NATRONA COUNTY

Development Department

200 North Center Street, Room 202
Casper, WY 82601

AGENDA
Natrona County Planning Commission
Tuesday, July 14, 2020 – 5:30 P.M.
District Courtroom #1, 200 North Center St., Casper, WY 82601

ITEMS ON THIS AGENDA ARE SUBJECT TO A SECOND PUBLIC HEARING BEFORE THE BOARD OF COUNTY COMMISSIONERS FOR FINAL ACTION. RECOMMENDATIONS BY THE PLANNING COMMISSION ON ITEMS FROM THIS AGENDA MAY BE CONSIDERED BY THE BOARD OF COUNTY COMMISSIONERS AT ITS MEETING AUGUST 4, 2020 AT 5:30 P.M.

1. Approval of the May 12, 2020 Planning Commission meeting minutes.

2. **PS20-2** – Request to subdivide a 5.04-acre parcel of land into 2 lots to be known as Zero Road Industrial Park, Lots 3A & 3B. This parcel currently has 2 buildings addressed as 1014 & 1028 N. Robertson Road.

3. **CUP20-3** – A Conditional Use Permit (CUP) by Union Wireless/Hemphill for an 84-foot self-supporting communication tower on an existing site located at 56252 W. US Highway 20-26. Applicant is requesting 100-feet to include all appurtenances. This location is approximately 4 miles west of Hiland.

4. **CUP20-4** – A Conditional Use Permit (CUP) by Union Wireless/Hemphill for an 84-foot self-supporting communication tower on an existing site located at 15303 Arminto Rd. Applicant is requesting 100-feet to include all appurtenances.

5. **CUP20-5** – A Conditional Use Permit (CUP) by Union Wireless/Hemphill for an 84-foot self-supporting communication tower on an existing site located at 21755 State Highway 220. Applicant is requesting 100-feet to include all appurtenances. This location is east of Highway 220 and north of Grey Reef Rd.

---PUBLIC COMMENT---

6. "Public Comment" is a time when citizens may bring forth items of interest or concern that are not on the agenda. Please note that no formal action will be taken on these items during this time, due to the open meeting law provision. However, they may be scheduled on a future posted agenda, if action is required.

ADA Compliance: Natrona County fully subscribes to the provisions of the Americans with Disabilities Act. If you desire to attend this public meeting and are in need of special accommodations, please notify the Natrona County Development Department at (307) 235-9435 so that appropriate auxiliary aids and services are available.

NATRONA COUNTY

Development Department

200 North Center Street, Room 202
Casper, WY 82601

MINUTES OF THE
NATRONA COUNTY PLANNING COMMISSION
May 12, 2020

MEMBERS PRESENT: Harold Wright, Jim Brown, Bob Bailey, Tom Davis and Hal Hutchinson

MEMBERS ABSENT: None

STAFF MEMBERS PRESENT: Jason Gutierrez, Trish Chavis and Peggy Johnson

OTHERS PRESENT: Charmaine Reed, Deputy County Attorney, Eric Nelson, County Attorney

Chairman Wright called the meeting to order at 5:30 p.m.

ITEM 1

Brown moved and Bailey seconded a motion to approve the March 10, 2020 meeting minutes as presented. Motion carried unanimously.

ITEM 2

Chairman Wright opened the hearing for **CUP20-2** – A Conditional Use Permit (CUP) by Dinosolar, LLC for a 240-MW Utility Scale Solar Energy System on a portion of land, north of Casper and west of Bar Nunn. This request also includes **VC20-1** – A Variance by Dinosolar, LLC to reduce the eastern setback from 1.25 miles to .63 miles from a residential zoning district.

Gutierrez gave the staff report. Staff proposes a motion and vote by the Planning and Zoning Commission to recommend approval of the requested Conditional Use Permit and Variance with the following conditions:

1) Recommendations of the Wyoming Game & Fish Department as stated in the letter dated March 4, 2020 are adhered to.
2) Work with the Wyoming Department of Transportation (WYDOT) on appropriate access and intersection improvements through the access permit process. Evaluate and mitigate construction as necessary.
3) Construction shall commence no later than December of 2022 or a new Conditional Use Permit will be required.
4) Road improvements shall be to County road standards and shall be maintained throughout entire construction phase, this includes dust and drainage controls. Access roads shall also be restored to County road standards once decommissioning has been completed.
5) Semi and heavy truck traffic shall occur between 7 A.M. and 4 P.M if access is through a residential area.
6) Financial assurance agreeable to Board for decommissioning per the Zoning Resolution.

Staff also recommended the Planning Commission incorporate by reference all findings of fact set forth in the staff report and this public hearing.

Public hearing open with all participants signed into video conference.

Those speaking in favor – John Masterson, Casper, Christine Mikell, Salt Lake City, Utah

Those speaking in opposition via phones – Steve and Schelly Burnett, Tom Van Kleef, and Roy Rogers, Casper

Brown makes a motion to recommend approval of CUP20-2 by the Board of County Commissioners including the five conditions as presented by staff subject to the variance (VC20-1) approval. Hutchinson seconded the motion.

Brown amended the motion to include the sixth condition that was presented by staff. Hutchinson seconded the amended motion.

Brown make a motion to recommend approval VC20-1 as presented by staff and incorporate by reference all findings of fact as presented by staff. Davis seconded the motion.

Motions carried unanimously.

Public Comment – None

Meeting adjourned at 8:15 p.m.

_____
Harold Wright, Chairman
Natrona County Planning and Zoning Commission

_____
Tracy Good
Natrona County Clerk

Applicant Name: Energy 307, LLC

Applicant Address: 6790 Casper Mountain Road, Casper, WY 82601

Applicant Phone: 307-215-6057

Owner Name: SAME

Owner Address: Same

Owner Phone: Same

Explain why you are requesting this major subdivision and detail the proposed use:

Plan to divide the parcel into two lots and develop both lots for commercial use

Legal description, acreage, and Parcel Identification number (PID) (if within a platted subdivision, give subdivision name, block and lot number. If not within a platted subdivision, give quarter-section, section, township and range).

Lot 3 Zero Road Industrial Park
PID# 33800310200300

Current zoning of property: LI

Type of sewage disposal ☐ Public ☒ Septic ☐ Holding Tank ☐ Other

Source of Water: Town of Mills

This property was purchased from: Daniel J McGlade

The date this property was purchased: 10/19/17

I (We) hereby certify that I (We) have read and examined this application and know the same to be true and correct to the best of my (our) knowledge. Granting this request does not presume to give authority to violate or cancel the provisions of any other State or local laws. Falsification or misrepresentation is grounds for voiding this request, if granted. All information within, attached to or submitted with this application shall become part of the public record. I (We) further understand that all application fees are non-refundable.

Applicant: _____ Date: 5-26-2020
(Signature)

Print Name: Dan McGlade

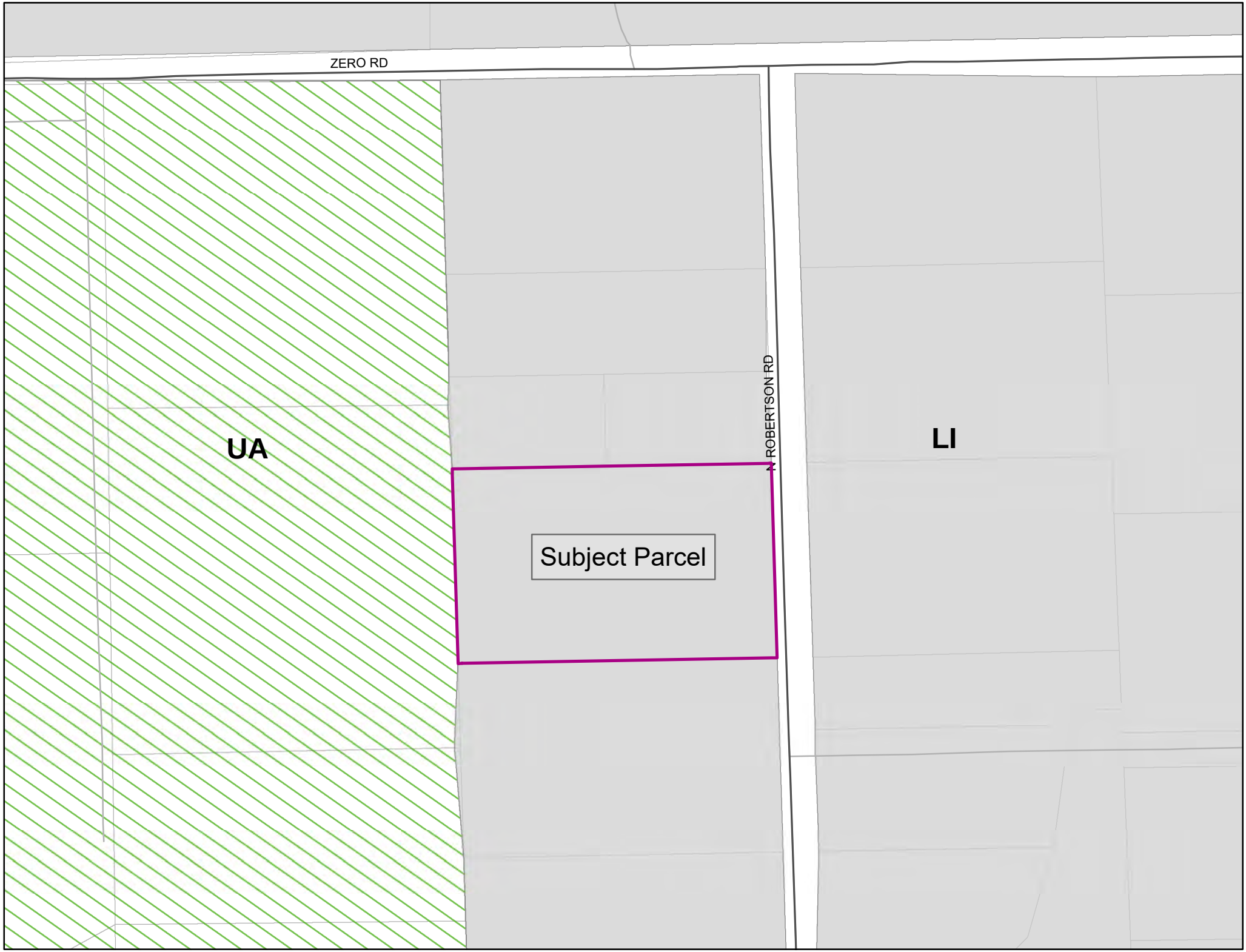
Owner: _____ Date: 5-26-2020
(Signature)

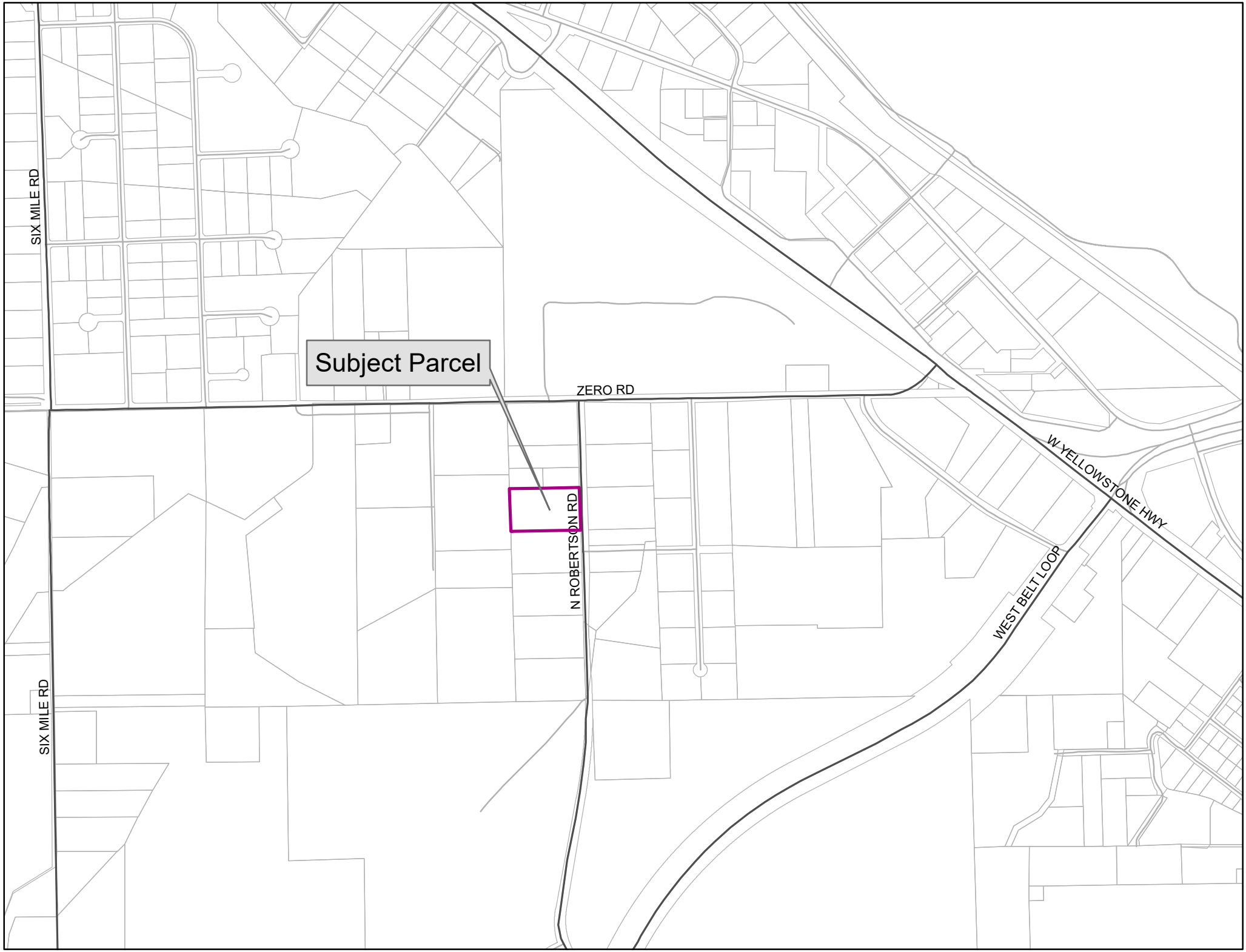
Print Name: Dan McGlade

_____
Initials

I (We) are aware that the Legal notice fees and the County Surveyor fees must be reimbursed to the Development Department prior to the recording of the Subdivision plat. In the event that the Subdivision is not approved, withdrawn, or not recorded, we are still responsible for the County Surveyor fees.


Subject Parcel
N ROBERTSON RD


ZERO RD
N ROBERTSON RD
UA
LI
Subject Parcel


Subject Parcel
SIX MILE RD
ZERO RD
N ROBERTSON RD
W YELLOWSTONE HWY
WEST BELT LOOP
SIX MILE RD

PS20-2

STAFF REPORT: Trish Chavis
June 10, 2020

For

July 14, 2020
Planning and Zoning Commission Meeting
&
August 4, 2020
Board of County Commissioner Meeting

APPLICANT: Energy 307, LLC

REQUEST: To subdivide a 5.04-acre parcel of land into 2 lots to be known as Zero Road Industrial Park, Lots 3A & 3B.

LOCATION AND ZONING

The parcel currently has 2 buildings addressed as 1014 & 1028 N. Robertson Rd.

The subject parcel, parcels to the north, east, and south are zoned Light Industrial (LI). The parcels to the west are zoned Urban Agriculture (UA).

DEFINITION AND APPLICATION

1. Intent and purpose. The intent and purpose of the Light Industrial (LI) district is to provide for light manufacturing and storage facilities. Zoning Resolution of Natrona County, Wyoming, Chapter VI, Section 11 at page 42.

2. Major Subdivision. A Major Subdivision is a division of one parcel into two or more parcels. Subdivision Regulations of Natrona County, Wyoming, Chapter 2, Section 1d at page 9.

The proposed subdivision will consist of two lots.

GENERAL STANDARDS
FOR
MAJOR SUBDIVISIONS

1. Criteria for Approval

a) The subdivision is consistent with the Natrona County Development Plan and the Natrona County Zoning Resolution.

The proposed subdivision is located in Neighbor 14 (West Belt Loop/Robertson) of the 2016 Development Plan. The Development Plan recommends industrial development with residential development closer to Mills.

Proposed Finding of Fact. The proposed subdivision is developed and does comply with the Development Plan and Zoning Resolution.

b) The subdivision is in conformance with the General Provision (Chapter 1) and Subdivision Design Standards (Chapter 7).

Proposed Finding of Fact. This subdivision has been processed in accordance with the applicable General Provisions and Subdivision Design Standards of the 2013 Natrona County Subdivision Regulations.

c) The applicant has provided evidence that a sufficient water supply system will be acquired in terms of quantity, quality, and dependability for the type of subdivision proposed.

The existing structures are currently supplied water from an existing Mills waterline.

Proposed Finding of Fact. Both structures currently have water served by the Town of Mills.

d) The applicant has provided evidence that a public sewage disposal system will be established and, if other methods are proposed, evidence that the system complies with state and local laws and regulations.

Proposed Finding of Fact. Both structures have newly installed septic systems that were approved through the Department of Environmental Quality (DEQ).

e) The applicant has provided evidence to show all areas of the proposed subdivision, which may involve soil or topographical conditions presenting hazards or requiring special precautions, have been identified by the applicant and the proposed uses of the areas are compatible with such areas.

The subdivision does not lie within any established flood plain. There are no soil or topographical conditions that currently exist.

f) Necessary services, including fire/police protection, schools, recreation, utilities, open space and transportation system, are available to serve the proposed subdivision.

This subdivision will be within the Natrona County Sheriff's jurisdiction. The proposed subdivision has adequate utility easements provided. This will be an area of industrial/commercial uses, no recreation or schools are proposed.

g) The subdivision appears to be compatible with the surrounding area, not detrimental to the future development of the area, and not detrimental to the health, safety, and general welfare of the inhabitants of the area and the County.

Proposed Finding of Fact. The subdivision is developed. There will be no detriment to the health, safety and general welfare of the inhabitants of the area and the County.

h) Documentation satisfactory to the Board of County Commissioners that the Improvement and Service District requirements have been met.

Proposed Finding of Fact. Access to the subdivision is from Robertson Road and is maintained by NC Road & Bridge. An Improvement and Service District will not be required for this subdivision.

i) Documentation that the subdivider has adequate financial resources to develop and complete water and/or sewage systems or any facility proposed or represented to be the responsibility of the subdivider, but not limited to the above mentioned.

As stated above, the systems are in place, no financial guarantee is required.

PUBLIC COMMENT

The property owners within 1/4 mile were notified resulting in 9 neighbors being notified.

As of the date of this staff report, no comments have been received.

PROPOSED MOTION

Staff proposes that the Planning and Zoning Commission enter a motion and vote to recommend approval of the requested major subdivision by the Board of County Commissioners and incorporate by reference all findings of fact set forth herein and make them a part thereof.

Site Name: Poison Creek
Site Address: 56252 W. US Highway 20-26, Casper WY 82604
GEOCODE: 37882730000700 **Lat/Long:** 43 8 26.5 -107 24 29.04

Purpose of Request

Union Wireless is committed to improving coverage and expanding network capacity to meet customer demand throughout the State of Wyoming. The existing Wireless Communication Facility (WCF) provides residents, visitors and businesses with high quality reliable wireless service for both personal & business, in addition to enhancing emergency services.

Union Wireless is proposing the following at the existing WCF located at 56252 W. US Highway 20-26, Casper.

Details of Request

Union Wireless is proposing a new 80' self-support tower at the existing WCF, but **requesting approval for a 100' self-support tower**. The existing site footprint will be expanded to accommodate the upgrades as detailed on the attached site plan/elevation (see sheet C2-1). The existing 50' Union self-support tower will remain for a period to accommodate the transfer of equipment to the new tower.

The proposed upgrades are necessary to allow Union Wireless to continue providing the best possible service to the adjacent community, in addition to enhancing emergency service capabilities through FIRSTNET.

Technical Information

Steel four leg 80' self-support tower designed to accommodate multiple carriers, please see Exhibit A for tower structural/technical details.

Valmont self-support tower, proposed antennas are COMMSCOPE NNH4-65C-R6-V3, please see Exhibit A for tower structural/technical details and Exhibit B for antenna spec's.

Union/Hemphill is proposing an 80’ Self-Support Tower with 3 sectors of antennas, please see Exhibit A for tower details. No lighting is required at the proposed location/height per FAA TowAir.

The proposed frequency range is 698-896 MHz to 1695-2360 MHz

Please see Exhibit B - Antenna Spec’s for the actual intended transmission, effective radiated power etc.

Please see Exhibit B - Antenna Spec’s for direction of maximum lobes and associated radiation of the antennas etc.

Please see Exhibit C - NIER Report.

Union Wireless is an FCC licensed carrier, therefore all transmissions will be within the allocated frequencies and will not cause interference with any other licensed transmission.

Please see the Exhibit D – Union FCC License Info.

Please see Exhibit F for information on proposed tower foundation, soils etc.

FAA does not require lighting for the proposed height, which is typical for sites under 200’ unless the site is very close to an Airport.

The proposed 80’ Self-Support tower will replace the existing 40’ Union Self-support at the existing cell-site, and is structurally designed to accommodate multiple carriers.

Please see Exhibit A with information on the tower/foundation engineering compliant with local, County, State and Federal structural requirements.

Grounding and Bonding, please sheets E4-1, G1-1 and G1-2 for details.

The existing cell-site is far removed from the nearest residential. The site is visible from US HWY 20-26, however setback far enough to not be in the peripheral view of passing traffic.

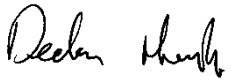
Please see the attached photo simulations of the before and after views.

The subject location is an existing cell-site. The proposed changes mainly in tower height will be noticeable but should have little visual impact or public concern give the setback of the existing sites.

The existing cell-site currently has screening in place, so Union Wireless will continue to maintain the current screening to maintain consistency with the existing screening.

Please let me know if you need any additional information.

