

The Reserves At Grand View Heights Estates Design Report

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1.0 INTRODUCTION

1.1 Project Description

The proposed project, identified as The Reserves at Grand View Heights Estates, is located within the limits of the City of Laramie, in Albany County, Wyoming; Section 6 of Township 15 North, Range 73 West, of the 6th Prime Meridian. The project extents are illustrated on the cover sheet of the enclosed construction drawings and in Figure 1 below.

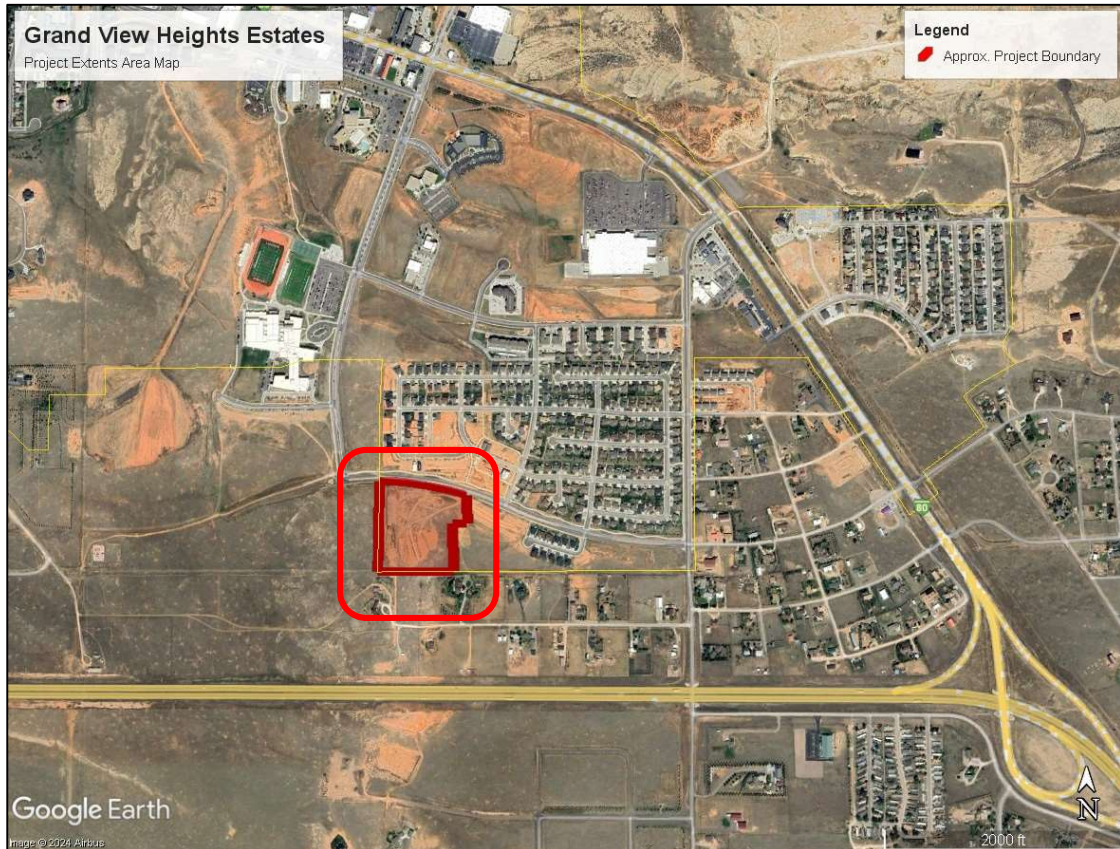


Figure 1- Project Extents

It is the intent of the developer to construct an apartment complex with 42-dwelling units. The development is subject to a Planned Unit Development (PUD) handbook filed with and accepted by the City of Laramie.

The Final plat for this filing is called the Grand View Heights Estates (GVHE), First Filing, and is currently under review by the City of Laramie with an anticipated approval in October 2024.

This project is to service two new buildings containing 42 dwelling units as a multi-family apartment complex. The development includes the installation of water and sanitary sewer pipe for services to each building and appropriate appurtenances with the parking lot and site improvements to meet City of Laramie code requirements. The limits of this first filing include 20

single-family home lots, and two multi-family development lots with a maximum projected capacity of 66-bedroom units. The water, sanitary and storm sewer pipe will be private utilities owned and maintained by the development and connect to the City facilities located in the dedicated public rights-of-way granted to the City of Laramie by Preliminary Plat. Water system tie-ins are going to be connected to existing stub-out lines within the Sitting Bull and Red Cloud rights-of-way and sanitary sewer collection will be connected to an existing sanitary sewer stub in Sitting Bull Trail planned for during the construction of Grand View Heights Estates subdivision. The project will be constructed in accordance with Wyoming Public Works 2021 Standard Specifications and City of Laramie’s Supplementals as well as the enclosed contract documents.

