Fax: 406-587-9768
mbalch@chengineers.com

Providing Civil Engineering, Structural Engineering, Land Surveying, Subdivision Design, Geotechnical Engineering, Septic/Water System Design and Soils/Concrete testing since 1994.

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Engineering and Surveying Inc.
1091 Stoneridge Drive • Bozeman, MT 59718
Phone (406) 587-1115 • Fax (406) 587-9768
www.chengineers.com • info@chengineers.com

Dear Mr. Balch:

I have conducted a cultural resource file search for the above-cited project located in Section 10, T2S R24E. According to our records there has been one previously recorded site within the designated search scale. Site 24YL0163 is the historic Nutting Canal. In addition to the site there have been a few previously conducted cultural resource inventories done in the area.

It is SHPO's position that any structure over fifty years of age is considered historic and is potentially eligible for listing on the National Register of Historic Places. If any structures are to be altered and are over fifty years old we would recommend that they be recorded and a determination of their eligibility be made.

As long as there will be no disturbance or alteration to structures over fifty years of age we feel that there is a low likelihood cultural properties will be impacted. We, therefore, feel that a recommendation for a cultural resource inventory is unwarranted at this time. However, should structures need to be altered or if cultural materials be inadvertently discovered during this project we would ask that our office be contacted and the site investigated.

If you have any further questions or comments you may contact me at (406) 444-7767 or by e-mail at dmurdo@mt.gov. I have attached an invoice for the file search. Thank you for consulting with us.

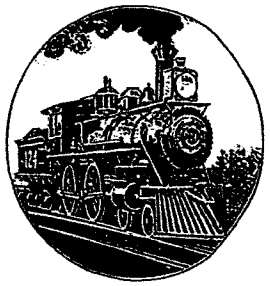
Sincerely,

Damon Murdo
Cultural Records Manager
State Historic Preservation Office

File: LOCAL/SUBDIVISIONS/2014

Laurel Public Schools

Tim Bronk, Superintendent
School District No. 7 & 7-70
410 Colorado Avenue
Laurel, Montana 59044
District Office (406) 628-8623 • Website: www.laurel.k12.mt.us
Fax (406) 628-8625 • Email tim_bronk@laurel.k12.mt.us



November 11, 2015

C&H Engineering and Surveying, Inc
1091 Stoneridge Drive
Bozeman, MT 59718

RE: Moore Subdivision

Dear Mr. Mike Blach, P.E.;

In response to your question regarding the Moore Subdivision I would need some additional information. Can you please provide me with the anticipated number of students and homes that will occupy this subdivision and the anticipated date of completion?

Most of our school buildings are currently over capacity and as we are looking for solutions, this information would be useful. Probably my biggest concern would pedestrian safety, and that students have safe routes, sidewalks from there to existing sidewalks, as there would not be bus transportation provided to this area.

If you have additional questions please do not hesitate to contact me.

Thanks,

Tim Bronk

Mike Balch

From: Tim Bronk <tim_bronk@laurel.k12.mt.us>
Sent: Thursday, November 12, 2015 5:12 PM
To: Mike Balch
Subject: Re: proposed mobile home park in Laurel

Mike,

Thank you for the information.

Tim Bronk
Superintendent
Laurel Public School

On Nov 12, 2015, at 4:56 PM, Mike Balch <mbalch@chengineers.com> wrote:

> Hi Tim,
>
> We are planning on 73 spaces for mobile homes. Laurel, on average, has 2.43 people per dwelling unit with 18.1% of the population between age 5 and 18. Using those numbers we can expect an additional 32 school aged children to live in the development. The project would be built over the next one to two years.
>
> The project would greatly increase the pedestrian safety in the area by providing sidewalks along all of the streets (east side of Date, both sides of Elm, north side of 8th, and south side of Maryland, as well as a pedestrian trail corridor that will link the existing neighborhood to the west (9th St.) to the park located to the east of the site. Please let me know if you would like any other information. Thank you.
>
> Mike Balch, P.E.
>
> C&H Engineering and Surveying, Inc
> 1091 Stoneridge Drive, Bozeman, MT 59718
> Phone: 406-587-1115 Fax: 406-587-9768
> mbalch@chengineers.com
>
> Providing Civil Engineering, Structural Engineering, Land Surveying, Subdivision Design, Geotechnical Engineering, Septic/Water System Design and Soils/Concrete testing since 1994.
>
> <image001.jpg>
>
>
>
> **From:** Tim Bronk [mailto:tim_bronk@laurel.k12.mt.us]
> **Sent:** Thursday, November 12, 2015 10:04 AM
> **To:** Mike Balch <mbalch@chengineers.com>
> **Subject:** Re: proposed mobile home park in Laurel
>
> Mike,

Please find my response attached. Thanks.