Sincerely,



Declan Murphy
Coal Creek Consulting for Union Wireless/Hemphill
2166 E. University Dr. #201, Tempe, AZ 85281
Tel: (602) 326-0111
Email: dmurphy@coal-creek.com

and Zoning Commission and **Board of County Commissioners** shall require showings concerning all of the following:

1. The owner of record or contract purchaser has signed the application.

2. Granting the conditional use permit will not contribute to an overburdening of County Services.

3. Granting the conditional use will not cause undue traffic, parking, population density, or environmental problems.

4. Granting the conditional use permit will not impair the use of adjacent property or alter the character of the neighborhood.

5. Granting the conditional use permit will not detrimentally affect the public health, safety, and welfare, or nullify the intent of the Development Plan or the Zoning Resolution.

APPLICATION INSTRUCTIONS

This is an application for a conditional use permit for wireless telecommunication facilities on the parcel described hereon. By completing the application form and providing the other requested information, your application will be acted upon in the fastest, fairest manner prescribed by law.

Person preparing report:

Name: Declan Murphy for Union Wireless/Hemphill

Address: 2166 E University Drive, Suite 201, Tempe AZ 85281

Phone Number: 602 326 0111

Property Owner:

Name: Deer Creek Ranch Inc

Mailing Address: 112 Missouri Road, Shoshoni WY 82649

Phone Number: 307 856 4401

Physical Address: US Hwy 20, Casper WY 82601

Tax map parcel no: 37882730000700

Name: Declan Murphy for Union Wireless/Hemphill

Address: 2166 E University Drive, Suite 201, Tempe AZ 85281

Phone Number: 602 326 0111

Legal form (Corporation, LLC, etc.) Union Telephone Company

If purchased tower, date of purchase: Original Lease date 9/16/2008

GPS coordinates of tower: Lat/Long: 43 8 26.5 -107 24 29.04

Original Conditional Use Permit resolution number:

Dated of original Conditional Use Permit:

Operator:

Name: Union Wireless

Address: PO Box 160, Mountain View WY 82939

Phone Number: 602 326 0111

Signatures

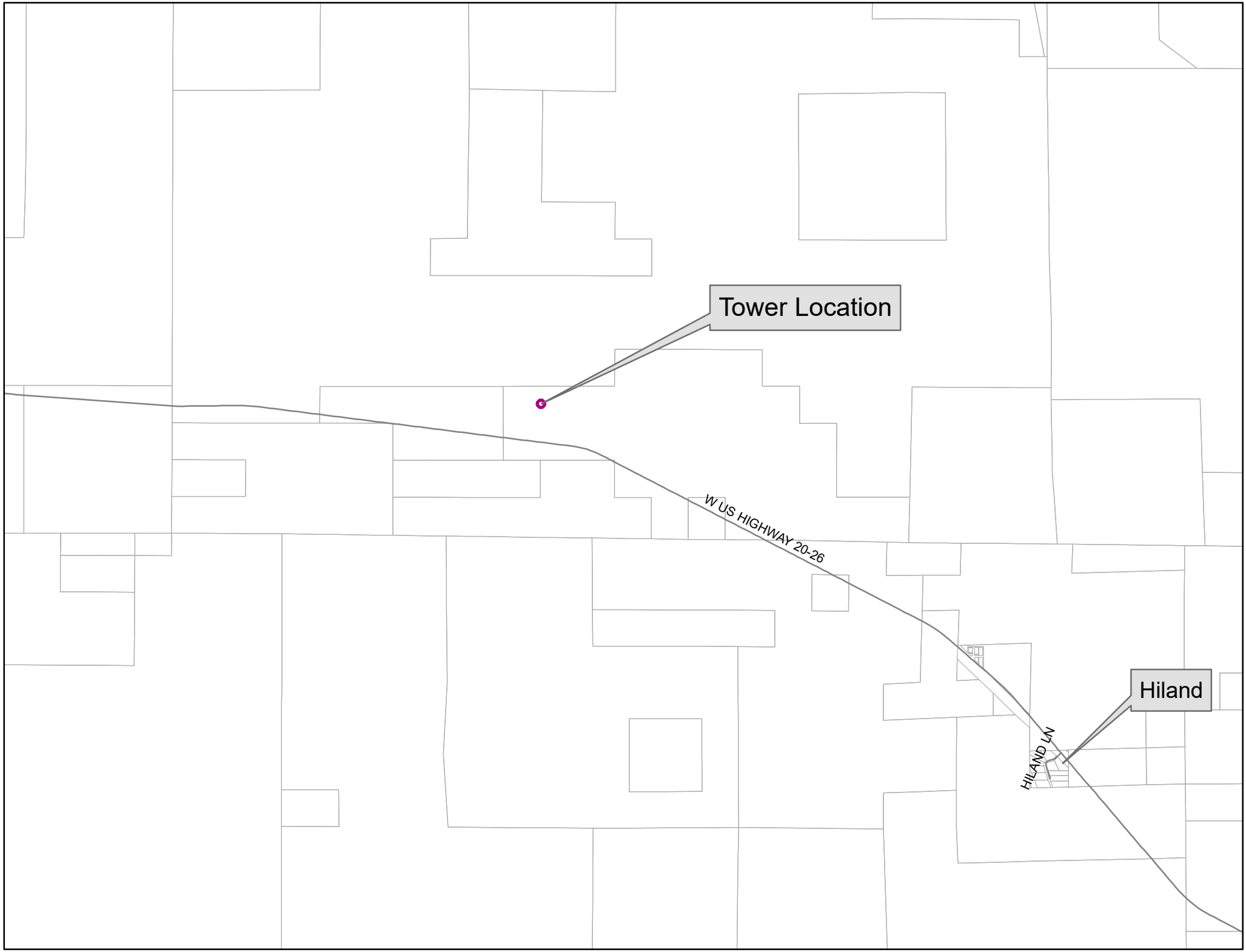
I (We) hereby certify that I (We) have read and examined this application and know the same to be true and correct to the best of my (our) knowledge. Granting this request does not presume to give authority to violate or cancel the provisions of any other State or local laws. Falsification or misrepresentation is grounds for voiding this request, if granted. All information within, attached to or submitted with this application shall become part of the public record, except as modified by applicable regulations. **I (We) further understand that all application fees are non-refundable.** By signing the application I am (We are) granting the Development Department access to our property for inspections.

Applicant: Declan Murphy Date: 3-3-20
(Signature)

Print Applicant Name: Declan Murphy

Owner: Robert Pingetzer MD Date: 5-28-2020
(Signature)

Print Owner Name: Robert Pingetzer MD
Pingetzer Six Iron Ranch LLC


Tower Location
W US HIGHWAY 20-26
Hiland
HILAND LN

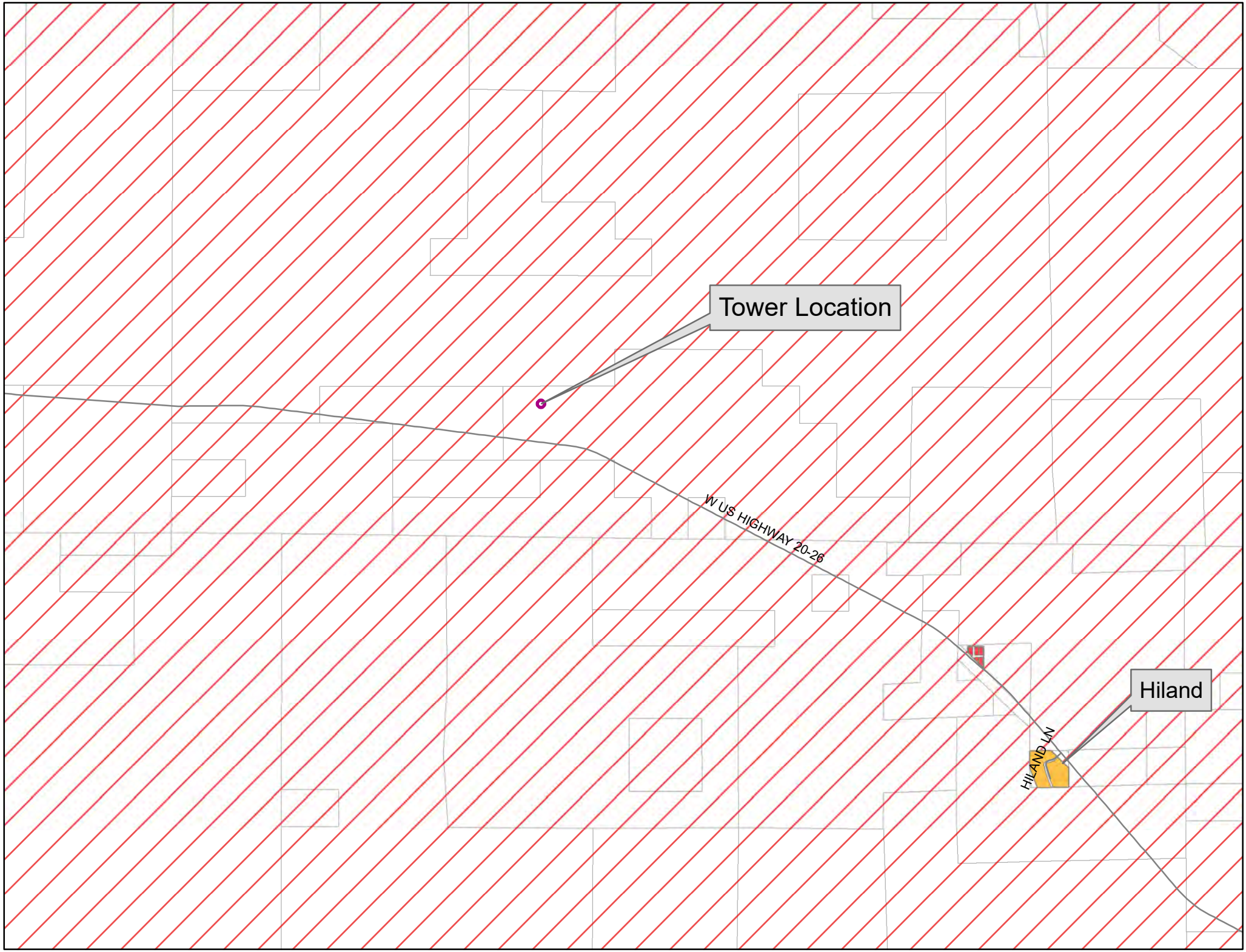

Tower Location
W US HIGHWAY 20-26
Hiland
HILAND LN

PHOTO SIMULATIONS

12063 - Poison Creek

LAT 43º 8’ 26.25”
LONG -107º 24’ 29.04”

HEMPHILL®

COAL CREEK CONSULTING

simulations C·J·B

Note: Simulations are an artistic illustration created to represent how the proposed project may look once constructed. Simulations are create to match the current design as accurately as possible, but are not guaranteed to match the final build.

Before:

PHOTO SIMULATIONS

12063 - Poison Creek

LAT 43º 8’ 26.25”
LONG -107º 24’ 29.04”

After:

View 1

Looking Northeast

Before:

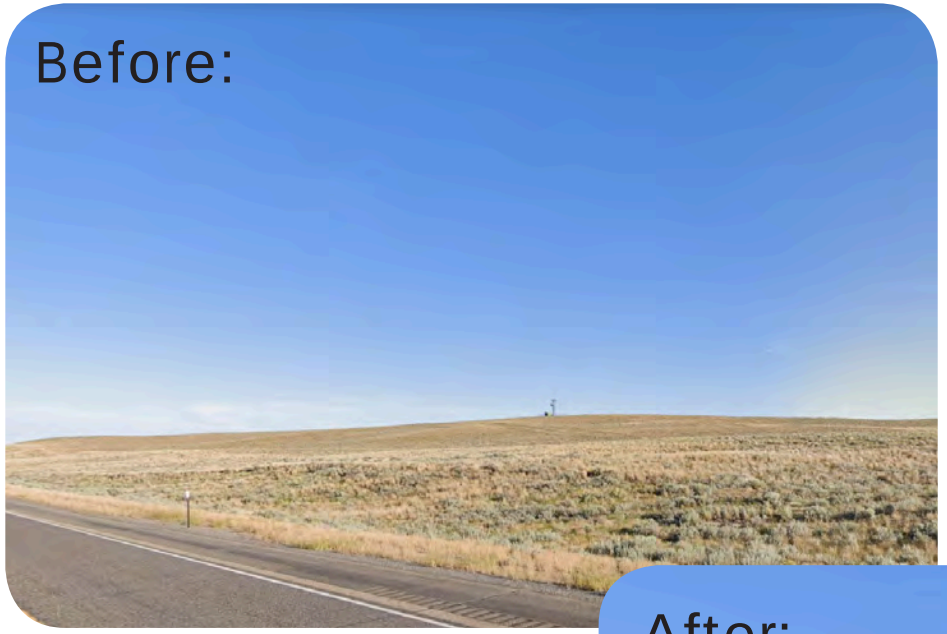


PHOTO SIMULATIONS

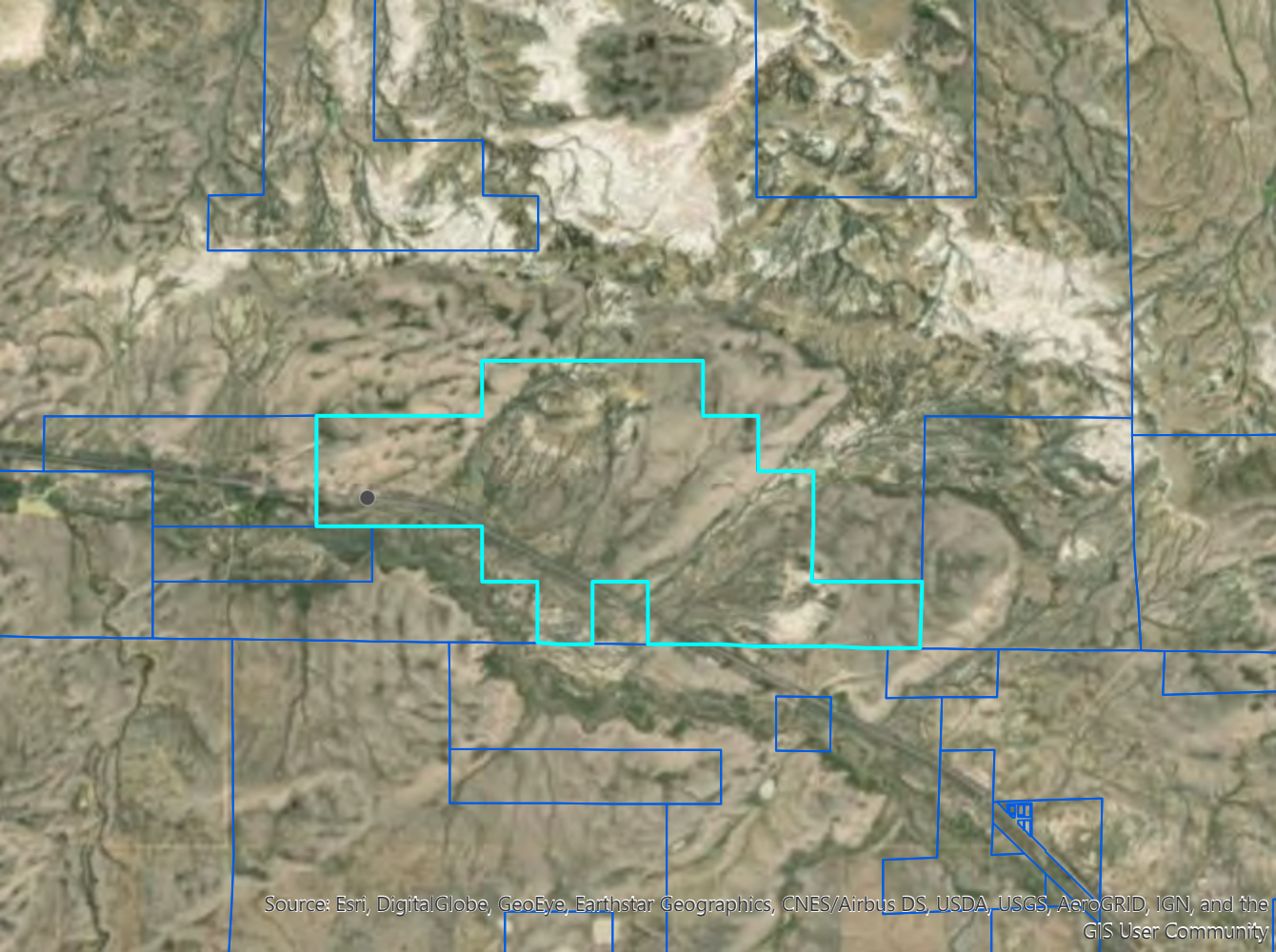
12063 - Poison Creek

LAT 43º 8’ 26.25”
LONG -107º 24’ 29.04”

After:

View 2

Looking Northwest


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

GEOTECHNICAL ENGINEERING REPORT

NEW HEMPHILL 4-LEG SELF-SUPPORT TOWER

POISON CREEK – SITE # 12063

US HIGHWAY 20

NATRONA COUNTY, CASPER, WYOMING

Prepared for:

Hemphill, LLC
1350 North Louisville Avenue
Tulsa, Oklahoma 74115

Prepared by:

• Geotechnical Services
• Environmental Services
• Material Testing Services

PALMERTON & PARRISH, INC.

Springfield, MO
4168 W. Kearney Springfield, MO 65803
Call 417.864.6000 Fax 417.864.6004
www.ppimo.com

PROJECT NUMBER: 261436

May 13, 2020

PALMERTON & PARRISH, INC.

GEOTECHNICAL & MATERIALS ENGINEERS
MATERIALS TESTING LABORATORIES
ENVIRONMENTAL SERVICES

4168 W. Kearney Street.
Springfield, MO 65803
Ph: (417) 864-6000
www.ppimo.com

May 13, 2020

Hemphill, LLC
1350 North Louisville Avenue
Tulsa, Oklahoma 74115

Attn: Mr. Scot Tinker, Director of Tower Operations
Email: scot.tinker@hemphill.com

RE: Geotechnical Engineering Report
New Hemphill 4-Leg Self-Support Tower - Poison Creek
US Highway 20
Natrona County, Casper, Wyoming
PPI Project Number: 261436

Dear Mr. Tinker:

Attached, please find the report summarizing the results of the geotechnical investigation conducted for the proposed New Hemphill 4-Leg Self-Support Tower in Natrona County, Casper, Wyoming. We appreciate this opportunity to be of service. If you have any questions, please don't hesitate to contact this office.

PALMERTON & PARRISH, INC.
By:

R. Todd Hercules, P.E.
Geotechnical Engineer

PALMERTON & PARRISH, INC.
By:

Professional Engineer
BRANDON PARRISH
P.E. 14631
Date
WYOMING

May 13, 2020

Brandon R. Parrish, P.E.
Vice-President

Submitted: One (1) Electronic .pdf Copy

BRP/BRP/RTH

TABLE OF CONTENTS

APPENDICES

EXECUTIVE SUMMARY

A Geotechnical Investigation was performed for the proposed New Hemphill 4-Leg Self-Support Tower located near US Highway 20 in Natrona County, Casper, Wyoming. It is understood that a new 80-foot Self-Support Tower will be constructed at the project site. Cut and fill depths are anticipated to be less than 1 foot across the subject site to provide finished subgrade elevations.

Based upon the information obtained from the boring drilled and subsequent laboratory testing, the site is suitable for the proposed Self-Support Tower. Important geotechnical considerations for the project are summarized below. However, users of the information contained in the report must review the entire report for specific details pertinent to geotechnical design considerations.

- Subsurface soils consisted of poorly-graded sand with silt extending the depth of the subsurface exploration. Sparse vegetation was noted at the ground surface;
- The poorly-graded sand was generally loose to dense and excavatable without rock excavation equipment. The poorly-graded sands may be collapsible in excavations;
- Mat foundations bearing on loose sands for the new Self-Support Tower can be designed for an allowable bearing capacity of 2,300 psf. Mat foundations bearing on medium dense sands at a depth of 8 feet or more for the new Self-Support Tower can be designed for an allowable bearing capacity of 5,000 psf. Micropiles may be used in conjunction with the mat foundation to resist overturning and lateral loads and provide additional bearing capacity. Alternatively, the proposed Self-Support Tower can be supported by a drilled pier foundation;
- Drilled pier design parameters have been included in Section 8. Collapsible materials may be encountered in the drilled pier excavations. Accordingly, it is recommended that the drilled pier contractor have casing available in case these conditions are encountered;

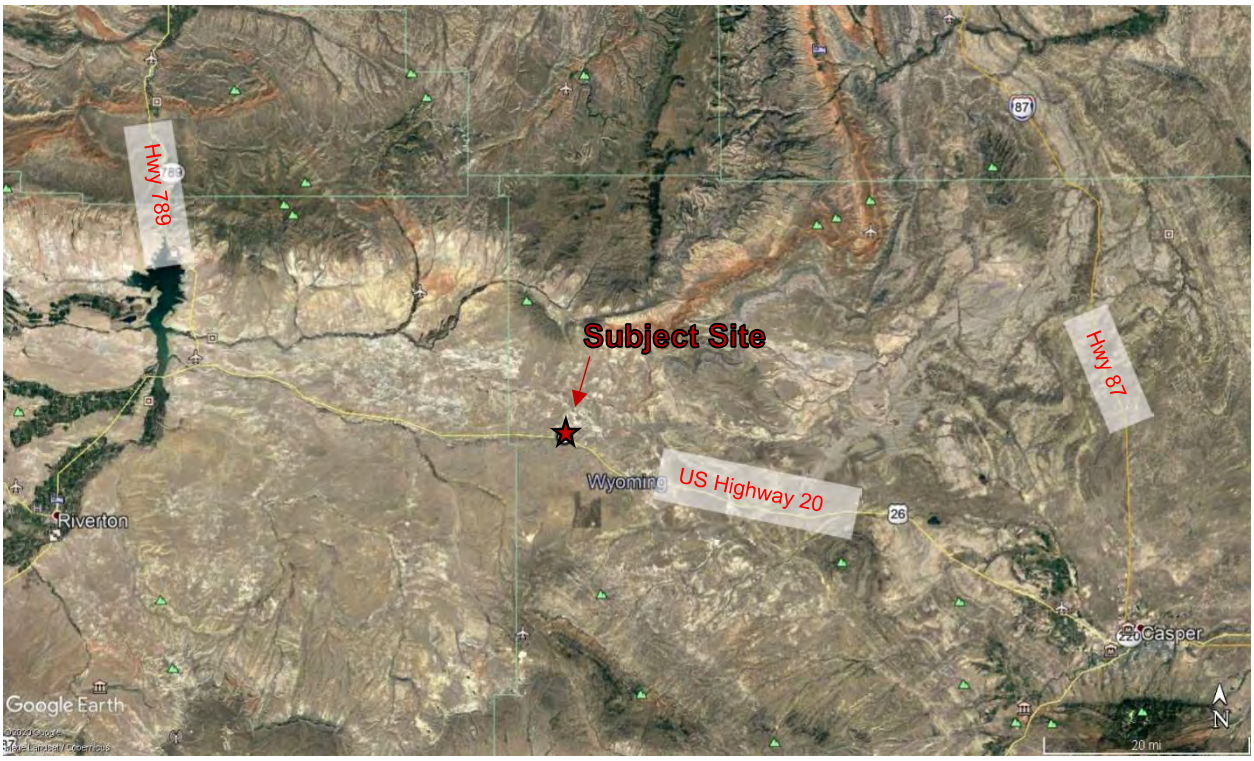
EXECUTIVE SUMMARY - CONTINUED

- The project site classifies as a Site Class D in accordance with Section 1613 of the 2012 International Building Code (IBC); and
- Construction materials testing should be performed on tower foundations by a qualified engineer and close monitoring of subgrade preparation work is considered critical to achieve adequate subgrade performance.

