

Grand View Heights Estates Preliminary Plat Design Report

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1.0 INTRODUCTION

1.1 Project Description

The proposed project, identified as 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.

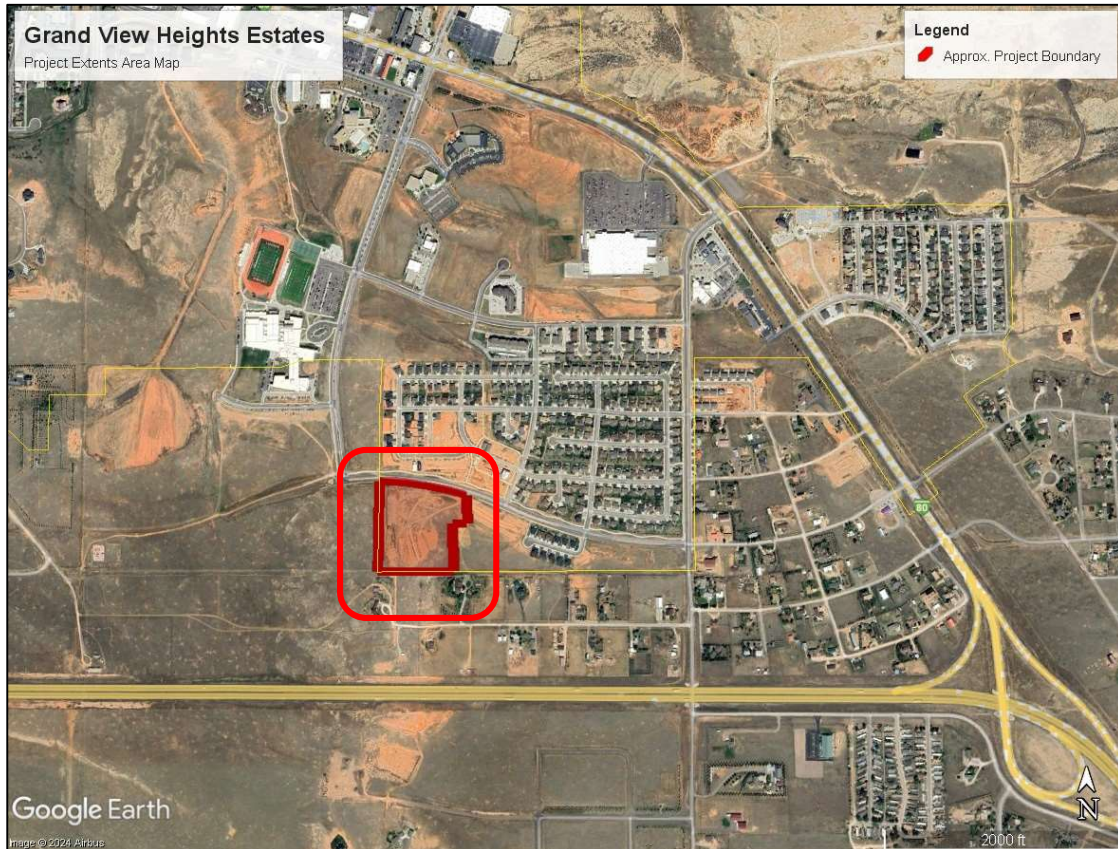


Figure 1- Project Extents

It is the intent of the developer to phase construction of the development, however, this report will address the design considerations of the full subdivision development as it relates to constraints of pipe sizing and flow design characteristics. The development is subject to a Planned Unit Development (PUD) handbook filed with and accepted by the City of Laramie. The PUD Handbook contains minimum design standards for roadway widths, roadway sections, storm drainage requirements and building facade elements. A copy of the PUD Handbook can be found attached to this report in the appendix.

The project is comprised of installation of water, sanitary and storm sewer pipe and appropriate appurtenances to service a new subdivision adjacent to Bill Nye Avenue within the City of Laramie corporate limits. The subdivision will be 58 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 located within 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 Bill Nye right-of-way and sanitary sewer collection will be connected to an existing sanitary sewer stub planned for during the construction of Grand View Heights subdivision and Bill Nye Ave improvements. Storm sewer pipe will be installed within the project boundary and daylight along the east boundary of the property then surface flow less than 1500 lineal feet to a regional detention pond constructed as part of a previous filing of Grand View Heights 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.