On Thu, Nov 12, 2015 at 8:03 AM, Mike Balch <mbalch@chengineers.com> wrote:

Hi Tim,

Thank you for the quick response. I was not able to open the attached file. Could you send it in a pdf or word document format? Thank you.

Mike Balch, P.E.

C&H Engineering and Surveying, Inc

1091 Stoneridge Drive, Bozeman, MT 59718

Phone: 406-587-1115 Fax: 406-587-9768

mbalch@chengineers.com

Providing Civil Engineering, Structural Engineering, Land Surveying, Subdivision Design, Geotechnical Engineering, Septic/Water System Design and Soils/Concrete testing since 1994.

<image001.jpg>

From: Tim Bronk [mailto:tim_bronk@laurel.k12.mt.us]
Sent: Wednesday, November 11, 2015 7:46 PM
To: Mike Balch <mbalch@chengineers.com>
Subject: Re: proposed mobile home park in Laurel

On Wed, Nov 11, 2015 at 8:42 AM, Mike Balch <mbalch@chengineers.com> wrote:

Hi Tim,

In early 2014 I was working on a project in Laurel and had asked you for comments for the preliminary plat. The project was never built and now a new owner has a new plan. I've attached the new plan for your review. The project is located near the intersection of 8th and Date. Please let me know if you have any comments or concerns with the project. Thank you.

Mike Balch, P.E.

C&H Engineering and Surveying, Inc

1091 Stoneridge Drive, Bozeman, MT 59718

Phone: 406-587-1115 Fax: 406-587-9768

mbalch@chengineers.com

Providing Civil Engineering, Structural Engineering, Land Surveying, Subdivision Design, Geotechnical Engineering, Septic/Water System Design and Soils/Concrete testing since 1994.

<image001.jpg>

--

Tim Bronk, Superintendent

ARTICLES OF INCORPORATION
OF AND FOR
REGAL COMMUNITY PARK ASSOCIATION, INC.
A NON-PROFIT CORPORATION

KNOW ALL MEN BY THESE PRESENT:

We, the undersigned, pursuant to Title 35, Chapter 2, Montana Code Annotated, acting as incorporator(s) of a corporation under the Montana Non-Profit Corporation Act, Section 35-2-113, et seq., MCA, do hereby adopt the following Articles of Incorporation for such corporation:

I.

That the name of the corporation is the Regal Community Park Association, Inc.

II.

That the corporation is a mutual benefit corporation.

III.

That the period of its duration is perpetual.

IV.

That the purposes for which said corporation is formed are as follows, to wit:

(A)To carry out and conduct all corporate responsibilities enumerated in the Montana Non-profit Corporation Act, as the same exists from time to time;

(B)To carry out and conduct the business of a homeowners' association;

V.

That the address of the initial registered office of the corporation is P.O. Box 80445, Billings, MT 59108 and That the name of the corporation's initial registered agent at such address is
Dan Wells.

VI.

That the name and address of the incorporator is as follows, to wit:

Regal Land Development, Inc. – Dan Wells
P.O. Box 80445
Billings, MT 59108

VII.

Upon winding up and dissolution of this corporation, after paying or adequately providing for the debts and obligations of the corporation, the remaining assets shall be distributed to a non-profit fund, foundation, or corporation which is organized and operated exclusively for charitable, educational, and/or scientific purposes and which has established its tax exempt status under Section 501(c)(3) of the Internal Revenue Code.

VIII.

The corporation will have members. The number and manner of selection of directors shall be fixed by the by-laws and may be altered from time to time by amendment to the bylaws in the manner provided therein.

Dated this ___ day of _____, 201_.

_____
Dan Wells

STATE OF MONTANA)
: ss.
County of _____)

On this _____ day of _____, 201_, before me, a Notary Public for the State of Montana, personally appeared Dan Wells known to me to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year first above written.

_____
NOTARY PUBLIC for the State of Montana

_____
Print Name
Residing at: _____
My Commission expires:_____

SEAL

After recording please return to:

Space Above This Line For Recorder's Use Only

PROTECTIVE COVENANTS

FOR REGAL COMMUNITY PARK

LAUREL, YELLOWSTONE COUNTY, MONTANA

INTRODUCTION

It is the general intent of this Document to establish the legal authority for and to list the Covenants that pertain to all the lands within the REGAL COMMUNITY PARK and to establish the Home Owners Association and Board of Directors.