GEOTECHNICAL ENGINEERING REPORT
NEW HEMPHILL 4-LEG SELF-SUPPORT TOWER
POISON CREEK
US HIGHWAY 20
NATRONA COUNTY, CASPER, WYOMING

1.0 INTRODUCTION

This is the report of the Geotechnical Investigation performed for the proposed New Hemphill 4-Leg Self-Support Tower located near US Highway 20 in Natrona County, Casper, Wyoming. This investigation was in accordance with a letter proposal dated October 8, 2019, and authorized by Mr. Scot Tinker with Hemphill. The approximate site location is shown below:



2.0 PROJECT PURPOSE

The purpose of this Geotechnical Investigation was to provide information for foundation design and construction planning for the proposed Self-Support Tower. PPI's scope of services includes field and laboratory testing, investigation of the subsurface conditions in the vicinity of the tower base, engineering analysis of collected data and development of recommendations for foundation design and construction planning, and preparation of this Engineering Report.

3.0 PROJECT DESCRIPTION

It is understood that a new 80-foot Self-Support Tower supported upon either a mat foundation or drilled piers is proposed at the project site. It is understood that micropiles may be utilized in combination with a mat foundation for additional overturning, lateral loading, and bearing capacity. Foundation loadings, both compressive and overturning are anticipated to be moderate. Cut and fill depths are anticipated to be less than 1 feet across the subject site to provide finished subgrade elevations.

4.0 SUBSURFACE INVESTIGATION

Subsurface conditions were investigated through completion of a subsurface boring and subsequent laboratory testing. Below is a picture of the boring location:

4.1 Subsurface Boring

The tower center was selected and staked in the field by the Client. The approximate boring location is shown on Figure 1, Boring Location Plan. The Wyoming One-Call System was notified prior to the investigation to assist in locating buried public utilities.

A log of the boring showing descriptions of soil and rock units encountered, as well as results of field tests, laboratory tests and a “Key to Symbols” are presented in Appendix II.

The boring was drilled on April 25, 2020 using air rotary methods and a 4-inch O.D. tricone bit powered by an ATV-mounted drill-rig. Soil samples were generally collected at 2.5 to 5-foot centers during drilling using a split spoon sampler while performing the Standard Penetration Test (SPT) in general accordance with ASTM D1586. Please refer to Appendix III for general notes regarding boring logs and additional soil sampling information.

4.2 Laboratory Testing

Collected samples were sealed and transported to the laboratory for further evaluation and visual examination. Laboratory soil testing included the following:

- Moisture Content (ASTM D2216); and
- Grain Size Analysis (ASTM D6913).

Laboratory test results are shown on each boring log in Appendix II and are summarized in the following table.

Depth (ft.)	Moisture Content (%)	USCS Symbol	Percent Passing No. 200 Sieve (%)
0	6.3	SP-SM	12
13.5	4.2	SP-SM	9

5.0 SITE GEOLOGY

Based on information available from the Wyoming Geological Survey, the subject site is located over dune sand and loess. These materials consist primarily of sand in active and dormant dune formations. Loess materials are windblown materials that are deposited in a “card house stacked” fashion and are collapsible if exposed to water.

The subject site is located on wind deposits according to the Wyoming Geological Survey. Accordingly, windblown deposits and/or the hazards of windblown material may impact the subject site in the future. Hazards include drift of dunes and soils which may partially bury structures or temporarily close roadways. Vegetation disturbance, if any, in these areas should be kept to a minimum.

6.0 GENERAL SITE SUBSURFACE CONDITIONS

Based upon subsurface conditions encountered within the boring drilled at the project site, generalized subsurface conditions are summarized in the table below. Soil stratification lines on the boring log indicate approximate boundary lines between different types of soil units based upon observations made during drilling. In-situ transitions between soil types are typically gradual.

6.1 Subsurface Stratums

Generalized subsurface conditions are summarized in the table below:

Depth	Stratum	Subsurface Material	Density/Consistency
0 to 50 feet	Sand	Poorly-Graded Sand, with Silt (SP-SM)	Loose to Dense

6.2 Groundwater

Shallow groundwater was not observed within the boring on the date drilled. Groundwater levels should be expected to fluctuate with changes in site grading, precipitation, and regional groundwater levels. Groundwater may be encountered during wetter periods.

7.0 EARTHWORK

Grading plans for the proposed Self-Support Tower were not provided. Grading for the project site is anticipated to have less than 1 foot of cut and/or fill to establish final grades. The initial phase of site preparation should include the steps listed below;

- Clearing and grubbing of any vegetation within the tower footprint; and
- Areas scheduled to receive controlled fill, if any, should be proof-rolled and approved in accordance with the following section of this report.

7.1 Site Preparation

Proof-rolling consists essentially of rolling the ground surface with a loaded tandem axle dump truck or similar heavy rubber-tired construction equipment and noting any areas which rut or deflect during rolling. All soft subgrade areas identified during proof-

rolling should be undercut and replaced with compacted fill as outlined below. Proof-rolling, undercutting and replacement should be monitored by a qualified representative of the Geotechnical Engineer.

7.2 Fill Material Types

Fill Type[1]	USCS Classification	Acceptable Location for Placement
Low Volume Change (LVC) Engineered Fill[2]	CL, GC, or SC (LL < 45%)	All locations and elevations
On-Site Natural Soils	SP-SM	All locations and elevations
Rock Fill[3]	GW	All locations and elevations

1. Controlled, compacted fill should consist of approved materials that are free of organic matter and debris and contain maximum rock size of 4 to 6 in. Frozen material should not be used and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to its use.
2. Low plasticity cohesive soil or granular soil having at least 15% low plasticity fines.
3. See Section 7.2.1 if rock fill will be utilized at the project site.

7.2.1 Rock Fill

If rock is to be used as the primary filling medium, embankments should be constructed using rock having maximum dimensions in excess of 4 inches, but no greater than 8 inches. Rock material should be placed in horizontal layers having a thickness of approximately the maximum size of the larger rock comprising the lift, but not greater than 12 inches. Rocks or boulders too large to permit placing in a 12-inch thick lift should be reduced in size as necessary to permit placement or be bladed over the edge of the fill and not used in the compacted fill. Rock fill should not be dumped into place but should be distributed in horizontal lifts by blading and dozing in such a manner as to ensure proper placement into final position in the embankment. Finer material including rock fines and limited soil fines should be worked into the rock voids during this blading operation. Excessive soil and rock fine particles preventing interlock of cobble and boulder sized rock should be prohibited. Rock fill should be consolidated by a minimum of three (3) passes of a large diameter self-propelled vibratory compactor. Terminal fill slopes using rock may be constructed 1.5 horizontal to 1 vertical for fill height of 15 feet or less. The testing of rock fill quality should include the requirements that a representative of the Geotechnical Engineer be present daily, but not necessarily

continuously during the placement of the fill to observe the placement of rock fill in order to determine fill quality and to observe that the contractors work sequence is in compliance with this specification. Progress reports indicative of the quality of the fill should be made at regular intervals to the Owner. If improper placement procedures are observed during the placement of the fill the Geotechnical Engineer should inform the Contractor, and no additional fill should be permitted on the affected area until the condition causing the low densities has been corrected and the fill has been reworked to obtain sufficient density.

7.3 Compaction Requirements

Item	Description
Subgrade Scarification Depth	At least 8 inches
Fill Lift Thickness	8-inch (loose)
Compaction Requirements[1]	• 70% Relative Density, or compacted by a minimum of three (3) passes of a self-propelled smooth drum vibratory compactor; or • 95% Standard Proctor Density (ASTM D-698).
Moisture Content	• ± 2% optimum moisture for CL, SC, or GC soil types.
Recommended Testing Frequency	• One (1) Field Density (compaction) test for each 2,500 sq. ft. of fill within the footprint of the Self-Support Tower; • One (1) Field Density (compaction) test for each 5,000 sq. ft. of fill within non-structure areas; • A minimum of three (3) tests per lift; and • Visual observation of the compaction process should be documented with no testing required **if** a performance compaction specification (i.e. number of passes) is utilized.
1. We recommend that engineered fill (including scarified compacted subgrade) be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.	

7.4 Excavations

Based upon the subsurface conditions encountered during this investigation, the on-site soils typically classify as Type C in accordance with OSHA regulations. Temporary excavations in soils classifying as Type C with a total height of less than 20 feet should be cut no steeper than 1.5H:1V in accordance with OSHA guidelines. Confirmation of

soil classification during construction, as well as construction safety (including shoring, if required), is the responsibility of the contractor.

8.0 TOWER FOUNDATION RECOMMENDATIONS

The proposed Self-Support Tower is anticipated to either be supported on a shallow mat foundation or on drilled pier foundations. It is understood that micropiles may be utilized in addition to a mat foundation to help resist overturning and lateral loads. Based upon the conditions encountered in the boring performed at the project site, the site subsurface materials are suitable for either a mat foundation or drilled pier foundations. Recommendations for mat foundations and drilled piers are included in the following sections.

8.1 Shallow Mat Foundations

Based upon the subsurface conditions encountered near the proposed Self-Support Tower and anticipated site grading, footings for the proposed Self-Support Tower are anticipated to bear in loose natural soils with additional support from micropiles. Alternatively, the mat foundation excavation may be extended to a minimum depth of 8 feet to bear on the medium dense sand in this location. Design bearing capacities for both options have been included in the shallow foundation design recommendation table below. Please refer to the section below for recommendations regarding shallow foundations.

8.2 Shallow Foundation Design Recommendations

Description	Mat Foundation Parameters on Loose Sands (Bearing Above 8 ft.)	Mat Foundation Parameters on Medium Dense Sands (Bearing at 8 ft. or Below)
Net allowable bearing pressure[1]	Loose Sand: 2,300 psf	Dense Sand: 5,000 psf
Ultimate bearing pressure[2]	Loose Sand: 6,900 psf	Dense Sand: 15,000 psf
Transient (wind) loading ONLY – Allowable Bearing Pressure[3]	Loose Sand: 3,450 psf	Dense Sand: 7,500 psf
Minimum embedment below finished grade for frost protection and variation in soil moisture[4]	Loose Sand: 5 feet	A minimum of 8 feet to bear on the medium dense sand.
Estimated total settlement[5]	1 inch or less	
Allowable passive pressure[6]	600 psf	800 psf
Coefficient of sliding friction[7]	0.5 (natural soils)	0.6 (natural soils)

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. The recommended pressure considers all unsuitable and/or soft or loose soils, if encountered, are undercut and replaced with tested and approved new engineered fill. Footing excavations should be free of loose and disturbed material, debris, and water when concrete is placed. A factor of safety value of 3 has been applied to these values.
2. No factor of safety has been applied to this value.
3. The allowable bearing capacity may be increased to this value **only** for transient or wind loading.
4. For footings beneath unheated areas. It is anticipated that additional depth may be required for overturning and uplift design considerations.
5. The foundation movement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of compacted fill, and the quality of the earthwork operations.
6. Allowable passive pressure value considers a factor of safety of about 2. Passive pressure value applies to undisturbed native clay or properly compacted fill. If formed footings are constructed, the space between the formed side of a footing and excavation sidewall should be cleaned of all loose material, debris, and water and backfilled with tested and approved fill compacted to at least 95% of the material's Standard Proctor dry density. Passive resistance should be neglected for the upper 5 feet of the soil below the final adjacent grade due to strength loss from freeze/thaw and shrink/swell.
7. Coefficient of friction value is an ultimate value and does not contain a factor of safety.

8.3 Uplift

Resistance of shallow spread footings to uplift (U_p) may be based upon the dead weight of the concrete footing structure (W_C) and the weight of soil backfill contained in an inverted cone or pyramid directly above the footings (W_S). The following parameters may be used in design:

Description	Weights
Weight of Concrete (W_c)	150 pcf
Weight of Soil Resistance (W_s)	100 pcf
Weight for on-site soils placed in accordance with Section 7	

The base of the cone or pyramid should be the top of the footing and the pyramid or cone sides should form an angle of 30 degrees with the vertical. Allowable uplift capacity (U_p) should be computed as the lesser of the two (2) equations listed below:

$$U_P = (W_S/2.0) + (W_C/1.25) \text{ or } U_P = (W_S + W_C)/1.5$$

If additional uplift and/or overturning load resistance is required for the project site consideration may be given to the use of rock anchors. Rock anchor design values are included in Section 8.4.

8.4 Anchor Design Values

It is understood that a combination of mat foundations and micropiles, of Case 1 type (directly loaded piles), may be utilized for the proposed Self-Support Tower. The following tables contain passive pressures and preliminary grout to ground bond strengths needed for use in the design of micropiles. These values, at their corresponding depths, should be used in conjunction with the following micropile design values.

It is understood that a total of three (3) possible installation methods may be utilized for micropile installation at the subject sites. Due to the variable installation procedures, grout to ground bond strengths are variable between these installation methods and have been included as separate bond strengths accordingly. The installation methods are noted below:

- Micropile Type "A" – Grout is gravity installed by tremie methods after drilling. This method is generally used for rock sockets;
- Micropile Type "B" – After drilling, grout is pressure grouted through casing or hollow stem auger during casing or auger removal; and
- Micropile Type "E" – High water content grout is utilized in drilling through a continuously threaded, hollow-core steel bar then replaced with pressurized structural grout near the completion of drilling.

Stratum	Applicable Depth (ft.)	Unit Weight (pcf)	Friction Angle, ϕ (Degrees)	Coefficient of Passive Pressure	Preliminary Grout-to-Ground Ultimate Bond Strength[2] (psi)		
					A	B	E
Surface Material and Sand	0 to 5	Moist: 120	Ignore	Ignore	-	-	-
Sand	5 to 10	Moist: 120	30	3.0	10	10	10
Sand	10 to 30	Moist: 125	32	3.3	14	18	18
Sand	30 to 50	Moist: 125	32	3.3	22	30	30
Sand[1]	Over 50	Moist: 125	32	3.3	22	30	30

1. Assumes soils are equal to or better than those at depths greater than the boring termination depth. This should be confirmed in the field during installation of micropiles.
2. Bond Values are based upon subsurface data obtain in 1 Boring and assume full time observation by a qualified Geotechnical Inspector experienced with micropiles during installation.

8.5 Drilled Pier Foundation Recommendations

Based upon the conditions encountered in the boring and subsequent laboratory testing, the proposed Self-Support Tower may be supported on a system of drilled piers bearing within the poorly-graded sand material. The drilled shaft should be plumb (no more than 2 percent of the shaft length off vertical), and the drilled shaft should have a relatively flat bottom. Essentially all groundwater, if encountered, should be removed from the drilled pier shaft prior to concrete placement. If it is not possible to remove nearly all (2 to 3 inches max) of the groundwater from the drilled shaft excavation, concrete should be placed via tremie methods.

The method of concrete placement and vibration should be selected by the Structural Engineer. Required strength and mix design characteristics should also be specified by the Structural Engineer or other members of the Design Team.

The sand layers were excavatable with air rotary methods; however, casing may be required at the subject site due to possible collapsible sandy material.

8.6 Bearing Capacity and Uplift Resistance for a Drilled Shaft

The design parameters summarized in the table below may be utilized for bearing capacity and uplift capacity design for drilled shafts as described above. Allowable end bearing pressures and side friction values are summarized in the table below.

Stratum[1]	Applicable Depth (ft.)	Allowable End Bearing Pressure (ksf)[2]	Allowable Side Friction (ksf)[3]
Surface Material and Sand	Ground surface to 1 shaft diameter or a minimum of 5 feet	Ignore	Ignore
Sand	5 feet to 10 feet	Not Recommended	0.6
Sand	10 feet to 20 feet	6.0	1.1
Sand	20 feet to 30 feet	8.0	1.3
Sand	30 feet to 40 feet	10.0	1.5
Sand	40 feet to 50 feet	14.0	1.5

1. If soft soils are encountered in plan bottom of shaft during drilling, the shaft should be deepened until an acceptable bearing stratum is encountered.
2. End bearing pressure values assume a Factor of Safety of 3.0 or greater.
3. Side friction values include a Factor of Safety of ~1.5. These values should be used with ***Factored Loads*** during structural design. Side Friction may be used for computation of Uplift and Compressive Capacity in soil.

8.7 Lateral Loadings

It is anticipated that designers will most likely utilize LPILE for completion of deep foundation lateral capacity design for the tower foundations. LPILE uses finite difference computer models based on the horizontal modulus of subgrade reaction (K_h).

The values listed in the table below may be utilized for Drilled Pier Analysis in LPILE. Please also notice that the table states to "ignore" lateral support for the depth from 0 to 1 pier diameter or a minimum of 5 feet. This notation is intended to account for the fact that near-surface soils are significantly disturbed during drilled shaft excavation, which greatly reduces the lateral support provided. Designers should use their judgment and make an appropriate reduction of soil strength parameters in this zone.

Values summarized in the table below are based upon published correlations, and field and laboratory data collected during this subsurface investigation. Values shown below are ultimate values representative of in-situ soil properties, and do not include

a Factor of Safety. These values may be used to compute resistance to lateral loading of the overburden soils. **The appropriate Factor of Safety should be chosen by the designer.**

Stratum (Model)	Applicable Depth	Unit Weight [1] (pcf)	Friction Angle, ϕ (Degrees)	Submerged Modulus, k (pci)	Above Water Table Modulus, k (pci)
Surface Material and Sand (Sand)	Ground surface to 1 shaft diameter or a minimum of 5 feet	Moist: 120	Ignore	Ignore	Ignore
Sand (Sand)	1 shaft diameter or a minimum of 5 feet to 10 feet	Moist: 120	30	20	25
Sand (Sand)	10 feet to 40 feet	Moist: 125	32	60	90
Sand (Sand)	40 feet to 50 feet (and below)	Moist: 125	32	125	225

1. Buoyant unit weight should be utilized for soils that extend below the design groundwater level. Groundwater was not encountered at the project site.

9.0 SEISMIC CONSIDERATIONS

Code Used	Site Classification
2012 International Building Code (IBC)[1]	D

1. In general accordance with the *2012 International Building Code*, Section 1613

10.0 CONSTRUCTION OBSERVATION & TESTING

The construction process is an integral design component with respect to the geotechnical aspects of a project. Since geotechnical engineering is influenced by variable depositional and weathering processes and because we sample only a small portion of the soils affecting the performance of the proposed Self-Support Tower, unanticipated or changed conditions can be disclosed during grading. Proper geotechnical observation and testing during construction is imperative to allow the Geotechnical Engineer the opportunity to evaluate assumptions made during the design process. Therefore, we recommend that PPI be kept apprised of design modifications and construction schedule of the proposed project to observe compliance with the design concepts and geotechnical recommendations, and to allow design changes in the event

that subsurface conditions or methods of construction differ from those assumed while completing this study. We recommend that during construction all earthwork be monitored by a representative of PPI, including site preparation, placement of all engineered fill and trench backfill, and all foundation excavations as outlined below.

- An experienced Geotechnical Engineer should observe the subgrade throughout the proposed project site immediately following stripping to evaluate the native soils, identify areas requiring undercutting, and evaluate the suitability of the exposed surface for fill placement;
- An experienced Engineer or Engineering Technician should monitor and test all fill placed within the Self-Support Tower area to determine whether the type of material, moisture content, and degree of compaction are within recommended limits; and
- An experienced Technician or Engineer should observe drilled pier excavations. Where unsuitable bearing conditions are observed, PPI should be contacted to provide remedial procedures.

11.0 REPORT LIMITATIONS

This report has been prepared in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Palmerton & Parrish, Inc. observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. Palmerton & Parrish's findings and conclusions must be considered not as scientific certainties, but as opinions based on our professional judgment concerning the significance of the data gathered during the course of this investigation. Other than this, no warranty is implied or intended.

S:_MASTER PROJECT FILE\2019\WY\Hemphill-261436-WY, CO & UT Registrations-Sub\Drilled\2020\Poison Creek\Poison Creek -

SCALE: 1" = 25'

LEGEND

Boring Location

NOTES

- Aerial image from Google Earth Pro.
- Site drawing provided by the Client.
- Not intended for use in design.