1.2 Background

The Grand View Heights Estates (GVHE) subdivision will still be subject to the same PUD Handbook as the original Grand View Heights subdivision and the utility connections to the City of Laramie system were included in the development phases already constructed. For reference, the Bill Nye avenue corridor includes two 8” water valves and curb returns for access into the GVHE property. In addition to the water connection stubs, an 8-inch sanitary sewer main is stubbed across Grand View Heights and Bill Nye Avenue to provide a planned sanitary connection servicing these lots.

2.0 WATER SYSTEM

2.1 Hydraulic Analysis

The following table presents the working range of pressures for the proposed water zone improvements.

Table 1: Water Zone Existing Pressures

PRESSURE ZONE 4	Size/ Material	Static Pressure at Hydrant	Residual Pressure at Hydrant	Total Test Flow Rate
Bill Nye Ave	14” PVC	93 PSI	84 PSI	2294 GPM

The primary feed for the apartments is from the Zone4 main located in Bill Nye Ave which feeds 8” mains through the GVHE development. A proposed 6” fire service loop is proposed for the apartments which will be owned and maintained at the Right-of-Way limits by the developer. This main can provide the required flow volumes for both domestic and fire flow demands to the development. This apartment complex sits entirely within the lower 1/3 of service elevations for zone 4 and is served by zone 4 pressure water. The apartments are three stories with a ground level with two elevated stories. Maximum finish floor above grade elevation for the water system is 21’-7” and an actual elevation near 7365’ which is inside the service band for zone 4 pressures. Analysis by City of Laramie staff showed no challenges presented with water pressures to service this development.

2.2 Design

The proposed subdivision improvements are to be connected to the existing 8” PVC water stubs

coming from Bill Nye Ave at the planned intersection locations. The pipelines proposed in the subdivision are a minimum of 8-inch diameter PVC pipe and will meet minimum cover requirements per City of Laramie Standards. This development includes two multi-family buildings which have 42-bedroom units. It is anticipated that each of the service lines will be 6-inch PVC into a common riser room before being distributed to each apartment.

Total water demand for apartments is anticipated to be an average of 125 gpd (0.087 gpm) per bedroom unit per day based on City of Laramie residential use data. Using a peaking factor of 2, the peak hour demand will be at 250 gpd (0.17gpm) per capita at peak hour use. This apartment development will require 5250 Gallons per day (3.65 gpm) average and the peak hour demand will be 10,500 Gallons per day (7.29 gpm) for consumption uses.

Fire flow demands for residential development is 1500 gpm for 2-hours. The proposed pipe distribution system is 8" pvc pipe with 6" pvc fire hydrant leads which can provide flow volumes in excess of the minimum values required by International Fire Code 2021 Appendix B provided adequate source water pressures. Because the subdivision is fed from a 14" PVC main in Bill Nye Ave, and residual pressures at 84 PSI during a fire demand, the system will be capable of meeting the minimum flow values required.

Water mains will consist of PVC C900 installed to a depth of at least six feet below the finished grade to prevent freezing. The system includes valves at each end of the service loop in accordance with WDEQ requirements for residential districts. Water mains will be placed a minimum of 10-feet horizontally from other utilities. Thrust blocking will be utilized at all fittings to prevent movement.

Fire hydrants are located at the southwest corner of the property and at the northeast intersection which maintains 200-foot intervals or less from all buildings on site, in accordance with WDEQ requirements. Building service lines shall follow City of Laramie standard details and terminate in a common riser room before continuing through building piping to each apartment.

2.3 Backflow Prevention

Per City of Laramie standard detail backflow prevention devices shall be located in the common riser room for each building.

2.4 Future connections

There are no future connections to the proposed water system anticipated as part of this project.

3.0 SEWER SYSTEMS

The proposed improvements to the sewerage system include a common 8" pvc line with new manholes which will connect to the City of Laramie sewer system in Sitting Bull Trail. The new service line will be privately owned by the developer and not part of the City of Laramie sanitary sewer system outside of previously dedicated rights-of-way.

3.1 Wastewater Flows

Please see Table 2 below for approximate average and peak flow for this apartment complex. This project's sanitary volumes to downstream collection and treatment facilities and wastewater type was planned for with the Grand View Heights development and are discussed in detail under the final plat report for the Grand View Heights Estates first filing. Additional calculations related to downstream flows for the full Grand View Heights Development flowing into Boulder Drive can be found in the appendices.

The proposed apartment complex will generate an average flow at full build out of 5250 Gallons per day (3.65 gpm) flowing into the manhole located in Sitting Bull Trail. Calculations below were performed for the apartment complex flowing into the city sewerage system at Sitting Bull Trail.