The Covenants explain how the lands with the Subdivision are to be developed and maintained beyond the minimum requirements of the Laurel Uniform Development Ordinance, which exists at the date of the execution of this document. It defines how improvements to the real property will be designed and landscaped and how the Common Open Space will be used, managed and maintained.

When a lot is rented in the park, the tenant automatically becomes a member of the Association. The Association is governed by a Board of Directors.

The Board of Directors shall implement, administer and enforce the Covenants, including the maintenance and management of the Open Space and stormwater retention pond, and carry on the day-to-day activities of the Association.

PROTECTIVE COVENANTS AND OWNERS ASSOCIATION GUIDELINES FOR REGAL COMMUNITY PARK

This Declaration, made this ___ day of _____, 201_, by Regal Land Development, Inc. – Dan Wells, of P.O. Box 80445, Billings, Montana, 59108, hereinafter referred to as the "Declarant".

WHEREAS, Declarant is the owner of the following real property located in the City of Laurel, Yellowstone County, Montana:

> LEGAL DESCRIPTION. Lots 7 and 8, Nutting Brothers Subdivision, 2nd Filing, NW ¼ Section 10, Township 2 South, Range 24 East, Yellowstone County, Montana.

WHEREAS, Declarant has applied for and received approval from the City of Laurel to create fifty four (54) spaces and, pursuant to the Laurel Municipal Code, Declarant is required to prepare and adopt protective covenants for purposes of public health, safety and welfare;

WHEREAS, the owner of the real property subject to this Declaration voted to adopt the following protective covenants for Regal Community Park.

NOW, THEREFORE, the Owner does hereby establish, dedicate, declare, publish and impose upon the real property the following Protective Covenants which shall run with the land and shall be binding upon and be for the benefit and value of the real property and the Owners thereof and shall be binding upon and inure to the benefit of the Association and the heirs, successors and assigns of the Owners of the real property and shall be for the purpose of maintaining a uniform and stable value, character, architectural design, use and development of the real property.

I.

DEFINITIONS

Articles of Incorporation or Articles- shall refer to the Articles of Incorporation of the Regal Community Park Association, Inc. as filed with the Montana Secretary of State on _____201_ and any amendments and restatements thereto.

Association- refers to the Regal Community Park Association, Inc., a Montana non-profit corporation operating pursuant to §35-2-113, et. seq., MCA, its successors or assigns.

Association's Jurisdiction- shall refer to the jurisdiction of the Association as set forth in the Bylaws.

Board of Directors or Board- shall refer to the Board of Directors of the Regal Community Park Association, Inc.

Bylaws- shall refer to the Bylaws for the Regal Community Park Association, Inc., and any amendments or restatements thereto.

Common Area or Open Space. Shall mean all of the parcels conveyed to the Association for use by the Association and its Members and Owners in common. The specific parts of the Parcel conveyed to the Association are all the parts of the Parcel within the property which are not specifically owned by individual lot owners.

Declaration – shall meant this Declaration of Protective Covenants, as it may, from time to time, be amended or supplemented.

Design Regulations- refers to those design regulations adopted by the Association, effective _____, 201_ and as subsequently amended.

Good Standing– refers to a Member's standing with the Association. In order to be in Good Standing, the Member must be current on the payment of their assessments, not be deemed by the Board to be in violation of these Protective Covenants, Articles, Bylaws, Design Regulations, and/or resolutions or policies of the Board; and current on any other payments deemed due and owing to the Association (including but not limited to design review fees, performance deposits and fines).

Improvement(s)

Lot- a legally described division of real property created pursuant to a subdivision plat recorded in the public land records in the office of the Clerk and Recorder of Yellowstone County, Montana.

MCA- refers to the Montana Codes Annotated 2013 and any subsequent amendments.

Member- a Person who is an Owner of a Unit, Lot or Tract. If a Unit, Lot, or Tract is held by more than one Person, all co-Owners shall share the rights and obligations of membership in the Association, provided that there shall be collectively only one membership for each Unit, Lot, or Tract.

Membership Interest- a Membership Interest is assigned to each Unit, Lot or Tract in the Bylaws for purposes of assigning voting rights and allocating assessment liability to Members.

Mortgagee- shall mean the holder of any recorded mortgage, or the party secured or beneficiary of any recorded deed of trust, encumbering one or more, Units, Lots, or Tracts.

Occupant- means an Owner, resident, guest, invitee, tenant, lessee, sublessee, or other person in possession of a Unit, Lot or Tract.