Project: Posion Creek - Site # 12063 - Self Support Tower - Casper, Wyoming
Client: Hemphill, LLC

Boring Location Plan

DATE: April 24, 2020

Project Number: 261436

PALMERTON & PARRISH, INC.
GEOTECHNICAL AND MATERIALS ENGINEERS/MATERIALS TESTING LABORATORIES/ENVIRONMENTAL SERVICES

FIGURE 1

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GEOTECHNICAL BORING LOG

BORING NUMBER 1

CLIENT Hemphill, LLC
PROJECT NAME Poison Creek Self-Support Tower
PROJECT NO. 261436
PROJECT LOCATION Casper, Wyoming
DATE STARTED 4/25/20 **COMPLETED** 4/25/20
SURFACE ELEVATION _____ **BENCHMARK EL.** _____
DRILLER CW **DRILL RIG** CME-550x
GROUND WATER LEVELS
HAMMER TYPE Auto
AT TIME OF DRILLING None
LOGGED BY CJ **CHECKED BY** RTH
AT END OF DRILLING _____
NOTES _____

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf) 20 40 60 80 100 N VALUE 20 40 60 80 PL MC LL 20 40 60 80 SHEAR STRENGTH (ksf) 1 2 3 4	ELEVATION (ft)
0	AIR ROTARY - 4" O.D. Tricone		POORLY-GRADED SAND, w/Silt, Fine to Medium Grained, Brown to Tannish Brown, Slight Reaction to HCL, Slightly Moist, Loose to Dense (SP-SM)	SPT 1		4-4-5 (9)			
				SPT 2		4-4-5 (9)			
				SPT 3		5-3-4 (7)			
				SPT 4		5-7-8 (15)			
10				SPT 5		7-12-9 (21)			
				SPT 6		4-7-8 (15)			
20				SPT 7		8-3-12 (15)			
				SPT 8		9-12-13 (25)			
30				SPT 9		7-13-16 (29)			
				SPT 10		9-13-13 (26)			
40				SPT 11		8-14-18 (32)			
				50.0 ft SPT 12		10-24-21 (45)			
50			Bottom of borehole at 50.0 feet.						

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KEY TO SYMBOLS

CLIENT Hemphill, LLC **PROJECT NAME** Poison Creek Self-Support Tower

PROJECT NO. 261436 **PROJECT LOCATION** Casper, Wyoming

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)

SP-SM: USCS Poorly-graded Sand with Silt

SAMPLER SYMBOLS

Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION

Water Level at Time Drilling, or as Shown

Water Level at End of Drilling, or as Shown

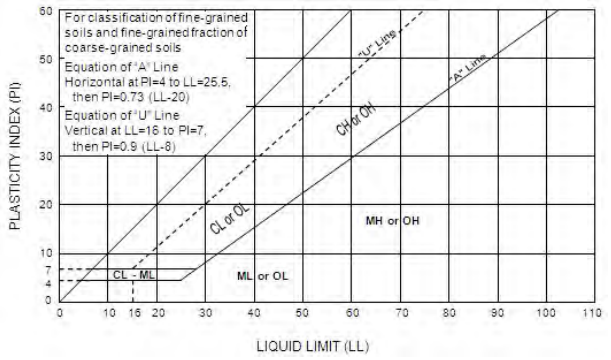
Water Level After 24 Hours, or as Shown

GENERAL NOTES

SOIL PROPERTIES & DESCRIPTIONS

COHESIVE SOILS

Consistency	Unconfined Compressive Strength (Qu)	Pocket Penetrometer Strength	N-Value
	(psf)	(tsf)	(blows/ft)
Very Soft	<500	<0.25	0-1
Soft	500-1000	0.25-0.50	2-4
Medium Stiff	1001-2000	0.50-1.00	5-8
Stiff	2001-4000	1.00-2.00	9-15
Very Stiff	4001-8000	2.00-4.00	16-30
Hard	>8000	>4.00	31-60
Very Hard			>60



Group Symbol	Group Name
CL –	Lean Clay
ML –	Silt
OL –	Organic Clay or Silt
CH –	Fat Clay
MH –	Elastic Silt
OH –	Organic Clay or Silt
PT –	Peat
CL-CH –	Lean to Fat Clay

Plasticity		Moisture	
Description	Liquid Limit (LL)	Descriptive Term	Guide
Lean	<45%	Dry	No indication of water
Lean to Fat	45-49%	Moist	Indication of water
Fat	≥50%	Wet	Visible water

Fine Grained Soil Sub Classification	Percent (by weight) of Total Sample
Terms: SILT, LEAN CLAY, FAT CLAY, ELASTIC SILT	PRIMARY CONSTITUENT
Sandy, gravelly, abundant cobbles, abundant boulders with sand, with gravel, with cobbles, with boulders scattered sand, scattered gravel, scattered cobbles, scattered boulders a trace sand, a trace gravel, a few cobbles, a few boulders	>30-50] >15-30] – secondary coarse grained constituents 5-15] <5]
The relationship of clay and silt constituents is based on plasticity and normally determined by performing index tests. Refined classifications are based on Atterberg Limits tests and the Plasticity Chart.	

NON-COHESIVE (GRANULAR) SOILS

RELATIVE DENSITY	N-VALUE
Very Loose	0-4
Loose	5-10
Medium Dense	11-24
Dense	25-50
Very Dense	≥51

MOISTURE CONDITION	
Descriptive Term	Guide
Dry	No indication of water
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table.

**GRAIN SIZE IDENTIFICATION		
Name	Size Limits	Familiar Example
Boulder	12 in. or more	Larger than basketball
Cobbles	3 in. to 12 in.	Grapefruit
Coarse Gravel	¾-in. to 3 in.	Orange or lemon
Fine Gravel	No. 4 sieve to ¾-in.	Grape or pea
Coarse Sand	No. 10 sieve to No. 4 sieve	Rock salt
Medium Sand	No. 40 sieve to No. 10 sieve	Sugar, table salt
Fine Sand*	No. 200 sieve to No. 40 sieve	Powdered sugar
Fines	Less than No. 200 sieve	
*Particles finer than fine sand cannot be discerned with the naked eye at a distance of 8 inches.		

Coarse Grained Soil Sub Classification	Percent (by weight) of Total Sample
Terms: GRAVEL, SAND, COBBLES, BOULDERS	PRIMARY CONSTITUENT
Sandy, gravelly, abundant cobbles, abundant boulders with gravel, with sand, with cobbles, with boulders scattered gravel, scattered sand, scattered cobbles, scattered boulders a trace gravel, a trace sand, a few cobbles, a few boulders	>30-50] >15-30] – secondary coarse grained constituents 5-15] <5]
Silty (MH & ML)*, clayey (CL & CH)* (with silt, with clay)* (trace silt, trace clay)*	<15] 5-15] – secondary fine grained constituents <5]
*Index tests and/or plasticity tests are performed to determine whether the term "silt" or "clay" is used.	

*Modified after Ref. ASTM D2487-93 & D2488-93
**Modified after Ref. Oregon DOT 1987 & FHWA 1997
***Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

GENERAL NOTES

BEDROCK PROPERTIES & DESCRIPTIONS

ROCK QUALITY DESIGNATION (RQD)	
Description of Rock Quality	*RQD (%)
Very Poor	< 25
Poor	25-50
Fair	50-75
Good	75-90
Excellent	90-100

*RQD is defined as the total length of sound core pieces 4 in. or greater in length, expressed as a percentage of the total length cored. RQD provides an indication of the integrity of the rock mass and relative extent of seams and bedding planes.

SCALE OF RELATIVE ROCK HARDNESS		
Term	Field Identification	Approx. Unconfined Compressive Strength (tsf)
Extremely Soft	Can be indented by thumbnail	2.6-10
Very Soft	Can be peeled by pocket knife	10-50
Soft	Can be peeled with difficulty by pocket knife	50-260
Medium Hard	Can be grooved 2 mm deep by firm pressure of knife	260-520
Moderately Hard	Requires one hammer blow to fracture	520-1040
Hard	Can be scratched with knife or pick only with difficulty	1040-2610
Very Hard	Cannot be scratched by knife or sharp pick	>2610

DEGREE OF WEATHERING	
Slightly Weathered	Rock generally fresh, joints stained and discoloration extends into rock up to 25mm (1 in), open joints may contain clay, core rings under hammer impact.
Weathered	Rock mass is decomposed 50% or less, significant portions of rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.
Highly Weathered	Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

GRAIN SIZE (TYPICALLY FOR SEDIMENTARY ROCKS)		
Description	Diameter (mm)	Field Identification
Very Coarse Grained	>4.76	
Coarse Grained	2.0-4.76	Individual grains can easily be distinguished by eye.
Medium Grained	0.42-2.0	Individual grains can be distinguished by eye.
Fine Grained	0.074-0.42	Individual grains can be distinguished by eye with difficulty.
Very Fine Grained	<0.074	Individual grains cannot be distinguished by unaided eye.

VOIDS	
Pit	Voids barely seen with the naked eye to 6mm *1/4-inch)
Vug	Voids 6 to 50mm (1/4 to 2 inches) in diameter
Cavity	50 to 6000mm (2 to 24 inches) in diameter
Cave	> 600mm

BEDDING THCKNESS	
Very Thick Bedded	> 3' Thick
Thick Bedded	1' to 3' Thick
Medium Bedded	4" to 1' Thick
Thin Bedded	1-1/4" to 4" Thick
Very Thin Bedded	½" to 1-1/4" Thick
Thickly Laminated	1/8" to ½" Thick
Thinly Laminated	1/8" or less (paper thin)

DRILLING NOTES

Drilling & Sampling Symbols		
NQ – Rock Core (2-inch diameter)	CFA- Continuous Flight (Solid Stem) Auger	WB – Wash Bore or Mud Rotary
HQ – Rock Core (3-inch diameter)	SS – Split Spoon Sampler	TP – Test Pit
HSA – Hollow Stem Auger	ST – Shelby Tube	HA – Hand Auger

Soil Sample Types

Shelby Tube Samples: Relatively undisturbed soil samples were obtained from the borings using thin wall (Shelby) tube samplers pushed hydraulically into the soil in advance of drilling. This sampling, which is considered to be undisturbed, was performed in accordance with the requirements of ASTM D 1587. This type of sample is considered best for the testing of "in-situ" soil properties such as natural density and strength characteristics. The use of this sampling method is basically restricted to soil containing little to no chert fragments and to softer shale deposits.

Split Spoon Samples: The Standard Penetration Test is conducted in conjunction with the split-barrel sampling procedure. The "N" value corresponds to the number of blows required to drive the last 1 foot of an 18-inch long, 2-inch O.D. split-barrel sampler with a 140 lb. hammer falling a distance of 30 inches. The Standard Penetration Test is carried out according to ASTM D-1586.

Water Level Measurements

Water levels indicated on the boring logs are levels measured in the borings at the times indicated. In permeable materials, the indicated levels may reflect the location of groundwater. In low permeability soils, shallow groundwater may indicate a perched condition. Caution is merited when interpreting short-term water level readings from open bore holes. Accurate water levels are best determined from piezometers.

Automatic Hammer

Palmerton and Parrish, Inc.'s CME's are equipped with automatic hammers. The conventional method used to obtain disturbed soil samples used a safety hammer operated by company personnel with a cat head and rope. However, use of an automatic hammer allows a greater mechanical efficiency to be achieved in the field while performing a Standard Penetration resistance test based upon automatic hammer efficiencies calibrated using dynamic testing techniques.

*Modified after Ref. ASTM D2487-93 & D2488-93
**Modified after Ref. Oregon DOT 1987 & FHWA 1997
***Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

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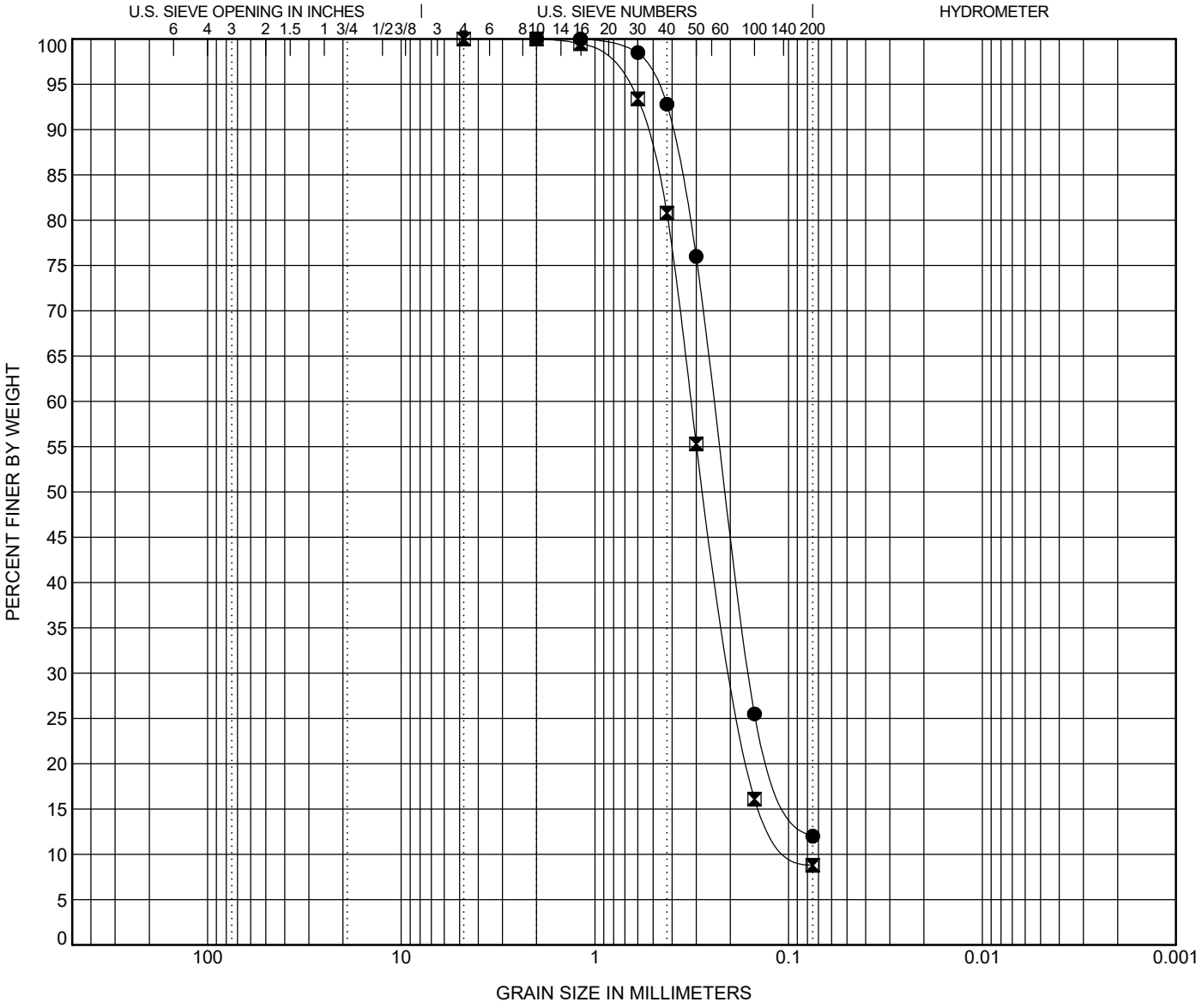
GRAIN SIZE DISTRIBUTION

CLIENT Hemphill, LLC **PROJECT NAME** Poison Creek Self-Support Tower

PROJECT NO. 261436 **PROJECT LOCATION** Casper, Wyoming



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	1	0.0	**POORLY-GRADED SAND, with Silt**				1.56	3.56
⊠	1	13.5	**POORLY-GRADED SAND, with Silt**				1.37	3.81

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	1	0.0	2	0.241	0.16		0.0	88.0	12.0	
⊠	1	13.5	4.75	0.32	0.192	0.084	0.0	91.2	8.8	

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

CONDITIONAL USE PERMIT REQUEST

FOR A

TELECOMMUNICATION SITE

CUP20-3

Staff Report: Trish Chavis
June 10, 2020

For

July 14, 2020
Planning and Zoning Commission

And

August 4, 2020
Board of County Commissioner Meeting

Applicant: Declan Murphy, Union Wireless/Hemphill

Request: Construct an 84-foot self-supporting communication tower to allow for the expansion of an existing Union Wireless site. The applicant is requesting 100-feet total height to include all appurtenances.

Location and Zoning

The parcel is located approximately 4 miles west of Hiland on W. US Highway 20-26.

The subject parcel and all surrounding parcels are zoned Ranching, Agricultural and Mining (RAM).

Proposal

Union has applied for a CUP to construct an 84-foot communication tower to replace their existing 45' tower. The applicant is request the CUP to have a total height of 100-feet. This will include the additional antennas and lightening rod.

The proposed upgrades are necessary to allow Union Wireless to continue providing service to the adjacent community, in addition to enhancing emergency service capabilities through FirstNet.

FirstNet is the First Responder Network Authority, and is an independent authority authorized by Congress in 2012, to develop, build and operate the nationwide, broadband network that equips first responders.

General Standards
For
Conditional Use Permits

Criteria for Approval

1. Will granting the Conditional Use Permit contribute to an overburdening of county services?

   Proposed Finding of Fact. Granting the Conditional Use permit will not contribute to an overburdening of county services. County services and infrastructure will not be necessary for this permit. The tower would provide needed cell service to the area, which will add E-911 capabilities through the carrier's networks, and promote greater coverage and reach for local law enforcement and emergency services.

2. Will granting the Conditional Use Permit cause undue traffic, parking, population density or environmental problems?

   Proposed Finding of Fact. The facility is unmanned and will not cause undue traffic or parking. Routine maintenance for the tower and antennas will be limited. There will be no affects to population density.

3. Will granting the Conditional Use Permit impair the use of adjacent property or alter the character of the neighborhood?

   Proposed Finding of Fact. The surrounding ranch consists of approximately 1,260 acres. The addition of a taller communication tower will not impair the use of adjacent properties.

4. Will granting the Conditional Use Permit detrimentally affect the public health, safety and welfare, or nullify the intent of the Development Plan or Zoning Resolution?

   The addition of the proposed tower would not be damaging or inconsistent with the surrounding area. The proposed tower is consistent with the intent of both the Development Plan and the Zoning Resolution.

   Proposed Finding of Fact. The proposed tower will be constructed in accordance with all applicable building, electrical and plumbing codes. With an approved CUP, the tower will comply with the Zoning Resolution and the Development Plan. This site will provide wireless coverage to residents and travelers as well as provides for valuable E911 services and FirstNet capabilities.

Key Communication Tower Regulations

Artificially Lighted: There is no requirement for lighting until the tower reaches 200 feet. The proposed tower does not meet the requirement for FAA review.

Setbacks: Setbacks from roads and structures is 110% of the tower height. The nearest road is ¼ mile away and does meet setbacks.

Documentation demonstrating need: The proposed site is situated to provide effective coverage to the area. The existing tower's current loading and height is insufficient to provide adequate service so a taller tower would be needed.

Public Comment

As of the date of this staff report there have been no comment received.

Staff sent the public notice to 6 neighbors within 3 miles.

Recommendation

Staff proposes a motion and vote by the Planning and Zoning Commission to recommend approval of the requested Conditional Use Permit, by the Board of County Commissioners and incorporate by reference all findings of fact set forth herein and make them a part thereof.

Site Name: Waltman
Site Address: 15303 Arminto Road, Waltman WY 82604
GEOCODE: 36861910000700 **Lat/Long:** 43 4 14.94325 -107 11 26.25296

Purpose of Request

Union Wireless is committed to improving coverage and expanding network capacity to meet customer demand throughout the State of Wyoming. The existing Wireless Communication Facility (WCF) provides residents, visitors and businesses with high quality reliable wireless service for both personal & business, in addition to enhancing emergency services.

Union Wireless is proposing the following at the existing WCF located at 15303 Arminto Road, Waltman.

Details of Request

Union Wireless is proposing a new 80' self-support tower at the existing WCF, but **requesting approval for a 100' self-support tower**. The existing site footprint will be expanded to accommodate the upgrades as detailed on the attached site plan/elevation (see sheet C2-1). The existing 45' Union self-support tower will remain for a period to accommodate the transfer of equipment to the new tower.

The proposed upgrades are necessary to allow Union Wireless to continue providing the best possible service to the adjacent community, in addition to enhancing emergency service capabilities through FIRSTNET.

Technical Information

Steel four leg 80' self-support tower designed to accommodate multiple carriers, please see Exhibit A for tower structural/technical details.

Valmont self-support tower, proposed antennas are COMMSCOPE NNH4-65C-R6-V3, please see Exhibit A for tower structural/technical details and Exhibit B for antenna spec's.

Union/Hemphill is proposing an 80’ Self-Support Tower with 3 sectors of antennas, please see Exhibit A for tower details. No lighting is required at the proposed location/height per FAA TowAir.

The proposed frequency range is 698-896 MHz to 1695-2360 MHz

Please see Exhibit B - Antenna Spec’s for the actual intended transmission, effective radiated power etc.

Please see Exhibit B - Antenna Spec’s for direction of maximum lobes and associated radiation of the antennas etc.

Please see Exhibit C - NIER Report.

Union Wireless is an FCC licensed carrier, therefore all transmissions will be within the allocated frequencies and will not cause interference with any other licensed transmission.

Please see the Exhibit D – Union FCC License Info.

Please see Exhibit F for information on proposed tower foundation, soils etc.

FAA does not require lighting for the proposed height, which is typical for sites under 200’ unless the site is very close to an Airport.

The proposed 80’ Self-Support tower will replace the existing 40’ Union Self-support at the existing cell-site, and is structurally designed to accommodate multiple carriers.

Please see Exhibit A with information on the tower/foundation engineering compliant with local, County, State and Federal structural requirements.

Grounding and Bonding, please sheets E4-1, G1-1 and G1-2 for details.

The existing cell-site is far removed from the nearest residential. The site is visible from US HWY 20, however setback far enough to not be in the peripheral view of passing traffic.

Please see the attached photo simulations of the before and after views.

The subject location is an existing cell-site. The proposed changes mainly in tower height will be noticeable but should have little visual impact or public concern give the setback of the existing sites.