The development will include paved roadway sections through the dedicated rights-of-way. Surface stormwater will be conveyed within the planned curb and gutter sections until they can be diverted to catchments and piped to drain into a regional detention pond. More discussion on the stormwater plan can be found in the appropriate section to follow.

1.2 Background

The developer has held this property for several years and the parcel being developed was part of the greater area master plan originally called Grand View Heights subdivision. The subdivision here is being called Grand View Heights Estates at request of the Albany County Planning Department to designate the parcel as different from the original filings. 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 14” main within Bill Nye Ave is the primary feed for the development. This main can provide the required flow volumes for both domestic and fire flow demands to the development. Hydraulic analysis of the pressures along Bill Nye Ave are included in the design reports for the Grand View Heights 5th Filing and the design of this subdivision was accounted for in regional

planning during the construction of Bill Nye Ave with the inclusion of the pressure reducing vault located to the north west corner of this subdivision being the pressure zone break for zone 4 water. This subdivision sits entirely within the lower 1/3 of service elevations for zone 4 and is served by zone 4 pressure water.

2.2 Design

The proposed 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 57 single family or twin-home lots, each of which would have their own service meter located inside the home. There are also two lots adjacent to Bill Nye Ave which are proposed multi-family complexes which could have up to 66-bedroom units, the easterly having 42 apartments and the westerly having 24 apartments. These lots would be serviced each by separated domestic water and fire prevention connections. 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 the homes and apartments is anticipated to be 131 Gallons/person per day based on City of Laramie residential use data. Typical household use for single-family and twin homes is expected at three persons per household for 363 gallons per day (0.25 gpm per household). Using a peaking factor of 2, the peak hour demand will be at 340 gpd (0.24gpm) per capita at peak hour use. Water demand for apartment use is generally accepted at lower rates and assumed here to be an average of 125 gpd (0.087 gpm) per bedroom unit. The build out of the development will require 28,941 Gallons per day (20.1 gpm) average and 80,580 gallons per day (56.0 gpm) peak hour demand. Maximum day flow rate would be approximately 31,100 gpd (21.6 gpm) for the development at full build out.

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 intersection 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 maintained at 400-foot intervals or less, in accordance with WDEQ requirements. Hydrant leads consist of 6-inch diameter C900 PVC. Water service lines will consist of ¾" type K copper. Curb stops will be installed near property lines.

2.3 Backflow Prevention

Individual residences are required to provide their own backflow prevention devices.

3.0 SEWER SYSTEMS

The proposed improvements to the sewerage system are an extension of the sanitary collection system for the City of Laramie. New sanitary mains will service individual lots with typical 4-inch sanitary sewer taps extended during construction to the property line. The new multi-family lots will have a single connection point directly into an additional manhole to allow for cleaning as necessary. Assumptions are made for the multi-family development as the developer for the subdivision is not directly involved in the design of the apartment complexes.

3.1 Wastewater Flows

Please see Table 2 below for approximate average and peak flow for this development. It is not anticipated that this project will have adverse effect on volumes to downstream collection and treatment facilities as the service area and wastewater type was planned for with the Grand View Heights development and are discussed in detail as modeled in the *Grandview Heights 5th Filing Utility Study* by United Civil Design Group dated May 20, 2014. 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 development will generate an average flow at full build out of 28,941 gpd (20.1 gpm) flowing across Bill Nye Ave on to the northern portion of Grand View Heights Subdivision.

Estimated Wastewater Flows		
Type of Development: Private Dwelling on well or meter supply		
Water Duty- Average*	131	Gal/person/day
Water Duty- High*	340	Gal/person/day
Estimated Lot Occupancy	3	people
Average Per Capita Usage	122	Gallons/day
Peak Per Capita Usage	131	Gallons/ day
Project Area- Average	28,941	Gpd
Project Area- High	31,100	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.

Flow volume calculations indicate that the 8" sanitary sewer main for the full build out of the development flowing into Bill Nye Ave (12" sanitary sewer) is at 24.4% full flow capacity and will be adequately sized for the volumes generated by the full build out of the development. It is understood that the overall discharge from the subdivision would be slightly higher than original

preliminary plat assumptions done circa 2005 and that the GVH-5 report also addressed an increase in density above the preliminary plat volumes.

Updated calculations show that the whole area of Grand View Heights with the updated density increases peak flow volumes by 23% over the assumptions made in the GVH-5 report, though this sounds like a large increase in density and flow, it is less than a 5% increase in 8" pipe capacity and should have no negative impact on development outflow volumes.