Owner- one or more Persons who hold the record title to any Unit, Lot, or Tract of land within the boundaries of the Subdivision, excluding in all cases any Person holding an interest merely as security for the performance of an obligation.

Owners Association or Association – shall mean the Regal Community Park Association, Inc., its successors and assigns. The Association shall be incorporated as a Montana nonprofit corporation with its members as the lot owners.

Person- a natural person, a corporation, a partnership, a trustee, or any other legal entity.

Plan- refers to the Regal Community Park plan recorded _____, 201_, on record with the office of the Clerk and Recorder of Yellowstone County, Montana.

Protective Covenants- this document in its entirety and any subsequent amendments.

Tract- a legally described division of real property created pursuant to or described in a survey containing a surveyor's certificate which is recorded in the public land records in the office of the Clerk and Recorder of Yellowstone County, Montana.

Zoning Regulations- shall refer to the zoning regulations adopted for the City of Laurel, through its Uniform Development Ordinance, and as subsequently amended.

II.

GENERAL COVENANTS

2.1 Authority. These guidelines shall apply to the site plan for Regal Community Park, as recorded at the Yellowstone County Courthouse. Association hereby declares that the entire Parcel, described above, is, and shall be, conveyed, hypothecated, encumbered, leased, occupied, built upon or otherwise used, improved or transferred in whole or in part, subject to this Declaration. All of the Covenants shall run with the entire Parcel for all purposes and shall be binding upon and inure to the benefit of the Association and all Owners, Occupants and successors in interest as set forth in the Declaration.

2.2 **Owner's Right to Common Area**. Every owner shall have a right to use the Common Areas as shown on the approved final plat of the Subdivision. The Owner's

right to use the Common Areas shall be appurtenant to and shall pass with the title to every Lot, subject to the following Provisions:

a) The right of the Association to provide reasonable restrictions on the use of the Common Areas for the overall benefit of the Association and its members, including restrictions on the type of activities and uses, including the use of fireworks, loud music, parties and motor vehicles in the Common Area.

2.3 **Nuisance**. No Owner, guest or invitee may use or occupy the Common Area or any Lot in such a manner as to disturb or interfere with the peaceful use, occupancy or enjoyment of any other Lot Owner in the Subdivision. The Association shall have the authority to enforce and violation of this provision.

2.4 **Control and Management**. The Association shall have the exclusive right and obligation to manage, control, and maintain the Common Areas.

2.5 **Reservation of Easements**. The Association reserves the right to grant and/or dedicate an easement or easements in the streets, roads or at any other location on, over or across any Lot, Common Area, or Trail for water, sewer, natural gas, electrical, telephone, cable TV or internet for the installation, maintenance and repair of all such new or existing services and utilities.

2.6. **Right of Access**. The Association, or its delegated representatives, shall have the right to have access across a Lot to each improvement on any Lot from time to time, during reasonable hours as may be necessary, for the inspection, maintenance, repair, or replacement of any utilities or other Improvements in accordance with these Covenants. A similar right of access shall also be reserved and me immediate for the making of emergency repairs therein to prevent personal injury or property damage.

2.7 **Condition of Property**. The Owner Occupant of any Lot shall at all times keep it and the buildings, improvements and appurtenances thereon in a safe and clean condition and comply at its own expense, in all respects, with all applicable governmental, health, fire and safety ordinances, regulations and directives. The Owner or Occupant shall also, at regular intervals, remove at its own expense, any rubbish of any character whatsoever that may accumulate upon such Lot.

2.8 **Maintenance of Grounds**. Each Owner shall be responsible for the maintenance and repair of all parking areas, driveways, walkways and landscaping of his or her Lot. Such maintenance and repair shall include, without limitation:

a. Maintenance and snow removal of all sidewalks, parking areas, driveways, and walkways in a clean and safe condition;

b. Performance of all necessary weed control and managements, maintenance of landscaping, including the trimming of all grass, ground cover, shrubs or trees, removal of dead waste materials, replacement of any dead or diseases grass, ground cover, shrubs or trees.

2.9 **Remedies for Failure to Maintain and Repair**. If any owner of a lot shall fail to perform the maintenance and repair required by Section 2, then the Association shall have the option of Enforcement, set forth in Section 7 below.

2.10 **General Maintenance**. The maintenance, alteration, replacement and/or repair of the Common Areas, including culverts, stormwater facilities and appurtenant facilities shall be the responsibility of the Association. The Association, as part of its responsibility, shall maintain, repair and provide for snow removal and maintenance activities on all Common Areas. The maintenance, repair and replacement of all improvements on each Lot shall be the responsibility of the Owner of such Lot and not the Association, except as expressly set forth in these covenants. The City Commission can cause written notice to be served demanding maintenance of the common areas.