The existing cell-site currently has screening in place, so Union Wireless will continue to maintain the current screening to maintain consistency with the existing screening.

Please let me know if you need any additional information.

Sincerely,

Declan Murphy
Coal Creek Consulting for Union Wireless/Hemphill
2166 E. University Dr. #201, Tempe, AZ 85281
Tel: (602) 326-0111
Email: dmurphy@coal-creek.com

and Zoning Commission and **Board of County Commissioners** shall require showings concerning all of the following:

1. The owner of record or contract purchaser has signed the application.
2. Granting the conditional use permit will not contribute to an overburdening of County Services.
3. Granting the conditional use will not cause undue traffic, parking, population density, or environmental problems.
4. Granting the conditional use permit will not impair the use of adjacent property or alter the character of the neighborhood.
5. Granting the conditional use permit will not detrimentally affect the public health, safety, and welfare, or nullify the intent of the Development Plan or the Zoning Resolution.

APPLICATION INSTRUCTIONS

This is an application for a conditional use permit for wireless telecommunication facilities on the parcel described hereon. By completing the application form and providing the other requested information, your application will be acted upon in the fastest, fairest manner prescribed by law.

Person preparing report:

Name: Declan Murphy for Union Wireless/Hemphill

Address: 2166 E University Drive, Suite 201, Tempe AZ 85281

Phone Number: 602 326 0111

Property Owner:

Name: DEM Ranch Trust

Mailing Address: PO Box 24, Powder River, WY 82648

Phone Number: 307 258 5243

Physical Address: 15303 Arminto Road, Waltman WY 82604

Tax map parcel no: 36861910000700

Applicant:

Name: Declan Murphy for Union Wireless/Hemphill

Address: 2166 E University Drive, Suite 201, Tempe AZ 85281

Phone Number: 602 326 0111

Legal form (Corporation, LLC, etc.) Union Telephone Company

If purchased tower, date of purchase: Original Lease date 9/17/2008

GPS coordinates of tower: Lat/Long: 43 4 14.94325 -107 11 26.25296

Original Conditional Use Permit resolution number:

Dated of original Conditional Use Permit:

Operator:

Name: Union Wireless

Address: PO Box 160, Mountain View WY 82939

Phone Number: 602 326 0111

Signatures

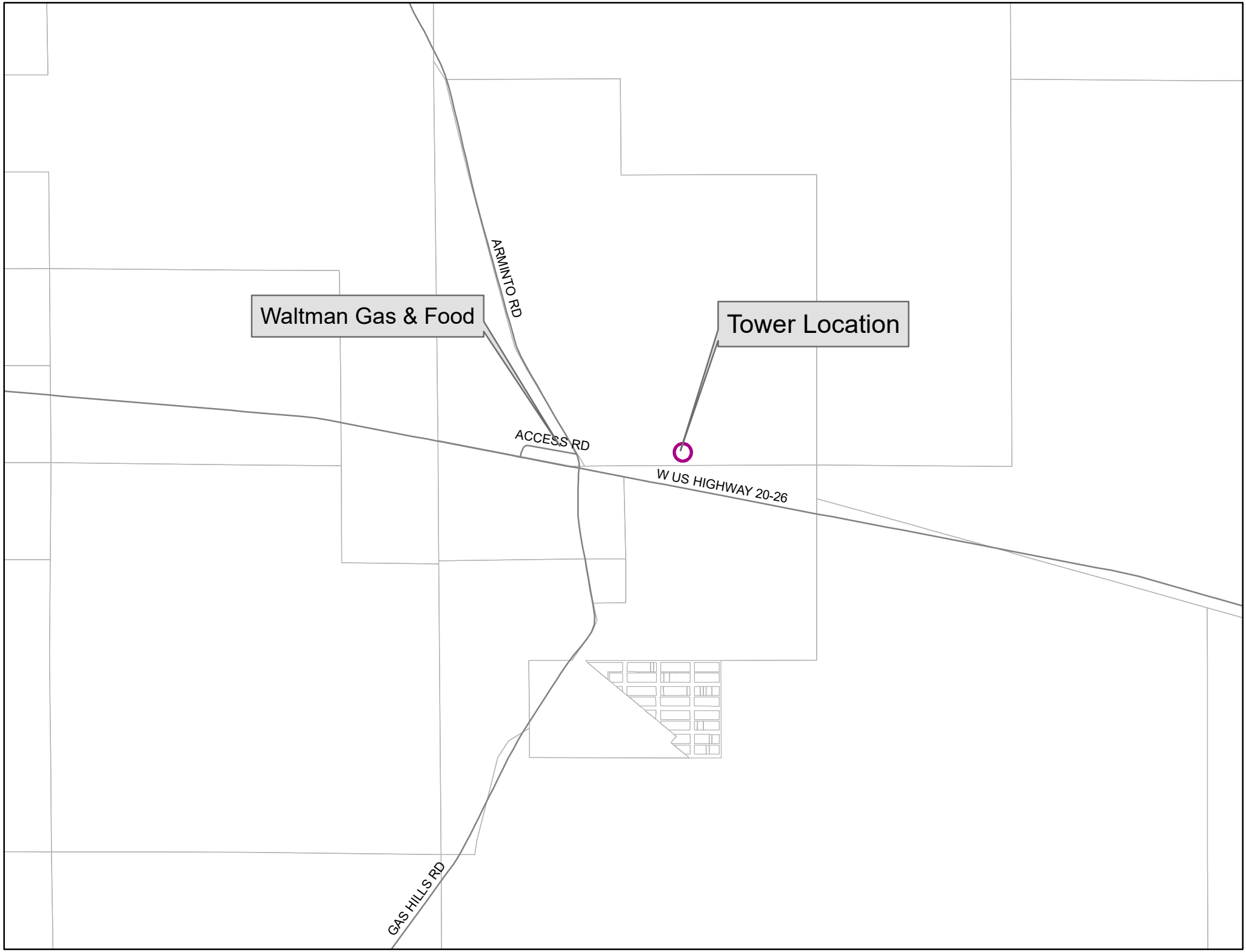
I (We) hereby certify that I (We) have read and examined this application and know the same to be true and correct to the best of my (our) knowledge. Granting this request does not presume to give authority to violate or cancel the provisions of any other State or local laws. Falsification or misrepresentation is grounds for voiding this request, if granted. All information within, attached to or submitted with this application shall become part of the public record, except as modified by applicable regulations. **I (We) further understand that all application fees are non-refundable.** By signing the application I am (We are) granting the Development Department access to our property for inspections.

Applicant: _____ Date: 3/3/20
(Signature)

Print Applicant Name: Declan Murphy

Owner: _____ Date: 5-20-20
(Signature)

Print Owner Name: D.C. Miller, Trustee


Waltman Gas & Food
Tower Location
ARMINTO RD
ACCESS RD
W US HIGHWAY 20-26
GAS HILLS RD

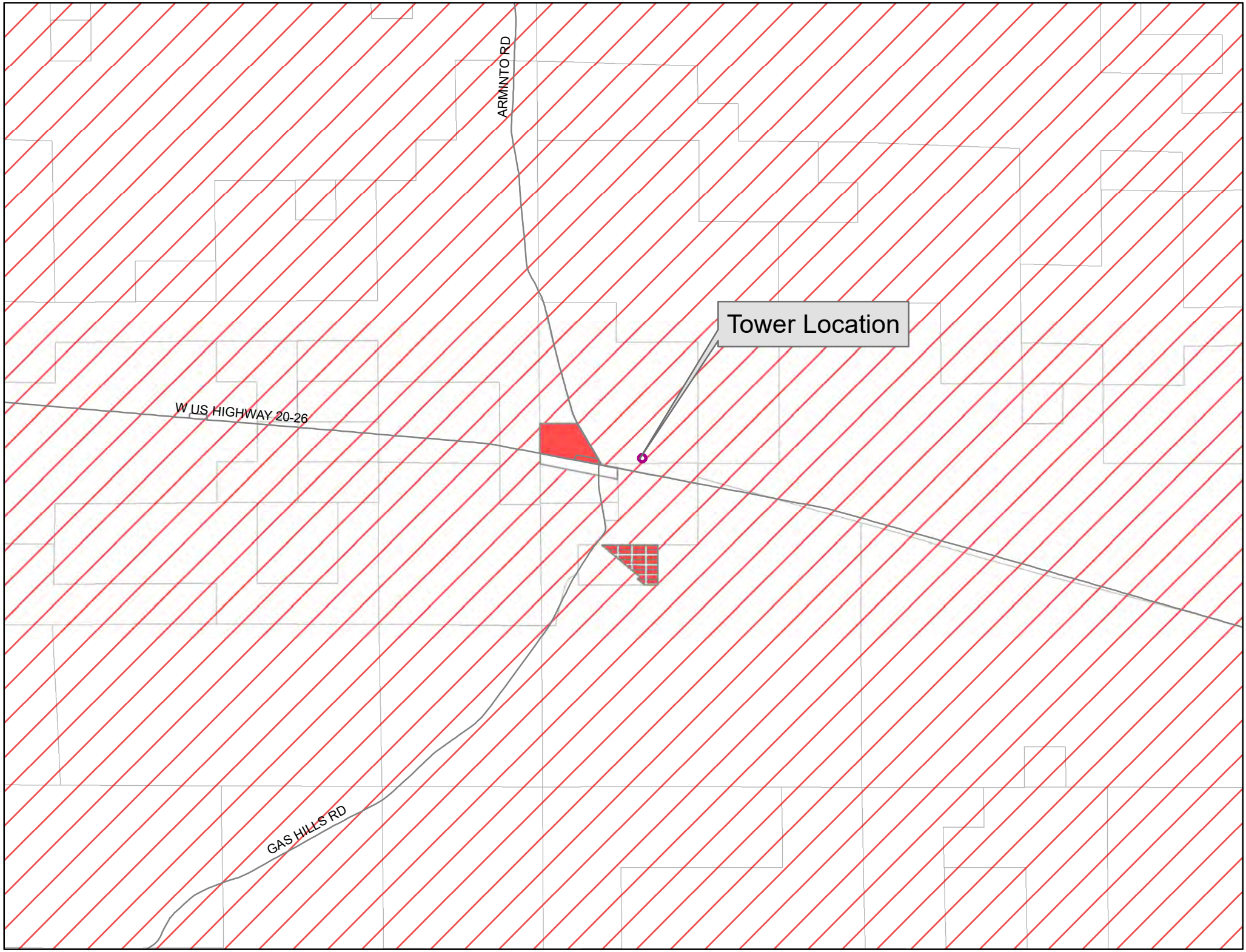

ARMINTO RD
Tower Location
W US HIGHWAY 20-26
GAS HILLS RD

PHOTO SIMULATIONS

12037 - Waltman

LAT 43º 4’ 14.94325”

LONG -107º 11’ 26.25296”

HEMPHILL®

COAL CREEK CONSULTING

simulations C·J·B

Note: Simulations are an artistic illustration created to represent how the proposed project may look once constructed. Simulations are create to match the current design as accurately as possible, but are not guaranteed to match the final build.

Before:

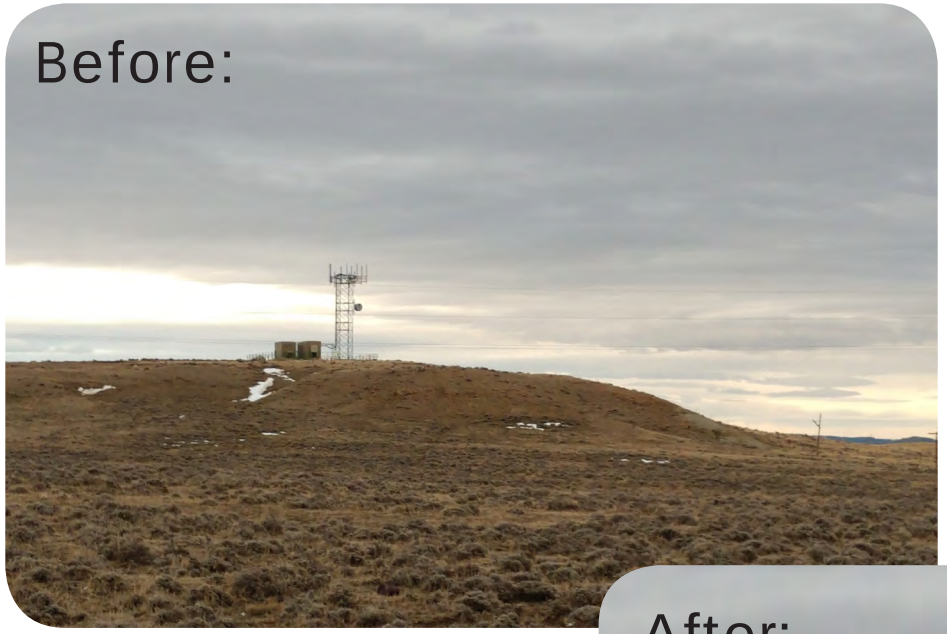


PHOTO SIMULATIONS

12037 - Waltman

LAT 43º 4’ 14.94325”
LONG -107º 11’ 26.25296”

After:

View 1

Looking Northeast

Before:

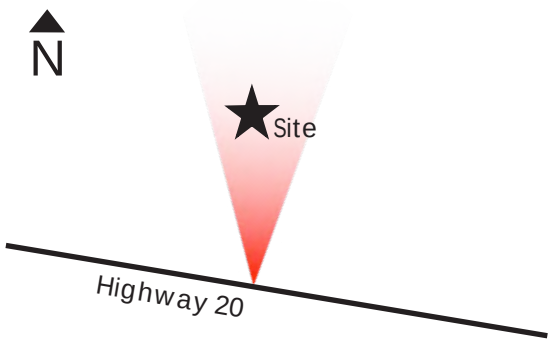
PHOTO SIMULATIONS

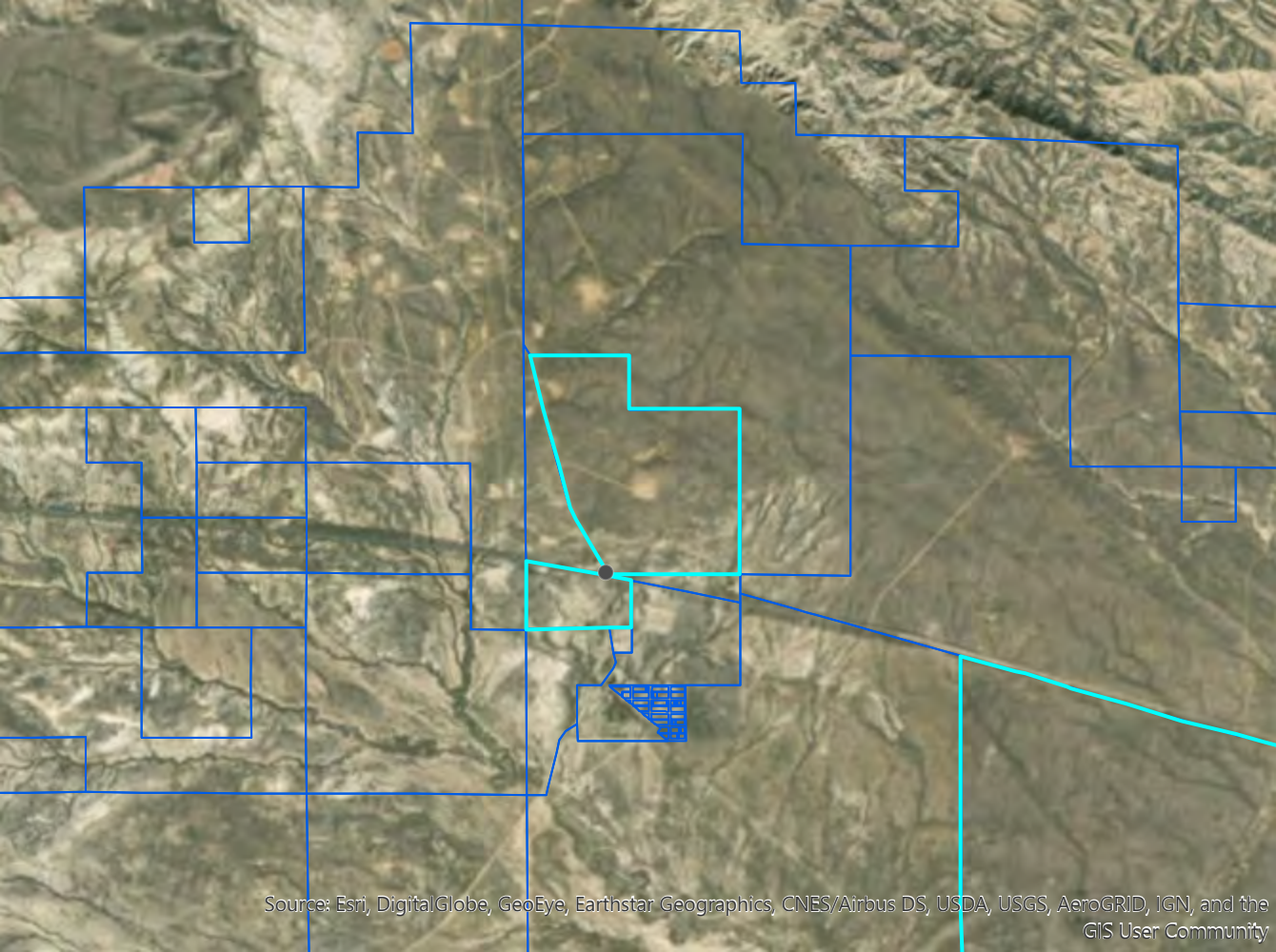
12037 - Waltman

LAT 43º 4’ 14.94325”
LONG -107º 11’ 26.25296”

After:

View 2
Looking North




Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

GEOTECHNICAL ENGINEERING REPORT

NEW HEMPHILL 4-LEG SELF-SUPPORT TOWER

WALTMAN

1 ARMINTO ROAD

NATRONA COUNTY, WYOMING

Prepared for:

Hemphill, LLC
1350 North Louisville Avenue
Tulsa, Oklahoma 74115

Prepared by:

• Geotechnical Services
• Environmental Services
• Material Testing Services

PALMERTON & PARRISH, INC.

Springfield, MO
4168 W. Kearney Springfield, MO 65803
Call 417.864.6000 Fax 417.864.6004
www.ppimo.com

PROJECT NUMBER: 261436

December 6, 2019

PALMERTON & PARRISH, INC.

GEOTECHNICAL & MATERIALS ENGINEERS
MATERIALS TESTING LABORATORIES
ENVIRONMENTAL SERVICES

4168 W. Kearney Street.
Springfield, MO 65803
Ph: (417) 864-6000
www.ppimo.com

December 6, 2019

Hemphill, LLC
1350 North Louisville Avenue
Tulsa, Oklahoma 74115

Attn: Mr. Scot Tinker, Director of Tower Operations
Email: scot.tinker@hemphill.com

RE: Geotechnical Engineering Report
New Hemphill 4-Leg Self-Support Tower - Waltman
1 Arminto Road
Natrona County, Wyoming
PPI Project Number: 261436

Dear Mr. Tinker:

Attached, please find the report summarizing the results of the geotechnical investigation conducted for the proposed New Hemphill 4-Leg Self-Support Tower in Natrona County, Wyoming. We appreciate this opportunity to be of service. If you have any questions, please don't hesitate to contact this office.

PALMERTON & PARRISH, INC.
By:

R. Todd Hercules, P.E.
Geotechnical Engineer

PALMERTON & PARRISH, INC.
By:

Professional Engineer
BRANDON PARRISH
P.E. 14631
Date
WYOMING

December 6, 2019

Brandon R. Parrish, P.E.
Vice-President

Submitted: One (1) Electronic .pdf Copy

BRP/BRP/RTH

TABLE OF CONTENTS

APPENDICES

EXECUTIVE SUMMARY

A Geotechnical Investigation was performed for the proposed New Hemphill 4-Leg Self-Support Tower located at 1 Arminto Road in Natrona County, Wyoming. It is understood that a new 80-foot Self-Support Tower will be constructed at the project site. Cut and fill depths are anticipated to be less than 2 feet across the subject site to provide finished subgrade elevations.

Based upon the information obtained from the borings drilled and subsequent laboratory testing, the site is suitable for the proposed Self-Support Tower. Important geotechnical considerations for the project are summarized below. However, users of the information contained in the report must review the entire report for specific details pertinent to geotechnical design considerations.

- Surface soils consisted of clayey sand to approximately 5.5 feet below the ground surface. Below the clayey sand layer was a sandstone layer that transitioned into a claystone/siltstone layer extending to the boring termination depth;
- Sandstone bedrock and claystone bedrock was generally excavatable without rock excavation equipment; however, hard layers within the bedrock may be encountered requiring rock excavation equipment. It is recommended that rock excavation equipment be available during excavations or drilled piers;
- Mat foundations bearing on sandstone for the proposed new Self-Support Tower can be designed for an allowable bearing capacity of 6,000 psf. Alternatively, the proposed Self-Support Tower can be supported by a drilled pier foundation;
- Drilled pier design parameters have been included in Section 8. Rock coring or rock bits may be required to advance the drilled piers through possible boulder and cobble zones. Additionally, some collapsible materials may be encountered in the drilled pier excavations. Accordingly, it is recommended that the drilled pier contractor have casing available in case these conditions are encountered;

EXECUTIVE SUMMARY - CONTINUED

- The project site classifies as a Site Class C in accordance with Section 1613 of the 2012 International Building Code (IBC); and
- Palmerton & Parrish, Inc. should be retained for construction observation and construction materials testing. Close monitoring of subgrade preparation work is considered critical to achieve adequate pavement and subgrade performance.

GEOTECHNICAL ENGINEERING REPORT
NEW HEMPHILL 4-LEG SELF-SUPPORT TOWER
WALTMAN
1 ARMINTO ROAD
NATRONA COUNTY, WYOMING

1.0 INTRODUCTION

This is the report of the Geotechnical Investigation performed for the proposed New Hemphill 4-Leg Self-Support Tower located at 1 Arminto Road in Natrona County, Wyoming. This investigation was in accordance with a letter proposal dated October 8, 2019, and authorized by Mr. Scot Tinker with Hemphill. The approximate site location is shown below:

2.0 PROJECT PURPOSE

The purpose of this Geotechnical Investigation was to provide information for foundation design and construction planning for the proposed Self-Support Tower. PPI's scope of services includes field and laboratory testing, investigation of the subsurface conditions in the vicinity of the tower base, engineering analysis of collected data and development of recommendations for foundation design and construction planning, and preparation of this Engineering Report.