Estimated Wastewater Flows		
Type of Development: Private Dwelling on well or meter supply		
Water Duty- Average*	125	Gal/person/day
Water Duty- High*	340	Gal/person/day
Peak Per Capita Usage	131	Gallons/ day
Project Area- Average	5,250	Gpd
Project Area- High	10,500	Gpd

* (City of Laramie water use data, 2024)

Average flow depth calculations for the shallowest pipe slope are included in the appendix. Calculations show that the average flow depth for a 8" pvc pipe at 0.4% slope is 1.2" and is at 5% of full flow capacity. Pipe velocity of this segment is 1.5ft/sec which is above DEQ minimums to minimize settling and below maximums to prevent pipe scouring.

3.2 Design

A utility drawing shows the sanitary sewer system layout for apartments and how it connects to the city sewerage system in Sitting Bull Trail. Information related to the slopes, sizes and appurtenances can be found in the construction drawings. Generally, the sewer system sits to the west of both buildings and flows by gravity to the south, before combining with City of Laramie system piping at a manhole in Sitting Bull Trail.

Sanitary sewer main will be constructed with 8" PVC schedule 35 pipe. The slope meets the minimum requirement of 0.4 ft/ft for 8" line. The manholes will be new precast 48" diameter manholes with cast in place inverts to meet the design drawings.

3.3 Future Connections

There are no future connections to the proposed sewerage system anticipated as part of this project.

4.0 Storm Water Drainage

Lot two, block two of the Grand View Heights Estates subdivision is bounded by public street improvements on the north, east and south while the west boundary is shared with another multi-family lot. The final plat report for GVHE made some assumptions accounting for water drainage pertaining to the multi-family lots impervious surface areas. The table below is a copy of the table from the GVHE Final plat report showing assumed drainage from the multifamily lot 1 impervious surface area.

Table 3. Summary of Assumed Impervious Surface Areas

Lot Designation	Lot size (SF)	Number of Lots	Assumed Impervious Area
Single Family or Cottage Lot	4360-8200	58	3,000
Multifamily Lot 1	85,150	1	51,090
Multifamily Lot 2	65,600	1	39,360
Total Impervious Surfacing not Streets			264,450
Approximate R-O-W Surfacing Area			101,300

Construction plans for the Reserves apartments have a total impervious surface of 48, 570 sf. This impervious surface area includes all sidewalks, parking lot paving, and building footprint areas. The remainder of the site is planned to be landscaped per city of Laramie code. The total impervious surface area of the site plan is in line with original assumptions for the lot as submitted and accepted in the GVHE final plat submission.

4.1 Storm Water Flows

The primary catchment for the storm water south of Bill Nye Ave in this area is a detention pond constructed during the development of the Grand View Heights 7th Filing. The detention pond is oversized for the 100-year storm capacity and detention capacity accounted for the inclusion of the development proposed here. The pond outlet works has been designed so that the outflow is less than the historical 100-year event for the area. Per the drainage report for the 7th filing, the pond constructed for the area included additional pond capacity to accommodate flows from this development. The pond size required during the calculation of the 7th filing was 1.76 acre-feet of capacity, and as the pond was constructed the provided storage capacity of the pond within the park is 3.74 acre-feet. The additional storage capacity of the pond was built to handle the included development flows with the GVHE subdivision.

5.0 Traffic Impacts to the Subdivision

The traffic impact of the full subdivision has been assessed in the Grand View Heights Estates Traffic Impact Study by Ulteig Dated April 2024. That study evaluates the off-site intersection and road capacity for the additional trips from this subdivision with the existing Grand View Heights traffic loading.

For this submission, assessment on the trips associated only with the single lot for this apartment complex follows. There are 42 planned units for this apartment complex. The ITE Trip generation manual 11th edition uses a trip generation rate of 6.74 trips per multi-family housing unit (low rise). It is assumed that ½ of those daily trips are generated off site and ½ are generated on site.

With 42-units and 6.74 trips per unit, the total daily trips leaving site are 142 trips, and the total daily trips entering site are 141 trips.

With AM and PM peak hour trips per unit being less than 0.5 vehicles per hour, the entrances from the site are unlikely to see more than 1 vehicle per minute even during peak hours of the day. The low volume of traffic from this site should not impact the overall function of the local streets which the entrances connect with.

The total volume of traffic from this site is significantly less than the total volume assessed in the GVHE Traffic Impact Study and follows assumptions made under the subdivision traffic impact study.

References

Grand View Heights Planned Unit Development (PUD) Handbook.

EPA. (2019, 05 23). U.S. EPA DWMAPS. Retrieved from <https://geopub.epa.gov/DWWidgetApp/>

<https://www.epa.gov/sites/default/files/2017-02/documents/ws-specification-home-supstatement-v1.0.pdf>

Grandview Heights 5th Filing Utility Study by United Civil Design Group dated September 25, 2013.

Preliminary Drainage & Erosion Control Study Grand View Heights 7th Filing by United Civil Design Group Dated May 22, 2017.

Final Plat application for Grand View Heights Estates, First Filing. By SolTerra Engineering dated August 2024.