The maintenance of the onsite stormwater collection, detention and discharge release appurtenances shall be integrated as part of the duties of maintenance personnel responsible for normal grounds keeping. Duties shall include routine inspections to ensure that debris, yard waste, and seasonal ice does not impede operation of the detention ponds, culverts, manholes, ditches and discharge structures. These inspections shall occur after each major runoff event and on a continued monthly basis through the year. All results shall be recorded and kept on file for future verification by the City or regulatory agencies. In addition to the routine inspections, annual inspections shall assess and mitigate, if necessary, performance of the detention ponds, culverts, manholes and release structures as well as any weather or vandalism related damage. Detention ponds and ditches shall be mowed on a regular basis during the grown season so as to remain free of vegetation that might impede their storage capacity or conveyance capacity.

2.11 **Lawn Care and Weed Control**. Every lot owner shall be responsible for the care of his or her lot including weed control. If an improvement is constructed on a lot, the landscaping shall be installed within a reasonable length of time considering the season. Once installed, the landscaping shall be cared for and not allowed to deteriorate or become unsightly and detract from the subdivision and neighborhood.

Both unimproved and improved lots shall be kept free of weeds. If a lot must be cleared of weeds and the owner fails to do so after notice from the Association or any persons in the subdivision, the weeds may be cleared and controlled and the cost and expense associated with such weed maintenance shall be assessed the lot and such assessment may become a lien if not paid within thirty (30) days of the mailing of such assessment.

Weeds shall be controlled in the open spaces and common areas by the Association.

The control of noxious weeds by the Association on those areas for which the Association is responsible and the control by individual owners on their respective lots shall be as set forth and specified under the Montana Noxious Weed Control Act, Section 87-22-2101, et. seq., MCA and the rules and regulations of the Yellowstone County Weed Control District Subdivision Noxious Weed Planning Requirements as the same exist from time to time.

2.12. **Remedies for Failure to Maintain, Repair or Control Weeds**. If an owner of a lot shall fail to perform the maintenance, repair or control of weeds as required by this Covenants, the Association shall have the right to enforcement the requirements of these covenants and assess the landowner the resulting costs.

2.13 **Public Utilities.** Association reserves the right to grant consents for the construction and operation of public utilities including, but not limited to, interurban or rapid transit, lines for electricity, telephone, internet, above or below ground conduits, and gas pipes in and upon any of the streets now existing or hereafter established upon which any portion of the Property may now or hereafter front or abut. Association reserves the right to grant consents and to petition the property authorities for any and all street improvements such as grading, seeding, tree planting, sidewalks, paving, sewer and water installation, whether it be on the surface or subsurface, which in the judgment of the Association is necessary on or to the Property.

2.14 **Sidewalks**. Upon the third anniversary of the plat recordation of any phase of the subdivision, any lot owner who has not constructed said sidewalk shall, without further notice, construct within thirty (30) days, said sidewalk for their lot(2), regardless of whether other improvements have been made upon the lot.

2.15. **Fences, Walls and Hedges**. Fences located in the front, side or rear yard setback of properties adjacent to any park or common open space shall not exceed a maximum height of 5 feet.

III.

USE

3.1 **Spaces**

i. Spaces 1 through 54, shall be used for only those purposes allowed by the zoning applicable to the property as set forth in the Laurel Municipal Code, as that Ordinance may, from time to time be amended.

IV.

EASEMENTS

4.1 Reservation of Easements. Easements for roads, drainage, electricity, telephone, lighting, water, sewer, cable television and all other utilities, skiing, trails, bridle paths, pedestrian traffic, or any other service or utility shall be and are hereby reserved as shown on the Plat and any amendments thereto, as well as along the front, side and rear setback areas of all Lots in the Subdivision.

4.2 Requirement to Bury Utilities. All utilities, pipe and service lines shall be buried.

4.3 Road Easements. All road easements as shown on the Plat shall include a corresponding easement for drainage, electricity, telephone, lighting, water, sewer, cable television and all other utilities, skiing, bicycle, bridle paths and pedestrian traffic.

4.4 Landscaping Easements. Easement areas may be landscaped by Owners so as to enhance their appearance so long as the landscaping does not interfere with the use of the real property as an easement. However, Owners who landscape within these easements do so at their own risk.

V.

OWNERS ASSOCIATION, MEMBERSHIP, AND VOTING RIGHTS

5.1 Association. The owners association for Regal Community Park shall be the Regal Community Park Association, Inc. Pursuant to Montana Law, the Association shall operate under the Bylaws.