3.0 PROJECT DESCRIPTION

It is understood that a new 80-foot Self-Support Tower supported upon either a mat foundation or drilled piers is proposed at the project site. Foundation loadings, both compressive and overturning are anticipated to be moderate. Cut and fill depths are anticipated to be less than 2 feet across the subject site to provide finished subgrade elevations.

4.0 SUBSURFACE INVESTIGATION

Subsurface conditions were investigated through completion of a subsurface boring and subsequent laboratory testing. Below is a picture of the existing tower site.

4.1 Subsurface Boring

The boring location was selected and staked in the field by the Client. The approximate boring location is shown on Figure 1, Boring Location Plan. The Missouri One-Call System was notified prior to the investigation to assist in locating buried public utilities.

A log of the boring showing descriptions of soil and rock units encountered, as well as results of field tests, laboratory tests and a "Key to Symbols" are presented in Appendix II.

The boring was drilled on November 4, 2019 using 4.5-inch O.D. continuous flight augers powered by an ATV-mounted drill-rig. Soil samples were generally collected at 2.5 to 5-foot centers during drilling using a split spoon sampler while performing the Standard Penetration Test (SPT) in general accordance with ASTM D1586. Please refer to Appendix III for general notes regarding boring logs and additional soil sampling information.

4.2 Laboratory Testing

Collected samples were sealed and transported to the laboratory for further evaluation and visual examination. Laboratory soil testing included the following:

- Unconfined Compressive strength of Rock Core (ASTM D7012);
- Moisture Content (ASTM D2216);
- Grain Size Analysis (ASTM D6913); and
- Pocket Penetrometers.

Laboratory test results are shown on each boring log in Appendix II and are summarized in the following table.

Depth (ft.)	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Moisture Content (%)	USCS Symbol	Percent Passing No. 200 Sieve (%)
3.5	30	20	10	11.7	SC	41

5.0 SITE GEOLOGY

Based on information available from the Wyoming Geological Survey, the subject site is located over the Wind River Formation. This formation consists of variegated red and white claystone and siltstone with a thinly bedded conglomerate. Some volcanic tuff is noted near the upper portion of this formation.

The subject site is located near known wind deposits according to the Wyoming Geological Survey. Though the subject site was not indicated to be within the included windblown deposit area, the site is within ½ mile of a windblown deposit area based on information provided by the Wyoming Geological Survey. Accordingly, windblown deposits and/or the hazards of windblown material may impact the subject site in the future. Hazards include drift of dunes and soils which may partially bury structures or temporarily close roadways.

6.0 GENERAL SITE SUBSURFACE CONDITIONS

Based upon subsurface conditions encountered within the borings drilled at the project site, generalized subsurface conditions are summarized in the table below. Soil stratification lines on the boring log indicate approximate boundary lines between different types of soil units based upon observations made during drilling. In-situ transitions between soil types are typically gradual.

6.1 Subsurface Stratums

Generalized subsurface conditions are summarized in the table below:

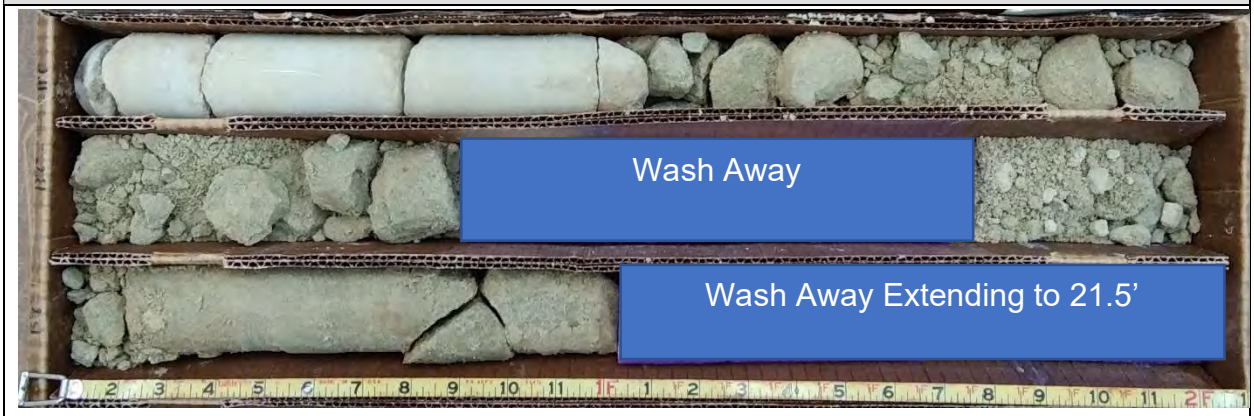
Depth	Stratum	Subsurface Material	Density
0 to 5.5 foot	Overburden	Clayey Sand	Loose to Medium Dense
5.5 to 24.7 feet	Sandstone	Silty Sandstone, Weakly Cemented	Soft to Medium Hard Rock
24.7 to 34.3 feet	Claystone	Claystone/Siltstone	Soft Rock

6.1.1 Rock Core

Rock coring was attempted using an NQ_2 sized core barrel with a diamond embedded core bit in the Silty Sandstone unit at the subject site. Rock coring was

advanced from 11.5 to 21.5 feet below the ground surface and was discontinued at 21.5 feet due to poor recovery. The resulting rock core was boxed and transported to PPI's office for further inspection. Based on the rock core obtained, the bedrock at the subject site consists of a claystone/siltstone unit. A uniaxial rock core test was performed on the silty sandstone at approximately 11.7' below the ground surface indicating a strength of 4,223 psi. Based on measurements performed in the laboratory, the silty sandstone rock core had a unit weight of approximately 157 pcf. A photo of the rock core obtained is included below:

Rock Core Photo



Rock Core Depth 13' to 23'

6.2 Groundwater

Shallow groundwater was not observed within the boring on the date drilled. Groundwater levels should be expected to fluctuate with changes in site grading, precipitation, and regional groundwater levels. Groundwater may be encountered during wetter periods.

7.0 EARTHWORK

Grading plans for the proposed Self-Support Tower were not provided. Grading for the project site is anticipated to have less than 2 feet of cut and/or fill to establish final grades. The initial phase of site preparation should include the steps listed below;

- Clearing and grubbing of any vegetation within the tower footprint; and

- Areas scheduled to receive controlled fill should be proof-rolled and approved in accordance with the following section of this report.

7.1 Site Preparation

Proof-rolling consists essentially of rolling the ground surface with a loaded tandem axle dump truck or similar heavy rubber-tired construction equipment and noting any areas which rut or deflect during rolling. All soft subgrade areas identified during proof-rolling should be undercut and replaced with compacted fill as outlined below. Proof-rolling, undercutting and replacement should be monitored by a qualified representative of the Geotechnical Engineer.

7.2 Fill Material Types

Fill Type[1]	USCS Classification	Acceptable Location for Placement
Low Volume Change (LVC) Engineered Fill[2]	CL, GC, or SC (LL < 45%)	All locations and elevations
On-Site Natural Soils	SC	All locations and elevations
Rock Fill[3]	GW	All locations and elevations

1. Controlled, compacted fill should consist of approved materials that are free of organic matter and debris and contain maximum rock size of 4 to 6 in. Frozen material should not be used and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to its use.
2. Low plasticity cohesive soil or granular soil having at least 15% low plasticity fines.
3. See Section 7.2.1 if rock fill will be utilized at the project site.

7.2.1 Rock Fill

If rock is to be used as the primary filling medium, embankments should be constructed using rock having maximum dimensions in excess of 4 inches, but no greater than 8 inches. Rock material should be placed in horizontal layers having a thickness of approximately the maximum size of the larger rock comprising the lift, but not greater than 12 inches. Rocks or boulders too large to permit placing in a 12-inch thick lift should be reduced in size as necessary to permit placement or be bladed over the edge of the fill and not used in the compacted fill. Rock fill should not be dumped into place but should be distributed in horizontal lifts by blading and dozing in such a manner as to ensure proper placement into final position in the embankment. Finer material including rock fines and limited soil

fines should be worked into the rock voids during this blading operation. Excessive soil and rock fine particles preventing interlock of cobble and boulder sized rock should be prohibited. Rock fill should be consolidated by a minimum of three (3) passes of a large diameter self-propelled vibratory compactor. Terminal fill slopes using rock may be constructed 1.5 horizontal to 1 vertical for fill height of 15 feet or less. The testing of rock fill quality should include the requirements that a representative of the Geotechnical Engineer be present daily, but not necessarily continuously during the placement of the fill to observe the placement of rock fill in order to determine fill quality and to observe that the contractors work sequence is in compliance with this specification. Progress reports indicative of the quality of the fill should be made at regular intervals to the Owner. If improper placement procedures are observed during the placement of the fill the Geotechnical Engineer should inform the Contractor, and no additional fill should be permitted on the affected area until the condition causing the low densities has been corrected and the fill has been reworked to obtain sufficient density.

7.3 Compaction Requirements

Item	Description
Subgrade Scarification Depth	At least 8 inches
Fill Lift Thickness	8-inch (loose)
Compaction Requirements[1]	• 95% Standard Proctor Density (ASTM D-698)
Moisture Content	• ± 2% optimum moisture for CL, SC, or GC soil types; or • 0 to 4% above optimum for CH soil types
Recommended Testing Frequency	• One (1) Field Density (compaction) test for each 2,500 sq. ft. of fill within the footprint of the Self-Support Tower; • One (1) Field Density (compaction) test for each 5,000 sq. ft. of fill within non-structure areas; • A minimum of three (3) tests per lift; and • Visual observation of the compaction process should be documented with no testing required **if** a performance compaction specification (i.e. number of passes) is utilized.

1. We recommend that engineered fill (including scarified compacted subgrade) be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.

7.4 Excavations

Based upon the subsurface conditions encountered during this investigation, the on-site soils typically classify as Type B in accordance with OSHA regulations. Temporary excavations in soils classifying as Type B with a total height of less than 20 feet should be cut no steeper than 1H:1V in accordance with OSHA guidelines. Confirmation of soil classification during construction, as well as construction safety (including shoring, if required), is the responsibility of the contractor.

Generally. excavations are anticipated to be capable of being performed with traditional excavation equipment in the clayey sand layer; however, excavations into the sandstone layer may require rock excavation equipment. It is recommended that rock excavation equipment be available during excavations if excavations extend to the sandstone unit.

8.0 TOWER FOUNDATION RECOMMENDATIONS

The proposed Self-Support Tower is anticipated to either be supported on a shallow mat foundation or on drilled pier foundations. Based upon the conditions encountered in the boring performed at the project site, the site subsurface materials are suitable for either a mat foundation or drilled pier foundations. Recommendations for mat foundations and drilled piers are included in the following sections.

8.1 Shallow Mat Foundations

Based upon the subsurface conditions encountered near the proposed Self-Support Tower and anticipated site grading, footings for the proposed Self-Support Tower are anticipated to bear on competent sandstone. Please refer to the section below for recommendations regarding shallow foundations.

8.2 Shallow Foundation Design Recommendations

Description	Mat Foundation Parameters
Net allowable bearing pressure[1]	Sandstone: 6,000 psf
Ultimate bearing pressure[2]	Sandstone: 18,000 psf
Transient (wind) loading ONLY – Allowable Bearing Pressure[3]	Sandstone: 7,500 psf
Minimum embedment below finished grade for frost protection and variation in soil moisture[4]	5 feet
Estimated total settlement[5]	1 inch or less
Allowable passive pressure[6]	600 psf
Coefficient of sliding friction[7]	0.5 (natural soils/controlled fill)

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. The recommended pressure considers all unsuitable and/or soft or loose soils, if encountered, are undercut and replaced with tested and approved new engineered fill. Footing excavations should be free of loose and disturbed material, debris, and water when concrete is placed. A factor of safety value of 3 has been applied to these values.
2. No factor of safety has been applied to this value.
3. The allowable bearing capacity may be increased to this value **only** for transient or wind loading.
4. For footings beneath unheated areas. It is anticipated that additional depth may be required for overturning and uplift design considerations.
5. The foundation movement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of compacted fill, and the quality of the earthwork operations.
6. Allowable passive pressure value considers a factor of safety of about 2. Passive pressure value applies to undisturbed native clay or properly compacted fill. If formed footings are constructed, the space between the formed side of a footing and excavation sidewall should be cleaned of all loose material, debris, and water and backfilled with tested and approved fill compacted to at least 95% of the material's Standard Proctor dry density. Passive resistance should be neglected for the upper 5 feet of the soil below the final adjacent grade due to strength loss from freeze/thaw and shrink/swell.
7. Coefficient of friction value is an ultimate value and does not contain a factor of safety.

8.3 Uplift

Resistance of shallow spread footings to uplift (U_p) may be based upon the dead weight of the concrete footing structure (W_C) and the weight of soil backfill contained in an inverted cone or pyramid directly above the footings (W_S). The following parameters may be used in design:

Description	Weights
Weight of Concrete (W_c)	150 pcf
Weight of Soil Resistance (W_s)	100 pcf
Weight for on-site soils placed in accordance with Section 7	

The base of the cone or pyramid should be the top of the footing and the pyramid or cone sides should form an angle of 30 degrees with the vertical. Allowable uplift capacity (U_p) should be computed as the lesser of the two (2) equations listed below:

$$U_P = (W_S/2.0) + (W_C/1.25) \text{ or } U_P = (W_S + W_C)/1.5$$

8.4 Drilled Pier Foundation Recommendations

Based upon the conditions encountered in the boring and subsequent laboratory testing, the proposed Self-Support Tower may be supported on a system of drilled piers bearing within the sandstone or claystone bedrock. The drilled shaft should be plumb (no more than 2 percent of the shaft length off vertical), and the drilled shaft should have a relatively flat bottom. Essentially all groundwater, if encountered, should be removed from the drilled pier shaft prior to concrete placement. If it is not possible to remove nearly all (2 to 3 inches max) of the groundwater from the drilled shaft excavation, concrete should be placed via tremie methods.

The method of concrete placement and vibration should be selected by the Structural Engineer. Required strength and mix design characteristics should also be specified by the Structural Engineer or other members of the Design Team.

Drilled pier installation may require core barrels or rock bits to penetrate the medium hard sandstone bedrock stratum. Casing may be required at the subject site due to dry clayey sand material.

8.5 Bearing Capacity and Uplift Resistance for a Drilled Shaft

The design parameters summarized in the table below may be utilized for bearing capacity and uplift capacity design for drilled shafts as described above. Allowable end bearing pressures and side friction values are summarized in the table below.

Stratum[1]	Applicable Depth (ft.)	Allowable End Bearing Pressure (ksf)[2]	Allowable Side Friction (ksf)[3]
Overburden	Ground surface to 1 shaft diameter or a minimum of 5.5 feet	Ignore	Ignore
Sandstone	5.5 feet to 12 feet	6.0	0.8
Sandstone[4]	12 to 20 feet	15	2.0
Claystone[4]	20 feet to 34.3 feet	10	1.0

1. If soft soils are encountered in plan bottom of shaft during drilling, the shaft should be deepened until an acceptable bearing stratum is encountered.
2. End bearing pressure values assume a Factor of Safety of 3.0 or greater.
3. Side friction values include a Factor of Safety of ~1.5. These values should be used with ***Factored Loads*** during structural design. Side Friction may be used for computation of Uplift and Compressive Capacity in soil.
4. Applicable depths of these layers are based on a drilled pier parameter less than 4.5 feet, if larger drilled piers are utilized, applicable depths of these layers may need to be adjusted.

8.6 Lateral Loadings

It is anticipated that designers will most likely utilize LPILE for completion of deep foundation lateral capacity design for the tower foundations. LPILE uses finite difference computer models based on the horizontal modulus of subgrade reaction (K_h).

The values listed in the table below may be utilized for Drilled Pier Analysis in LPILE. Please also notice that the table states to "ignore" lateral support for the depth from 0 to 1 pier diameter or a minimum of 5 feet. This notation is intended to account for the fact that near-surface soils are significantly disturbed during drilled shaft excavation, which greatly reduces the lateral support provided. Designers should use their judgment and make an appropriate reduction of soil strength parameters in this zone.

Values summarized in the table below are based upon published correlations, and field and laboratory data collected during this subsurface investigation. Values shown below are ultimate values representative of in-situ soil properties, and do not include a Factor of Safety. These values may be used to compute resistance to lateral loading of the overburden soils**. The appropriate Factor of Safety should be chosen by the designer.**

Stratum (Model)	Applicable Depth	Unit Weight [1] (pcf)	Undrained Cohesion, c (psf)	Static Modulus, k (pci)	Cyclic Modulus, k (pci)	Strain Factor ε_{50}
Overburden	Ground surface to 1 shaft diameter or a minimum of 5.5 feet	Moist: 125	Ignore	Ignore	Ignore	Ignore
Sandstone (Stiff Clay Without Water)	5.5 feet to 12 feet	Moist: 135	2,000	680	280	0.006
Sandstone (Strong Rock)	12 feet to 20 feet	Moist: 150	Uniaxial Compressive Strength (psi)			
			4,200			
Claystone (Strong Rock)	20 feet to bottom of shaft	Moist: 140	1,500			

1. Buoyant unit weight should be utilized for soils that extend below the design groundwater level. Groundwater was not encountered at the project site.

9.0 SEISMIC CONSIDERATIONS

Code Used	Site Classification
2012 International Building Code (IBC)[1]	C

1. In general accordance with the *2012 International Building Code*, Section 1613

10.0 CONSTRUCTION OBSERVATION & TESTING

The construction process is an integral design component with respect to the geotechnical aspects of a project. Since geotechnical engineering is influenced by variable depositional and weathering processes and because we sample only a small portion of the soils affecting the performance of the proposed Self-Support Tower, unanticipated or changed conditions can be disclosed during grading. Proper geotechnical observation and testing during construction is imperative to allow the Geotechnical Engineer the opportunity to evaluate assumptions made during the design process. Therefore, we recommend that PPI be kept apprised of design modifications and construction schedule of the proposed project to observe compliance with the design concepts and geotechnical recommendations, and to allow design changes in the event that subsurface conditions or methods of construction differ from those assumed while completing this study. We recommend that during construction all earthwork be monitored by a representative of PPI, including site preparation, placement of all engineered fill and trench backfill, and all foundation excavations as outlined below.

- An experienced Geotechnical Engineer or Engineering Technician of PPI should observe the subgrade throughout the proposed project site immediately following stripping to evaluate the native soils, identify areas requiring undercutting, and evaluate the suitability of the exposed surface for fill placement;
- An experienced Engineering Technician of PPI should monitor and test all fill placed within the Self-Support Tower area to determine whether the type of material, moisture content, and degree of compaction are within recommended limits; and
- An experienced Technician or Engineer should observe drilled pier excavations. Where unsuitable bearing conditions are observed, PPI should be contacted to provide remedial procedures.

11.0 REPORT LIMITATIONS

This report has been prepared in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Palmerton & Parrish, Inc. observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. Palmerton & Parrish's findings and conclusions must be considered not as scientific certainties, but as opinions based on our professional judgment concerning the significance of the data gathered during the course of this investigation. Other than this, no warranty is implied or intended.

S:_MASTER PROJECT FILE\2019\WY\Hemphill-261436-WY, CO & UT Registrations-Sub\Drilled\Waltman\CAD\261436 - Waltman

SCALE: 1" = 30'

Image From Google Earth Pro

LEGEND

Boring Location

Project: New Hemphill 4-Leg Self-Support Tower - Waltman
Client: Hemphill, LLC

Boring Location Plan

DATE: December 6, 2019

Project Number: 261436

PALMERTON & PARRISH, INC.
GEOTECHNICAL AND MATERIALS ENGINEERS/MATERIALS TESTING LABORATORIES/ENVIRONMENTAL SERVICES

FIGURE 1

4168 W. Kearney
Springfield, Missouri 65803
Telephone: (417) 864-6000
Fax: (417) 864-6004

GEOTECHNICAL BORING LOG

BORING NUMBER 1

CLIENT Hemphill, LLC
PROJECT NAME Waltman - New 80' Tower
PROJECT NO. 261436
PROJECT LOCATION Natrona County, Wyoming
DATE STARTED 11/17/19 **COMPLETED** 11/17/19
SURFACE ELEVATION _____ **BENCHMARK EL.** _____
DRILLER MR **DRILL RIG** 2019 CME-55
GROUND WATER LEVELS
HAMMER TYPE Auto
AT TIME OF DRILLING None
LOGGED BY EV **CHECKED BY** RTH
AT END OF DRILLING _____
NOTES _____

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf) 20 40 60 80 100 / N VALUE 20 40 60 80 / PL MC LL 20 40 60 80 / SHEAR STRENGTH (ksf) 1 2 3 4	ELEVATION (ft)
0	HSA - 3.5" I.D.		CLAYEY SAND, Brown, Slightly Moist, Loose to Medium Dense (SC)	SPT 1		4-3-4 (7)			
				SPT 2		8-9-8 (17)	4.5		
5	ROTARY - 3 5/8" O.D.		5.5 ft SILTY SANDSTONE, Grayish Brown, Fine Grained, Weakly Cemented, Soft to Medium Hard	SPT 3		21-46-56 (102)			
				SPT 4		21-34-60 (94)			
10	CORE BARREL - 2" I.D.			NQ 1	80 (23)				
15									
				NQ 2	0 (0)				
20				SPT 5		43-65/5"			
	ROTARY - 3 5/8" O.D.		24.7 ft CLAYSTONE/SILTSTONE, Brownish Tan, Soft						
25				SPT 6		51-62-65/3"	4.5		
30			34.3 ft	SPT 7		49-65/4"	4.5		

Bottom of borehole at 34.3 feet.