3.2 Design

A map showing the sanitary sewer system layout for GVHE in relation to the street layout is included in the construction drawings. Information related to the slopes, sizes and appurtenances can be found in the construction drawings. Generally, the sewer system flows by gravity to the northwest intersection with Bill Nye Ave before crossing Bill Nye Ave north then through the Grand View Heights development, before combining with other City of Laramie system piping at Boulder and Beech streets.

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 sanitary sewer services will be stubbed out past the property line with 4" PVC and the slope and flows meet the requirements of the Chapter 12. The manholes will be new precast 48" diameter manholes with cast in place inverts to meet the design drawings.

4.0 Storm Water Drainage

This development is comprised of a rounded hilltop with gentle to medium slopes with a rocky ridge bisecting the property from north to south generally creating two drainage basins, one flowing east and one flowing west. The addition of roadways with hard surface paving and gutters will create new drainage conveyances that may move portions of water from one historic basin to another. Overall drainage areas will not change significantly from the flows calculated within the Preliminary Drainage & Erosion Control Study Grand View Heights 7th Filing report by United Civil Design Group dated May 22, 2017 and accepted by the City of Laramie.

The May 2017 report addressed the development parcel with proposed roadways in approximately the same configuration as shown on the drawings for this filing. The primary alteration from the May 2017 report to this date is that the portion of the development adjacent to Bill Nye Ave and bounded by Big Sky Trail and Red Cloud Trail is no longer proposed as single-family homes but two lots for multifamily development.

We anticipate that the multifamily development will require its own storm drainage review as part of the site plan review process for that development and will be assumed as 60% of the total lot area for the purposes of this report.

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 future development of this subdivision.

Grading on the development will be updated upon commencement of the roadway construction to allow for lot drainage to collect onto the street sections before being conveyed to the detention pond or to the connection with Bill Nye Ave.

Total area of impervious surface for each lot is assumed to be 3000sf based on a home footprint of 2400sf plus 600sf of other impervious surface improvements on each lot. The roadway section including sidewalks, curb & gutter is 48 feet wide and has the City of Laramie rollover type curb section. The roadway curb and gutter will convey storm water from the lots to catch basins or curb cuts then through drainage swales to storage or detention as appropriate.

Table 3 below shows the approximate lot sizes and areas of impervious surfacing which are included in the proposed development.

Table 3. Summary of Assumed Impervious Surface Areas

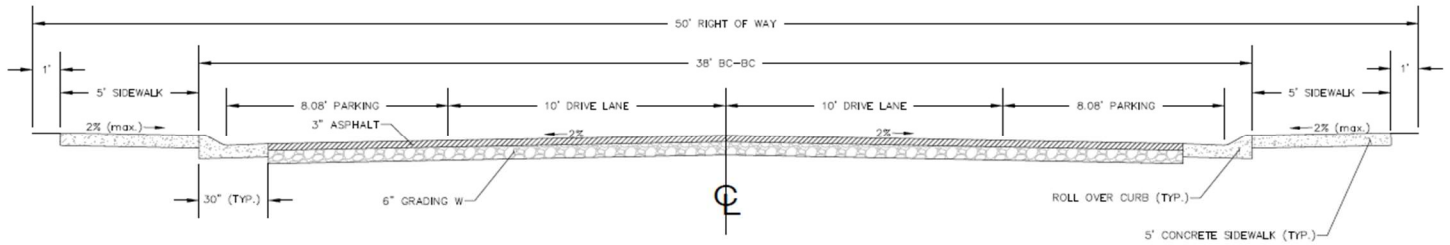
Lot Designation	Lot size (SF)	Number of Lots	Assumed Impervious Area
Single Family or Cottage Lot	4360-8200	58	3,000
Multifamily Lot 1	85,150	1	51,090
Multifamily Lot 2	65,600	1	39,360
Total Impervious Surfacing not Streets			264,450
Approximate R-O-W Surfacing Area			101,300