5.2 Membership. All Owners of a Unit, Lot, or Tract shall automatically, upon becoming the Owner, be a Member of the Association, and shall remain a Member

thereof until such time as the ownership ceases for any reason, at which time the membership in the Association shall automatically cease. All Owners in the Subdivision, as Members of the Association, shall be bound by the provisions of the Articles and Bylaws of the Association, copies of which are made a part hereof by reference. Membership shall be appurtenant to and may not be separated from the ownership of any Unit, Lot or Tract subject to assessment. It is the responsibility of the grantor to contact the Association and provide it with a copy of the recorded document of transfer evidencing the grantee's name and accurate mailing address. Membership shall begin and the Membership Interests shall vest upon recording a deed. Membership shall terminate and Membership Interests shall be revoked upon a Person divesting record ownership of Unit, Lot or Tract. No Member may withdraw nor be expelled while being an Owner. A Mortgagee does not have membership rights until it obtains title to the Unit, Lot or Tract by foreclosure or deed in lieu thereof.

5.3 Exercise of Voting Rights. Each Membership Interest shall have and exercise such voting rights as set forth in the Bylaws.

5.4 Liens and Assessments: Creation of the Lien and Personal Obligation of Assessments. Each Owner of any Unit, Lot or Tract, within the Subdivision, by acceptance of a deed therefore, whether or not it shall be so expressed in such deed, is deemed to covenant and agree to pay to the Association: (1) annual assessments and (2) special assessments. Annual assessments shall be billed on an annual basis as established in the Bylaws and notice of the same shall be mailed to each Owner as established in the Bylaws. All assessments become due 30 days after the date of mailing notice of such assessments. All assessments together with interest, costs, and reasonable attorney's fees, shall be a charge on the land, run with the land and shall be a continuing lien upon the property against which each such assessment is made.

Failure of the Board to set the annual assessment amount or to deliver or mail to each Owner an assessment notice shall not be deemed a waiver, modification, or a release of any Owner from the obligation to pay these assessments. In such event, each Owner shall continue to pay the annual assessments on the same basis as during the last year for which an annual assessment was made, if any, until a new budget becomes effective and a new annual assessment is levied pursuant thereto. Any such budget may include as an expense item any shortfall in amounts previously collected.

No Owner may exempt himself/herself from liability for any assessments by non-use of or abandonment of his/her Unit, Lot or Tract, or any other means. The obligation to pay assessments is a separate and independent covenant on the part of each Owner. No diminution or abatement of assessments or set-off shall be claimed or allowed for any alleged failure of the Association or Board to take some action or perform some function required of it, or for inconvenience or discomfort arising from the making of repairs or improvements, or from any other action it takes.

Upon request, the Association shall furnish to an Owner or his/her title company or mortgage company written (mailed, e-mailed, or faxed) or oral verification of the amount of such assessment owing and whether the Owner has paid such assessment. The Association may require the advance payment of a reasonable processing fee for the issuance of such verification.

5.5 Annual Assessments. The Board shall establish and levy annual assessments in an amount that the Board estimates will be sufficient to raise the funds needed to perform the duties of the Association during each fiscal year. The annual assessments shall include a portion for reserves in such amounts as the Board in its discretion considers appropriate to meet the costs of the future repair, replacement or additions to the major improvements and fixtures that the Association is obligated to maintain and repair.

5.6 Special Assessments. In addition to the annual assessments authorized above, the Board, at any time, may levy and establish the due dates for a special assessment in order to raise funds for unexpected operating or other costs, insufficient operating or reserve funds, or such other purposes as the Board in its discretion considers appropriate.

5.7 Uniform Rate of Assessment. Annual and Special Assessments for Members in this Subdivision shall be fixed at the same uniform rate for each Unit, Lot, and Tract. That is, each Unit, Lot, and Tract shall be assessed the same amounts regardless of size, and may be collected on a basis to be determined by the Board in the Bylaws.

5.8 Restrictions on Increases in Annual or Special Assessments. The Board may not increase an annual assessment or levy a special assessment on any Unit, Lot or Tract except as set forth in the Bylaws.

5.9 Effect of Nonpayment of Assessments and/or Fines: Remedies of the Association. Any assessment or fine not paid within sixty (60) days after the due date shall be delinquent, shall incur a late payment penalty in an amount to be set by the Board from time to time, not to exceed the maximum permitted by applicable law, and shall bear interest at a rate established by the Board which shall not exceed the maximum interest rate authorized by law until paid. Failure to pay within sixty (60) days of the due date will result in the Association recording a lien against the property being assessed or bringing an action at law or both. Suit to recover a money judgment for unpaid assessments, fines, late charges, interest and attorney's fees shall be maintainable without foreclosing or waiving the lien securing the same.