4168 W. Kearney
Springfield, Missouri 65803
Telephone: (417) 864-6000
Fax: (417) 864-6004

KEY TO SYMBOLS

CLIENT Hemphill, LLC **PROJECT NAME** Waltman - New 80' Tower

PROJECT NO. 261436 **PROJECT LOCATION** Natrona County, Wyoming

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)

CLAYSTONE: Claystone

SANDSTONE: Sandstone

SC: USCS Clayey Sand

SAMPLER SYMBOLS

NQ

Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION

Water Level at Time Drilling, or as Shown

Water Level at End of Drilling, or as Shown

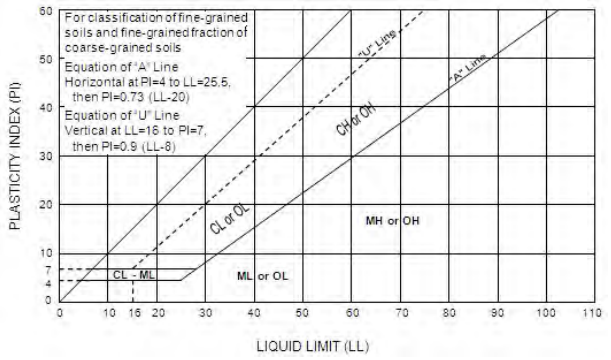
Water Level After 24 Hours, or as Shown

GENERAL NOTES

SOIL PROPERTIES & DESCRIPTIONS

COHESIVE SOILS

Consistency	Unconfined Compressive Strength (Qu)	Pocket Penetrometer Strength	N-Value
	(psf)	(tsf)	(blows/ft)
Very Soft	<500	<0.25	0-1
Soft	500-1000	0.25-0.50	2-4
Medium Stiff	1001-2000	0.50-1.00	5-8
Stiff	2001-4000	1.00-2.00	9-15
Very Stiff	4001-8000	2.00-4.00	16-30
Hard	>8000	>4.00	31-60
Very Hard			>60



Group Symbol	Group Name
CL –	Lean Clay
ML –	Silt
OL –	Organic Clay or Silt
CH –	Fat Clay
MH –	Elastic Silt
OH –	Organic Clay or Silt
PT –	Peat
CL-CH –	Lean to Fat Clay

Plasticity		Moisture	
Description	Liquid Limit (LL)	Descriptive Term	Guide
Lean	<45%	Dry	No indication of water
Lean to Fat	45-49%	Moist	Indication of water
Fat	≥50%	Wet	Visible water

Fine Grained Soil Sub Classification	Percent (by weight) of Total Sample
Terms: SILT, LEAN CLAY, FAT CLAY, ELASTIC SILT	PRIMARY CONSTITUENT
Sandy, gravelly, abundant cobbles, abundant boulders	>30-50]
with sand, with gravel, with cobbles, with boulders	>15-30] – secondary coarse grained constituents
scattered sand, scattered gravel, scattered cobbles, scattered boulders	5-15]
a trace sand, a trace gravel, a few cobbles, a few boulders	<5]
The relationship of clay and silt constituents is based on plasticity and normally determined by performing index tests. Refined classifications are based on Atterberg Limits tests and the Plasticity Chart.	

NON-COHESIVE (GRANULAR) SOILS

RELATIVE DENSITY	N-VALUE
Very Loose	0-4
Loose	5-10
Medium Dense	11-24
Dense	25-50
Very Dense	≥51

MOISTURE CONDITION	
Descriptive Term	Guide
Dry	No indication of water
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table.

**GRAIN SIZE IDENTIFICATION		
Name	Size Limits	Familiar Example
Boulder	12 in. or more	Larger than basketball
Cobbles	3 in. to 12 in.	Grapefruit
Coarse Gravel	¾-in. to 3 in.	Orange or lemon
Fine Gravel	No. 4 sieve to ¾-in.	Grape or pea
Coarse Sand	No. 10 sieve to No. 4 sieve	Rock salt
Medium Sand	No. 40 sieve to No. 10 sieve	Sugar, table salt
Fine Sand*	No. 200 sieve to No. 40 sieve	Powdered sugar
Fines	Less than No. 200 sieve	
*Particles finer than fine sand cannot be discerned with the naked eye at a distance of 8 inches.		

Coarse Grained Soil Sub Classification	Percent (by weight) of Total Sample
Terms: GRAVEL, SAND, COBBLES, BOULDERS	PRIMARY CONSTITUENT
Sandy, gravelly, abundant cobbles, abundant boulders	>30-50]
with gravel, with sand, with cobbles, with boulders	>15-30] – secondary coarse grained constituents
scattered gravel, scattered sand, scattered cobbles, scattered boulders	5-15]
a trace gravel, a trace sand, a few cobbles, a few boulders	<5]
Silty (MH & ML)*, clayey (CL & CH)*	<15]
(with silt, with clay)*	5-15] – secondary fine grained constituents
(trace silt, trace clay)*	<5]
*Index tests and/or plasticity tests are performed to determine whether the term "silt" or "clay" is used.	

*Modified after Ref. ASTM D2487-93 & D2488-93
**Modified after Ref. Oregon DOT 1987 & FHWA 1997
***Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

GENERAL NOTES

BEDROCK PROPERTIES & DESCRIPTIONS

ROCK QUALITY DESIGNATION (RQD)	
Description of Rock Quality	*RQD (%)
Very Poor	< 25
Poor	25-50
Fair	50-75
Good	75-90
Excellent	90-100

*RQD is defined as the total length of sound core pieces 4 in. or greater in length, expressed as a percentage of the total length cored. RQD provides an indication of the integrity of the rock mass and relative extent of seams and bedding planes.

SCALE OF RELATIVE ROCK HARDNESS		
Term	Field Identification	Approx. Unconfined Compressive Strength (tsf)
Extremely Soft	Can be indented by thumbnail	2.6-10
Very Soft	Can be peeled by pocket knife	10-50
Soft	Can be peeled with difficulty by pocket knife	50-260
Medium Hard	Can be grooved 2 mm deep by firm pressure of knife	260-520
Moderately Hard	Requires one hammer blow to fracture	520-1040
Hard	Can be scratched with knife or pick only with difficulty	1040-2610
Very Hard	Cannot be scratched by knife or sharp pick	>2610

DEGREE OF WEATHERING	
Slightly Weathered	Rock generally fresh, joints stained and discoloration extends into rock up to 25mm (1 in), open joints may contain clay, core rings under hammer impact.
Weathered	Rock mass is decomposed 50% or less, significant portions of rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.
Highly Weathered	Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

GRAIN SIZE (TYPICALLY FOR SEDIMENTARY ROCKS)		
Description	Diameter (mm)	Field Identification
Very Coarse Grained	>4.76	
Coarse Grained	2.0-4.76	Individual grains can easily be distinguished by eye.
Medium Grained	0.42-2.0	Individual grains can be distinguished by eye.
Fine Grained	0.074-0.42	Individual grains can be distinguished by eye with difficulty.
Very Fine Grained	<0.074	Individual grains cannot be distinguished by unaided eye.

VOIDS	
Pit	Voids barely seen with the naked eye to 6mm *1/4-inch)
Vug	Voids 6 to 50mm (1/4 to 2 inches) in diameter
Cavity	50 to 6000mm (2 to 24 inches) in diameter
Cave	> 600mm

BEDDING THCKNESS	
Very Thick Bedded	> 3' Thick
Thick Bedded	1' to 3' Thick
Medium Bedded	4" to 1' Thick
Thin Bedded	1-1/4" to 4" Thick
Very Thin Bedded	½" to 1-1/4" Thick
Thickly Laminated	1/8" to ½" Thick
Thinly Laminated	1/8" or less (paper thin)

DRILLING NOTES

Drilling & Sampling Symbols		
NQ – Rock Core (2-inch diameter)	CFA- Continuous Flight (Solid Stem) Auger	WB – Wash Bore or Mud Rotary
HQ – Rock Core (3-inch diameter)	SS – Split Spoon Sampler	TP – Test Pit
HSA – Hollow Stem Auger	ST – Shelby Tube	HA – Hand Auger

Soil Sample Types

Shelby Tube Samples: Relatively undisturbed soil samples were obtained from the borings using thin wall (Shelby) tube samplers pushed hydraulically into the soil in advance of drilling. This sampling, which is considered to be undisturbed, was performed in accordance with the requirements of ASTM D 1587. This type of sample is considered best for the testing of "in-situ" soil properties such as natural density and strength characteristics. The use of this sampling method is basically restricted to soil containing little to no chert fragments and to softer shale deposits.

Split Spoon Samples: The Standard Penetration Test is conducted in conjunction with the split-barrel sampling procedure. The "N" value corresponds to the number of blows required to drive the last 1 foot of an 18-inch long, 2-inch O.D. split-barrel sampler with a 140 lb. hammer falling a distance of 30 inches. The Standard Penetration Test is carried out according to ASTM D-1586.

Water Level Measurements

Water levels indicated on the boring logs are levels measured in the borings at the times indicated. In permeable materials, the indicated levels may reflect the location of groundwater. In low permeability soils, shallow groundwater may indicate a perched condition. Caution is merited when interpreting short-term water level readings from open bore holes. Accurate water levels are best determined from piezometers.

Automatic Hammer

Palmerton and Parrish, Inc.'s CME's are equipped with automatic hammers. The conventional method used to obtain disturbed soil samples used a safety hammer operated by company personnel with a cat head and rope. However, use of an automatic hammer allows a greater mechanical efficiency to be achieved in the field while performing a Standard Penetration resistance test based upon automatic hammer efficiencies calibrated using dynamic testing techniques.

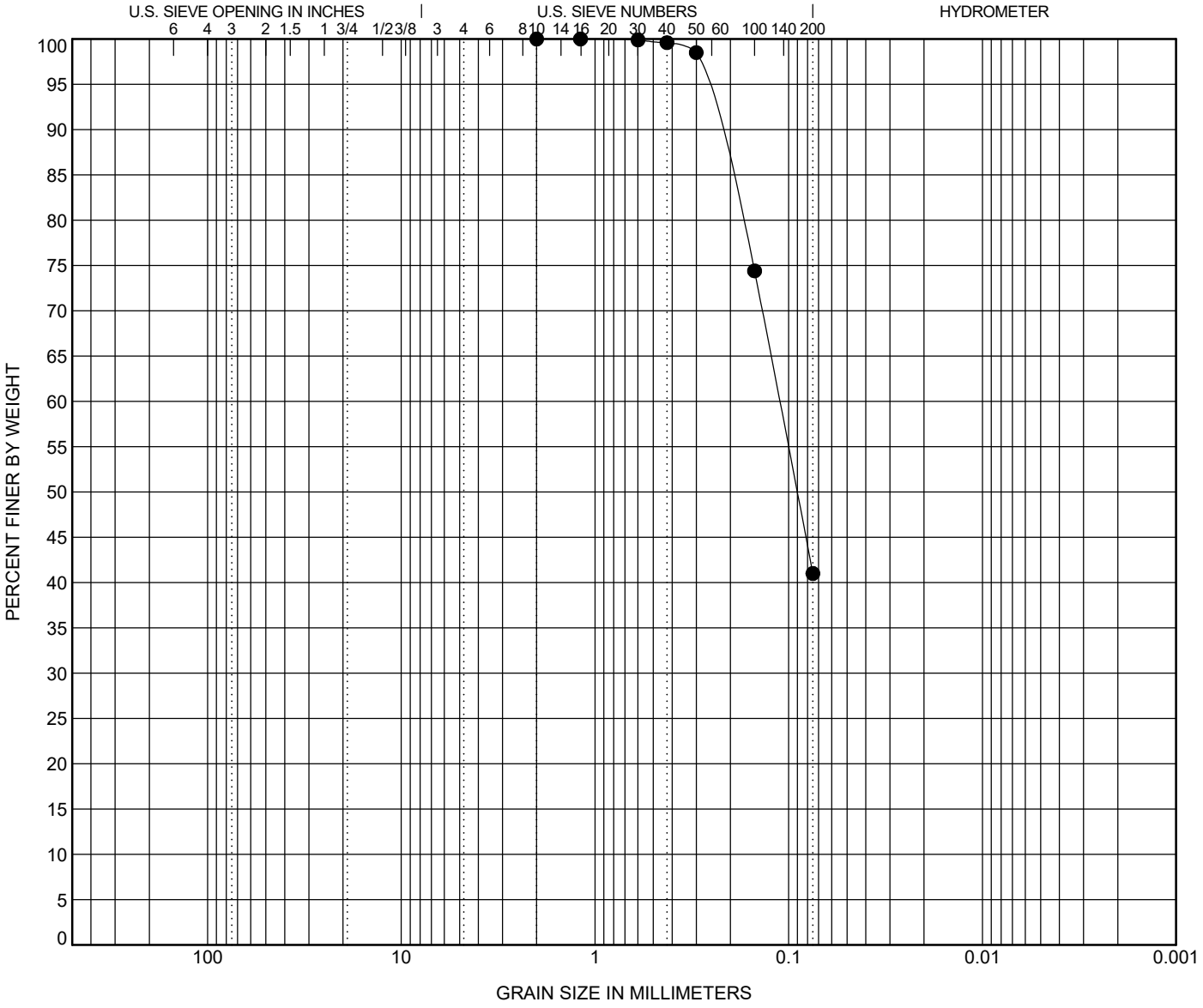
*Modified after Ref. ASTM D2487-93 & D2488-93
**Modified after Ref. Oregon DOT 1987 & FHWA 1997
***Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

GRAIN SIZE DISTRIBUTION

4168 W Kearney St.
Springfield, MO 65803
Telephone: 417-864-6000

CLIENT Hemphill, LLC **PROJECT NAME** Waltman - New 80' Tower

PROJECT NO. 261436 **PROJECT LOCATION** Natrona County, Wyoming



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● 1	3.5	**CLAYEY SAND(SC)**	30	20	10		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 1	3.5	2	0.111			0.0	59.0	41.0	

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

CONDITIONAL USE PERMIT REQUEST

FOR A

TELECOMMUNICATION SITE

CUP20-4

Staff Report: Trish Chavis
June 9, 2020

For

July 14, 2020
Planning and Zoning Commission

And

August 4, 2020
Board of County Commissioner Meeting

Applicant: Declan Murphy, Union Wireless/Hemphill

Request: Construct an 84-foot self-supporting communication tower to allow for the expansion of an existing Union Wireless site. The applicant is requesting 100-feet total height to include all appurtenances.

Location and Zoning

The parcel is located just east of the Waltman Food & Gas on W. US Highway 20-26.

The subject parcel and all surrounding parcels are zoned Ranching, Agricultural and Mining (RAM).

Proposal

Union has applied for a CUP to construct an 84-foot communication tower to replace their existing 45' tower. The applicant is request the CUP to have a total height of 100-feet. This will include the additional antennas and lightening rod.

The proposed upgrades are necessary to allow Union Wireless to continue providing service to the adjacent community, in addition to enhancing emergency service capabilities through FirstNet.

FirstNet is the First Responder Network Authority, and is an independent authority authorized by Congress in 2012, to develop, build and operate the nationwide, broadband network that equips first responders.

General Standards
For
Conditional Use Permits

Criteria for Approval

1. Will granting the Conditional Use Permit contribute to an overburdening of county services?

   Proposed Finding of Fact. Granting the Conditional Use permit will not contribute to an overburdening of county services. County services and infrastructure will not be necessary for this permit. The tower would provide needed cell service to the area, which will add E-911 capabilities through the carrier's networks, and promote greater coverage and reach for local law enforcement and emergency services.

2. Will granting the Conditional Use Permit cause undue traffic, parking, population density or environmental problems?

   Proposed Finding of Fact. The facility is unmanned and will not cause undue traffic or parking. Routine maintenance for the tower and antennas will be limited. There will be no affects to population density.

3. Will granting the Conditional Use Permit impair the use of adjacent property or alter the character of the neighborhood?

   Proposed Finding of Fact. The surrounding ranch consists of approximately 3,460 acres. The addition of a taller communication tower will not impair the use of adjacent properties.

4. Will granting the Conditional Use Permit detrimentally affect the public health, safety and welfare, or nullify the intent of the Development Plan or Zoning Resolution?

   The addition of the proposed tower would not be damaging or inconsistent with the surrounding area. The proposed tower is consistent with the intent of both the Development Plan and the Zoning Resolution.

   Proposed Finding of Fact. The proposed tower will be constructed in accordance with all applicable building, electrical and plumbing codes. With an approved CUP, the tower will comply with the Zoning Resolution and the Development Plan. This site will provide wireless coverage to residents and travelers as well as provides for valuable E911 services and FirstNet capabilities.

Key Communication Tower Regulations

Artificially Lighted: There is no requirement for lighting until the tower reaches 200 feet. The proposed tower does not meet the requirement for FAA review.

Setbacks: Setbacks from roads and structures is 110% of the tower height. The nearest road is 490-feet away and does meet setbacks.

Documentation demonstrating need: The proposed site is situated to provide effective coverage to the area. The existing tower's current loading and height is insufficient to provide adequate service so a taller tower would be needed.

Public Comment

As of the date of this staff report there have been no comment received.

Staff sent the public notice to 25 neighbors within 3 miles.

Recommendation

Staff proposes a motion and vote by the Planning and Zoning Commission to recommend approval of the requested Conditional Use Permit, by the Board of County Commissioners and incorporate by reference all findings of fact set forth herein and make them a part thereof.

Site Name: Grey Reef
Site Address: 21755 State Highway 220, Alcova WY 82620
GEOCODE: 30820740002300 **Lat/Long:** 42 34 04.1 -106 42 40.9

Purpose of Request

Union Wireless is committed to improving coverage and expanding network capacity to meet customer demand throughout the State of Wyoming. The existing Wireless Communication Facility (WCF) provides residents, visitors and businesses with high quality reliable wireless service for both personal & business, in addition to enhancing emergency services.

Union Wireless is proposing the following at the existing WCF located at 21755 State Highway 220, Alcova WY 82620.

Details of Request

Union Wireless is proposing a new 80' self-support tower at the existing WCF, but **requesting approval for a 100' self-support tower**. The existing site footprint will be expanded to accommodate the upgrades as detailed on the attached site plan/elevation (see sheet C2-1). The existing 45' Union self-support tower will remain for a period to accommodate the transfer of equipment to the new tower.

The proposed upgrades are necessary to allow Union Wireless to continue providing the best possible service to the adjacent community, in addition to enhancing emergency service capabilities through FIRSTNET.

Technical Information

Steel four leg 80' self-support tower designed to accommodate multiple carriers, please see Exhibit A for tower structural/technical details.

Valmont self-support tower, proposed antennas are COMMSCOPE NNH4-65C-R6-V3, please see Exhibit A for tower structural/technical details and Exhibit B for antenna spec's.

Union/Hemphill is proposing an 80' Self-Support Tower with 3 sectors of antennas, please see Exhibit A for tower details. No lighting is required at the proposed location/height per FAA TowAir.

The proposed frequency range is 698-896 MHz to 1695-2360 MHz

Please see Exhibit B - Antenna Spec's for the actual intended transmission, effective radiated power etc.

Please see Exhibit B - Antenna Spec's for direction of maximum lobes and associated radiation of the antennas etc.

Please see Exhibit C - NIER Report.

Union Wireless is an FCC licensed carrier, therefore all transmissions will be within the allocated frequencies and will not cause interference with any other licensed transmission.

Please see the Exhibit D – Union FCC License Info.

Please see Exhibit F for information on proposed tower foundation, soils etc.

FAA does not require lighting for the proposed height, which is typical for sites under 200' unless the site is very close to an Airport.

The proposed 80' Self-Support tower will replace the existing 40' Union Self-support at the existing cell-site, and is structurally designed to accommodate multiple carriers.

Please see Exhibit A with information on the tower/foundation engineering compliant with local, County, State and Federal structural requirements.

Grounding and Bonding, please sheets E4-1, G1-1 and G1-2 for details.

The existing cell-site is far removed from the nearest residential. The site is visible from US HWY 220 and Grey Reef Road, however setback far enough to not be in the peripheral view of passing traffic.

Please see the attached photo simulations of the before and after views.

The subject location is an existing cell-site. The proposed changes mainly in tower height will be noticeable but should have little visual impact or public concern give the setback of the existing sites.

The existing cell-site currently has screening in place, so Union Wireless will continue to maintain the current screening to maintain consistency with the existing screening.

Please let me know if you need any additional information.

Sincerely,

Declan Murphy
Coal Creek Consulting for Union Wireless/Hemphill
2166 E. University Dr. #201, Tempe, AZ 85281
Tel: (602) 326-0111
Email: dmurphy@coal-creek.com

and Zoning Commission and **Board of County Commissioners** shall require showings concerning all of the following:

1. The owner of record or contract purchaser has signed the application.

2. Granting the conditional use permit will not contribute to an overburdening of County Services.

3. Granting the conditional use will not cause undue traffic, parking, population density, or environmental problems.

4. Granting the conditional use permit will not impair the use of adjacent property or alter the character of the neighborhood.

5. Granting the conditional use permit will not detrimentally affect the public health, safety, and welfare, or nullify the intent of the Development Plan or the Zoning Resolution.

APPLICATION INSTRUCTIONS

This is an application for a conditional use permit for wireless telecommunication facilities on the parcel described hereon. By completing the application form and providing the other requested information, your application will be acted upon in the fastest, fairest manner prescribed by law.