4.0 Street Section Design

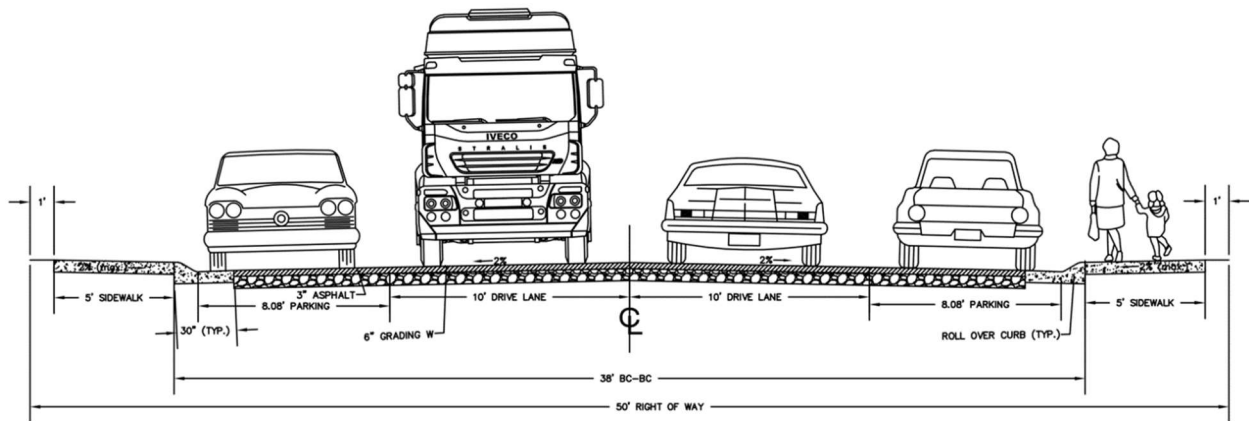
It is our goal and hope to continue to help address the lack of affordable housing in Laramie through our current & future development plans. In order to achieve this in general these days, homes must be smaller from a total square footage standpoint, and residences must be designed in a higher density format from a platting standpoint. These design considerations have a direct effect on Right-Of-Way (ROW) widths and actual street section widths as measured from back of curb to back of curb on a street cross section plan

The road section for this development is narrower than the typical City of Laramie standard but was structured to meet the needs of the development while maintaining the consistent feel of the other portions of the Grand View Heights Development. The proposed road cross section is designed to fit within a 50' Right of Way while allowing parking on both sides of the street and maintaining 10' travel lanes.

The following image shows proposed lane widths.



38' STREET SECTION in 50' RIGHT OF WAY



38' STREET SECTION in 50' RIGHT OF WAY

In addition to several of the older Filings, GVH 6th & 7th Filings contain street widths that measure between 36'-38' wide as measured from back of curb to back of curb on the street cross section plan. There are several streets within these previously approved Filings that measure 36' from back of curb to back of curb, within a 50' wide ROW section, that have and continue to have functional parking on both sides of the street. We have not heard of nor encountered any problems or issues with this design. Because of the higher density nature of the GVHE plat design, it was our original intent to propose a 36' wide street section for that area, but after hearing of the initial width concern from certain City staff & discussing it with the project engineer, we elected to widen the proposed street width design for GVHE to 38'.

To alleviate issues with vehicle turning movements around intersections and corners, parking along both sides of the street will be prohibited within appropriate distance of the intersections to accommodate the sight distance triangles required for vehicles at 25 miles per hour. The 25 mph speed was used because the streets are classified as local only with no through connections and the proposed 50' ROW section. Signage for 25 mph will be included in the development construction.

All previous streets within the totality of the constructed portions of Grand View Heights (GVH) have 3" thick asphalt pavement sections. In other words, all paved streets within GVH have 3" of

asphalt as their surfaces. Laramie's current code calls for 4" of asphalt thickness, and we are respectfully requesting to follow previous construction methods. The 3" pavement thickness is the standard street specification for a multitude of municipalities we have completed projects in throughout our 20 year development career, including the City of Cheyenne, and several cities along the front range of Colorado. To maintain consistency with other phases of the GVH development we propose using a 3" pavement thickness that has been approved in previous PUD handbook editions & constructed on all previous filings within GVH.

It is the intent of the developer to manufacture road base material on site using the overburden rock currently stockpiled on the property. A mobile crusher will be brought to the site and set up to produce the Grading W base material being proposed for use under roads and sidewalks. Base placed under roads, sidewalks and curb will be placed at 6" depth and compacted to 95% of standard proctor. We feel that this manufactured material with the 3" proposed asphalt section will provide adequate load capacity for the traffic experienced in this local subdivision.

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-suppstatement-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.