The Association may record that lien with the office of the Clerk and Recorder, Yellowstone County, Montana, or bring an action at law to collect the lien or foreclose the lien against the real property in the same manner as a mortgage on real property, and the Association shall be entitled in any such actions or foreclosure proceedings to recover its costs, expenses and reasonable attorneys' fees. The Association, acting on behalf of the Owners, shall have the power to bid for the Unit, Lot, or Tract at foreclosure sale, and

to acquire and hold, lease, mortgage and convey the same. During the period a Unit, Lot, or Tract is owned by the Association following foreclosure, no right to vote shall be exercised on behalf of the Unit, Lot, or Tract and no assessment shall be assessed or levied on the Unit, Lot, or Tract. The Board may authorize the execution and recordation of a deed conveying title to the Unit, Lot, or Tract which deed shall be binding upon the Owners, their successors, and all other parties.

VI.

PROPERTY USE RESTRICTIONS

6.1 Trash and Garbage. No trash, waste, garbage, litter, junk, or refuse shall be thrown, dumped or left on any portion of the Subdivision and no burning of the same shall be permitted.

6.2 Signs. All signs, real estate signs, billboards, posters, displays, advertisements or any structures relating thereto must receive approval under the applicable Zoning Regulations.

6.3 Animals. Animals such as dogs, cats, birds or horses are allowed in the Subdivision as pets only and so long as they are strictly controlled by their Owners to prevent them from becoming a nuisance to the neighbors or harassing wildlife. Kennels, stables or other facilities for the keeping or retention of animals shall be restricted to areas so designated and approved by the HOA. The commercial keeping, breeding, care, or raising of any animal is forbidden. No animal shall be allowed on a prolonged basis to howl, bark, yelp or utter other annoying noise. If a particular animal or animals shall, in the discretion of the Board, become a nuisance, the Board shall have the authority to require that the same be kept tethered, confined on the Owner's property or kept inside the Owner's residence and the Board may further require that when the said animal or animals are taken from the said property such animals must then be kept on a leash or bridle and must be under the Owner's control at all times. Owners not controlling their animals or abiding by the above shall be fined and at the discretion of the Board, nuisance animals will be removed from the Subdivision by the Owner.

6.4 Nuisance. No activity shall be conducted in any Lot or Tract that constitutes a nuisance or unreasonably interferes with the use or quiet enjoyment of the Occupants of any other Lot or Tract. No noxious, illegal, or offensive trade or activity shall be carried on upon any Lot or Tract, nor shall anything be done there which may be, or may become, an annoyance or nuisance to the Subdivision and surrounding area. No Owner shall permit anything to be done or kept in his or her Lot or Tract that violates any law, ordinance, statute, rule or regulation of any local, county, state or federal agency.

6.5 Television and Radio Antennas. No exterior visible television or radio antennas are permitted in the Subdivision. However, those dishes that are one meter or less used for satellite television are permitted in the Subdivision, but only in compliance with the Design Regulations.

6.6 Weeds and Ground Cover. The Owner of each Lot and/or Tract shall control or eliminate all noxious plants on his or her Lot and/or Tract, provided, however, that he/she shall only use herbicide approved for domestic use and/or approved by the State of Montana and/or Gallatin County for use around waterways as required. Ground cover shall be maintained and replaced in a timely manner for any Lot or Tract alterations.

6.7 Motor Vehicles. This includes any motorized vehicle, such as automobiles, motorcycles, boats, but not limited to the foregoing. Motorized vehicles must be in a n operation condition at all times.

6.8 Recreational Vehicles, Campers, and Horse Trailers. Parking or storing of these vehicles is not allowed. Also, repairing of the same on the premises will not be allowed. The above includes snowmobiles, ATV's, and any off-road vehicle.

VII.

ENFORCEMENT

7.1 Procedure. Each Owner or his/her tenants, guests and/or invitees of any Unit, Lot or Tract shall comply with these Protective Covenants, and as lawfully amended from time to time. Each Owner shall be responsible to the Association for compliance with the foregoing by his/her tenants, guests and/or invitees. The Association shall have the right (but not the obligation) to enforce these Protective Covenants, through its procedure adopted by resolution of the Board, abatement of the violation by the Association, or by proceedings either at law or in equity against any Person(s) violating or attempting to violate any of these Protective Covenants. Legal proceedings may be either to restrain violation of the Protective Covenants or to recover damages or both. Such procedures adopted by the Board to enforce these Protective Covenants shall include provisions for due process (including but not limited to notice and an opportunity to be heard at a regular meeting of the Board) for Person(s) violating or attempting to violate any of these Protective Covenants.

7.2 Discretion. The decision to have the Association pursue enforcement action in any particular case shall be left to the Board's discretion, except that the Board shall not be arbitrary or capricious in taking enforcement action. Without limiting the generality of the foregoing sentence, the Board may determine that, under the circumstances of a particular case:

i. the Association's position is not strong enough to justify taking any or further action; or

ii. the covenant, restriction or rule being enforced is, or is likely to be construed as, inconsistent with applicable law; or

iii. although a technical violation may exist or may have occurred, it is not of such a material nature as to be objectionable to a reasonable person or to justify expending the Association's resources; or

iv. it is not in the Association's best interest, based upon hardship, expense, or other reasonable criteria, to pursue enforcement action.

Such a decision shall not be deemed a waiver of the right of the Association to enforce such provision at a later time under other circumstances or preclude the Association from enforcing any other covenant, restriction or rule, nor shall it preclude any Owner from taking action at law or in equity to enforce these Protective Covenants.

7.3 **Costs of Enforcement.** Costs incurred for enforcing the provisions of these Protective Covenants and/or the Bylaws (inclusive of giving notice of the violation), costs of correcting the defect or undoing the violation, if undertaken by the Association, or any fines levied against the Owner after the Owner or his/her tenants, guests and/or invitees is determined by the Board to be in violation of these Protective Covenants and/or Bylaws shall be paid by the Owner. Any costs incurred for enforcing the provisions of these Protective Covenants and/or the Bylaws, for correcting the defect or undoing the violation, or fine assessed against the Owner that is not paid within sixty (60) days as provided for in Article ___, above, shall result in a lien being recorded against the Unit, Lot, or Tract and/or the Owner's interest therein, such lien to be enforceable by sale under the laws of the State of Montana. Such lien will be recorded in the office of the Clerk and Recorder, Yellowstone County, Montana.

Should any lawsuit, arbitration or other legal proceeding be instituted by the Association against an Owner alleged to have violated one or more of the provision of these Protective Covenants and/or the Bylaws and should the Association be wholly or partially successful in such proceeding, the offending Owner shall be obligated to pay the costs of such proceeding, including reasonable attorney's fees, costs and cost of collecting the judgment.

7.4 **Delegation.** The Board may delegate any of its obligations with respect to enforcement as set forth above to its Staff or any committee of the Board; except that any decision to pursue or not pursue any legal proceeding may not be delegated, and shall be determined by the Board.

7.5 **Remedies Cumulative.** Each remedy provided under this Article 8, are

cumulative and not exclusive.

7.6 Joint and Several Liability. In the case of joint ownership of a Unit, Lot, or Tract, in any form, the liability of each Owner thereof in connection with the liabilities and obligations of Owners as set forth in or imposed by these Protective Covenants shall be joint and several.

VIII.

AMENDMENT

These covenants, or any portion thereof, may be amended, abandoned, terminated, modified or supplemented at any time by the written consent or certification thereof, duly recorded with the officer of the Clerk and Recorder, Yellowstone County, Montana, of fifty-one percent (51%) of the Membership Interests within the Subdivision. Proposed amendments can be drafted and put to a vote of the Members within the Subdivision either by the Board or any Member within the Subdivision.

IX.

SEVERABILITY

A determination of invalidity of any one or more of the covenants or conditions hereof by judgment, order or decree of a court shall not affect in any manner the other provisions hereof, which shall remain in full force and effect.

X.

CITY OF LAUREL, MUNICPAL DEVELOPMENT CODE.

Moore Subdivision is part of the City of Laurel and subject to the rules, regulations and provisions of the Uniform Development Ordinance ("UDO"). Compliance with these covenants and receiving AC approval as detailed in Article ___ above, does not assure compliance with the UDO.

IN WITNESS WHEREOF, we certify that these Protective Covenants of _____ have been adopted by _____.

By: _____

and: _____
Secretary

STATE of MONTANA)
: ss.
County of Yellowstone)

On this _____ day of _____, 201_, before me, a Notary Public in and for said State, personally appeared Dan Wells of Regal Community Park Association, Inc and acknowledged to me that he executed the same on behalf of the corporation pursuant to the power and authority vested in him.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial seal the day and year written above.

_____
Notary Public for the State of Montana
Residing at: _____, Montana
My commission expires: _____