Person preparing report:

Name: Declan Murphy for Union Wireless/Hemphill

Address: 2166 E University Drive, #201, Tempe AZ 85281

Phone Number: 602 326 0111

Property Owner:

Name: Bret & Candy Van Rensselaer

Mailing Address: Casper WY

Phone Number: 307-237-1182

Physical Address: 21755 State Highway 220, Alcova WY 82620

Tax map parcel no: 30820740002300

Applicant:

Name: Declan Murphy for Union Wireless/Hemphill

Address: 2166 E University Drive, #201, Tempe AZ 85281

Phone Number: 602 326 0111

Legal form (Corporation, LLC, etc.) Union Telephone Company

If purchased tower, date of purchase: Lat/Long 42 34 04.1 -106 42 40.9

GPS coordinates of tower: Lat/Long 42 34 04.1 -106 42 40.9

Original Conditional Use Permit resolution number: CUP 10-0002

Dated of original Conditional Use Permit: 3/2/2010

Operator:

Name: Union Wireless

Address: PO Box 160, Mountain View WY 82939

Phone Number: 602 326 0111

Signatures

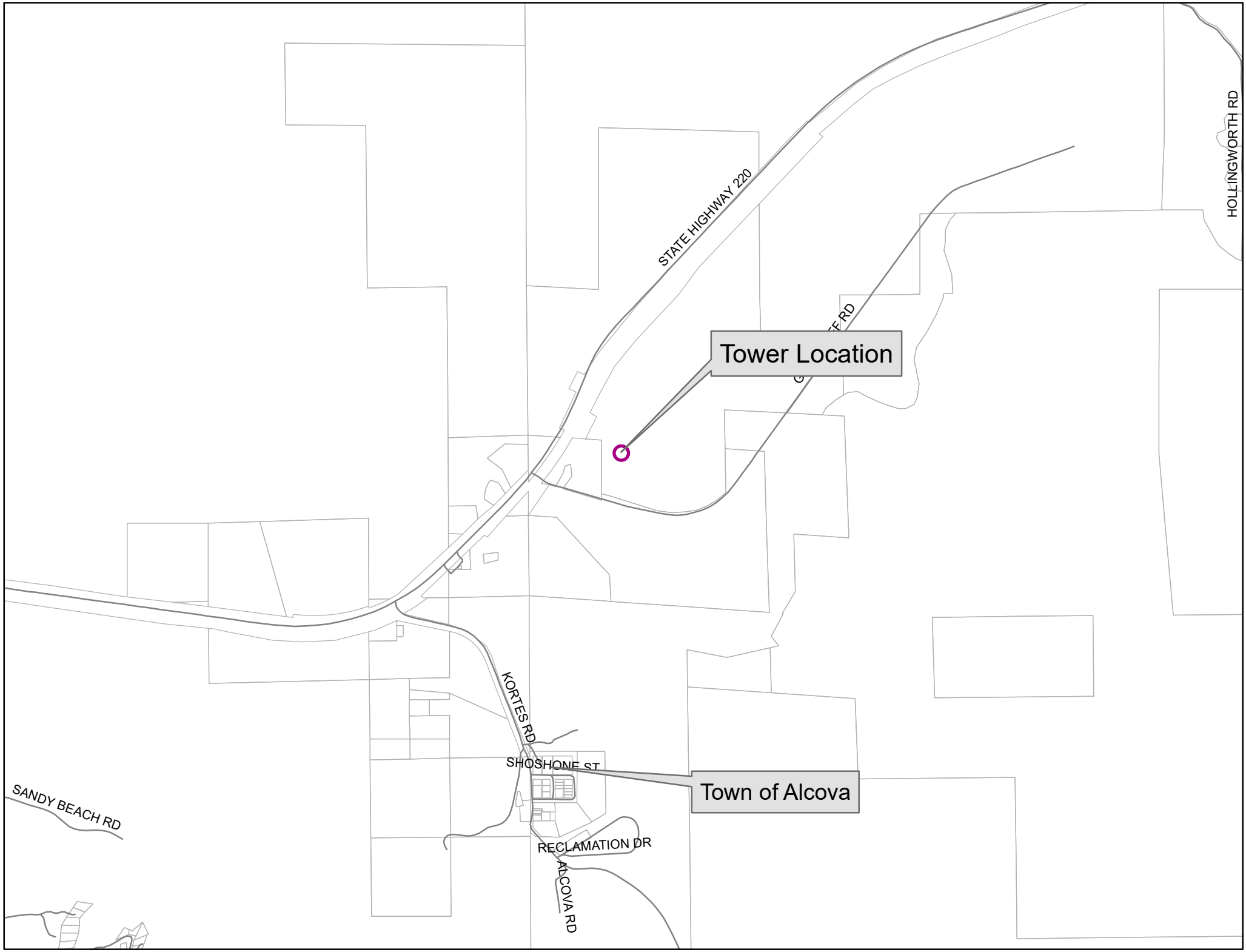
I (We) hereby certify that I (We) have read and examined this application and know the same to be true and correct to the best of my (our) knowledge. Granting this request does not presume to give authority to violate or cancel the provisions of any other State or local laws. Falsification or misrepresentation is grounds for voiding this request, if granted. All information within, attached to or submitted with this application shall become part of the public record, except as modified by applicable regulations. **I (We) further understand that all application fees are non-refundable.** By signing the application I am (We are) granting the Development Department access to our property for inspections.

Applicant: Declan Murphy (Signature) Date: 4-20-20

Print Applicant Name: Declan Murphy

Owner: (Signature) Date: 5-20-20

Print Owner Name: BRET VANZEUSSELHEIM


STATE HIGHWAY 220
HOLLINGWORTH RD
Tower Location
KORTES RD
SHOSHONE ST
Town of Alcova
SANDY BEACH RD
RECLAMATION DR
ALCOVA RD

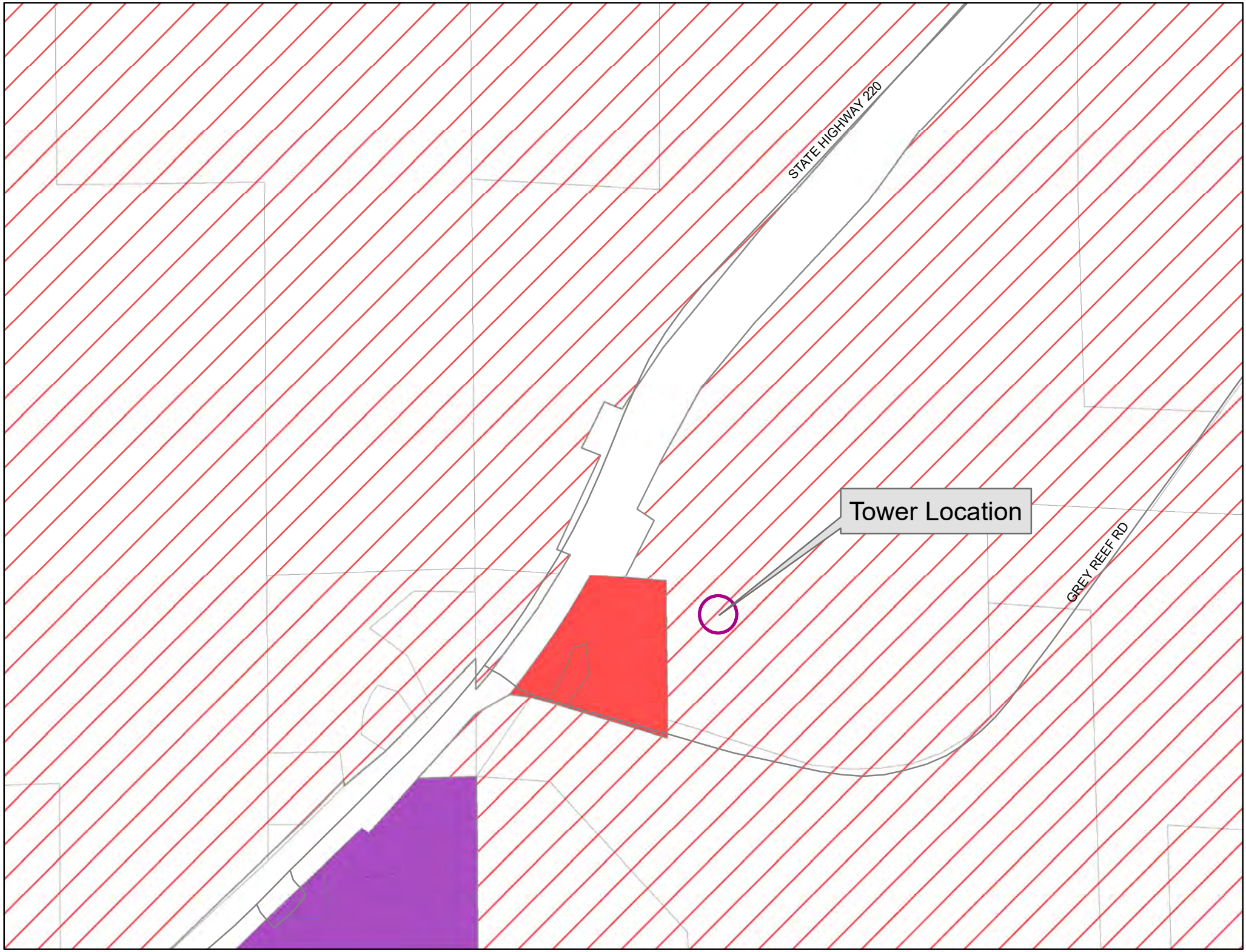
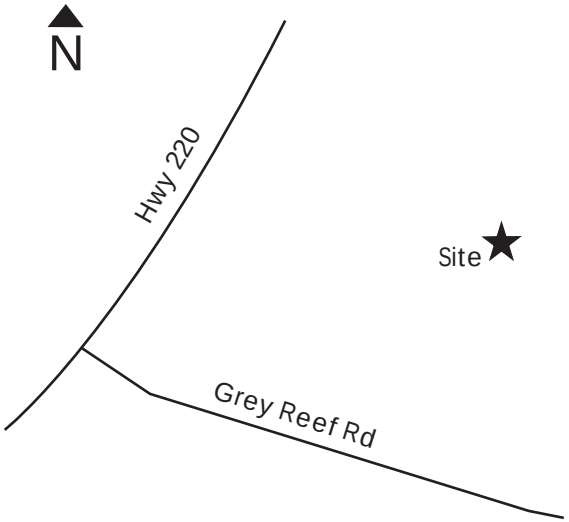

STATE HIGHWAY 220
Tower Location
GREY REEF RD

PHOTO SIMULATIONS

12048 - Grey Reef

LAT 42º 34’ 4.1”

LONG -106º 42’ 40.9”



HEMPHILL®

COAL CREEK CONSULTING

simulations C·J·B

Note: Simulations are an artistic illustration created to represent how the proposed project may look once constructed. Simulations are create to match the current design as accurately as possible, but are not guaranteed to match the final build.

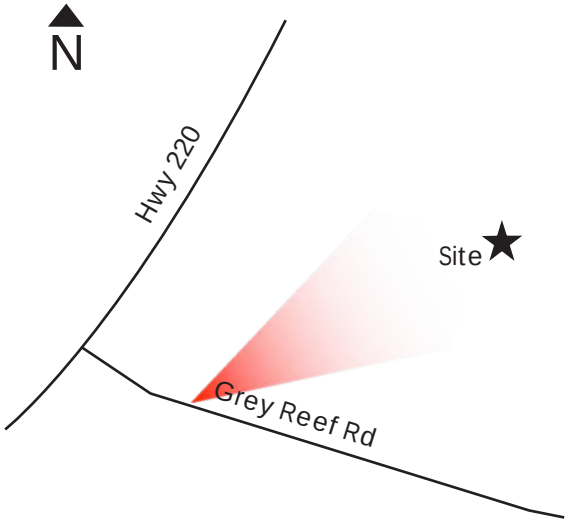
PHOTO SIMULATIONS

12048 - Grey Reef

LAT 42º 34’ 4.1”
LONG -106º 42’ 40.9”

View 1

Looking Northeast



Before:

PHOTO SIMULATIONS

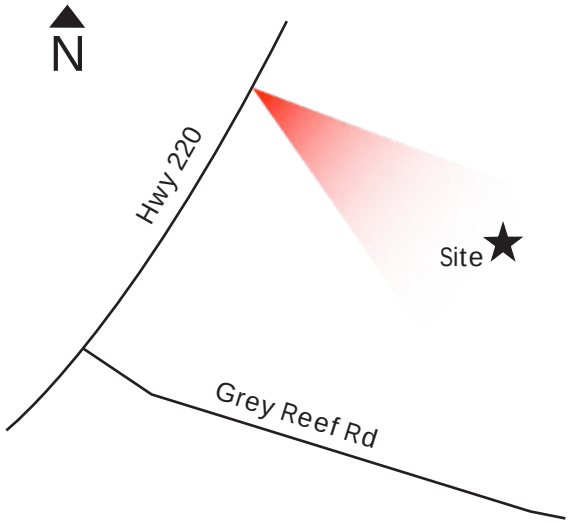
12048 - Grey Reef

LAT 42º 34’ 4.1”
LONG -106º 42’ 40.9”

After:

View 2

Looking Southeast




Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

GEOTECHNICAL ENGINEERING REPORT

NEW HEMPHILL 4-LEG SELF-SUPPORT TOWER

GREY REEF

21755 WEST HIGHWAY 220

NATRONA COUNTY, ALCOVA, WYOMING

Prepared for:

Hemphill, LLC
1350 North Louisville Avenue
Tulsa, Oklahoma 74115

Prepared by:

• Geotechnical Services
• Environmental Services
• Material Testing Services

PALMERTON & PARRISH, INC.

Springfield, MO
4168 W. Kearney Springfield, MO 65803
Call 417.864.6000 Fax 417.864.6004
www.ppimo.com

PROJECT NUMBER: 261436

May 13, 2020

PALMERTON & PARRISH, INC.

GEOTECHNICAL & MATERIALS ENGINEERS
MATERIALS TESTING LABORATORIES
ENVIRONMENTAL SERVICES

4168 W. Kearney Street.
Springfield, MO 65803
Ph: (417) 864-6000
www.ppimo.com

May 13, 2020

Hemphill, LLC
1350 North Louisville Avenue
Tulsa, Oklahoma 74115

Attn: Mr. Scot Tinker, Director of Tower Operations
Email: scot.tinker@hemphill.com

RE: Geotechnical Engineering Report
New Hemphill 4-Leg Self-Support Tower - Grey Reef
21755 West Highway 220
Natrona County, Alcova, Wyoming
PPI Project Number: 261436

Dear Mr. Tinker:

Attached, please find the report summarizing the results of the geotechnical investigation conducted for the proposed New Hemphill 4-Leg Self-Support Tower in Natrona County, Alcova, Wyoming. We appreciate this opportunity to be of service. If you have any questions, please don't hesitate to contact this office.

PALMERTON & PARRISH, INC.
By:

R. Todd Hercules, P.E.
Geotechnical Engineer

PALMERTON & PARRISH, INC.
By:

Professional Engineer
BRANDON PARRISH
P.E. 14631
Date
WYOMING

May 13, 2020

Brandon R. Parrish, P.E.
Vice-President

Submitted: One (1) Electronic .pdf Copy

BRP/BRP/RTH

TABLE OF CONTENTS

APPENDICES

EXECUTIVE SUMMARY

A Geotechnical Investigation was performed for the proposed New Hemphill 4-Leg Self-Support Tower located at 21755 West Highway 220 in Natrona County, Alcova, Wyoming. It is understood that a new 80-foot Self-Support Tower will be constructed at the project site. Cut and fill depths are anticipated to be less than 2 feet across the subject site to provide finished subgrade elevations.

Based upon the information obtained from the boring drilled and subsequent laboratory testing, the site is suitable for the proposed Self-Support Tower. Important geotechnical considerations for the project are summarized below. However, users of the information contained in the report must review the entire report for specific details pertinent to geotechnical design considerations.

- The soils explored at the subject site consisted of well-graded gravel with clay and sand. Sparse vegetation was noted at the ground surface. The well-graded gravel layer transitioned into a clayey sand layer at approximately 18 feet below the ground surface. Varying amounts of granite gravels and limestone nodules were also noted within this material;
- The subsurface soils were generally medium dense to very dense and excavatable without rock excavation equipment; however, intact, hard limestone sections or boulders may be encountered that may require rock excavation equipment. It is recommended that rock excavation equipment be available during excavations;
- Mat foundations bearing on medium dense to very dense native soil for the new Self-Support Tower can be designed for an allowable bearing capacity of 5,000 psf. Micropiles may be used in conjunction with the mat foundation to resist overturning and lateral loads and provide additional bearing capacity. Alternatively, the proposed Self-Support Tower can be supported by a drilled pier foundation;
- Drilled pier design parameters have been included in Section 8. Some collapsible materials may be encountered in the drilled pier excavations. Accordingly, it is

EXECUTIVE SUMMARY - CONTINUED

recommended that the drilled pier contractor have casing available in case these conditions are encountered;

- The project site classifies as a Site Class D in accordance with Section 1613 of the 2012 International Building Code (IBC); and
- Construction materials testing should be performed on tower foundations by a qualified engineer and close monitoring of subgrade preparation work is considered critical to achieve adequate subgrade performance.

GEOTECHNICAL ENGINEERING REPORT
NEW HEMPHILL 4-LEG SELF-SUPPORT TOWER
GREY REEF
21755 WEST HIGHWAY 220
NATRONA COUNTY, ALCOVA, WYOMING

1.0 INTRODUCTION

This is the report of the Geotechnical Investigation performed for the proposed New Hemphill 4-Leg Self-Support Tower located at 21755 West Highway 220 in Natrona County, Alcova, Wyoming. This investigation was in accordance with a letter proposal dated October 8, 2019, and authorized by Mr. Scot Tinker with Hemphill. The approximate site location is shown below:

2.0 PROJECT PURPOSE

The purpose of this Geotechnical Investigation was to provide information for foundation design and construction planning for the proposed Self-Support Tower. PPI's scope of services includes field and laboratory testing, investigation of the subsurface conditions in the vicinity of the tower base, engineering analysis of collected data and development of recommendations for foundation design and construction planning, and preparation of this Engineering Report.

3.0 PROJECT DESCRIPTION

It is understood that a new 80-foot Self-Support Tower supported upon either a mat foundation or drilled piers is proposed at the project site. It is understood that micropiles may be utilized in combination with a mat foundation for additional overturning, lateral loading, and bearing capacity. Foundation loadings, both compressive and overturning are anticipated to be moderate. Cut and fill depths are anticipated to be less than 2 feet across the subject site to provide finished subgrade elevations.

4.0 SUBSURFACE INVESTIGATION

Subsurface conditions were investigated through completion of a subsurface boring and subsequent laboratory testing. Below is a picture of the boring location:

4.1 Subsurface Boring

The tower center was selected and staked in the field by the Client. The approximate boring location is shown on Figure 1, Boring Location Plan. The Wyoming One-Call System was notified prior to the investigation to assist in locating buried public utilities.

A log of the boring showing descriptions of soil and rock units encountered, as well as results of field tests, laboratory tests and a "Key to Symbols" are presented in Appendix II.

The boring was drilled on April 23, 2020 using 4.5-inch O.D. continuous flight augers to a depth of 30 feet and air rotary methods with a 2.9-inch tricone bit past a depth of 35 feet powered by an ATV-mounted drill-rig. Soil samples were generally collected at 2.5 to 5-foot centers during drilling using a split spoon sampler while performing the Standard Penetration Test (SPT) in general accordance with ASTM D1586. Please refer to Appendix III for general notes regarding boring logs and additional soil sampling information.

4.2 Laboratory Testing

Collected samples were sealed and transported to the laboratory for further evaluation and visual examination. Laboratory soil testing included the following:

- Moisture Content (ASTM D2216);
- Grain Size Analysis (ASTM D6913); and
- Pocket Penetrometers.

Laboratory test results are shown on each boring log in Appendix II and are summarized in the following table.

Depth (ft.)	Moisture Content (%)	USCS Symbol	Percent Passing No. 200 Sieve (%)
6	2.5	GW-GC	9
18.5	2.5	SC	20

5.0 SITE GEOLOGY

Based on information available from the Wyoming Geological Survey, the subject site is located over the Cloverly, Morrison, and Sundance Formation. These formations contain sandstone, bentonitic claystone, limestone, glauconitic sandstone and shale. Some amount of chert-pebble conglomerate is also noted at the subject site. The claystone is in this area is noted to be locally bentonitic and may be expansive. Boulders encountered in the subsurface exploration are anticipated to be limestone nodules or areas of conglomerate.

6.0 GENERAL SITE SUBSURFACE CONDITIONS

Based upon subsurface conditions encountered within the boring drilled at the project site, generalized subsurface conditions are summarized in the table below. Soil stratification lines on the boring log indicate approximate boundary lines between different types of soil units based upon observations made during drilling. In-situ transitions between soil types are typically gradual.

6.1 Subsurface Stratums

Generalized subsurface conditions are summarized in the table below:

Depth	Stratum	Subsurface Material	Density/Consistency
0 to 18 feet	Gravel	Well-Graded Gravel, with clay and sand (GW-GC)	Medium Dense to Very Dense
18 to 35 feet	Sand	Clayey Sand, with gravel (SC)	Dense to Very Dense

6.2 Groundwater

Shallow groundwater was not observed within the boring on the date drilled. Groundwater levels should be expected to fluctuate with changes in site grading,

precipitation, and regional groundwater levels. Groundwater may be encountered during wetter periods.

7.0 EARTHWORK

Grading plans for the proposed Self-Support Tower were not provided. Grading for the project site is anticipated to have less than 2 feet of cut and/or fill to establish final grades. The initial phase of site preparation should include the steps listed below;

- Clearing and grubbing of any vegetation within the tower footprint; and
- Areas scheduled to receive controlled fill, if any, should be proof-rolled and approved in accordance with the following section of this report.

7.1 Site Preparation

Proof-rolling consists essentially of rolling the ground surface with a loaded tandem axle dump truck or similar heavy rubber-tired construction equipment and noting any areas which rut or deflect during rolling. All soft subgrade areas identified during proof-rolling should be undercut and replaced with compacted fill as outlined below. Proof-rolling, undercutting and replacement should be monitored by a qualified representative of the Geotechnical Engineer.

7.2 Fill Material Types

Fill Type[1]	USCS Classification	Acceptable Location for Placement
Low Volume Change (LVC) Engineered Fill[2]	CL, GC, or SC (LL < 45%)	All locations and elevations
On-Site Natural Soils	GW-GC or SC	All locations and elevations
Rock Fill[3]	GW	All locations and elevations

1. Controlled, compacted fill should consist of approved materials that are free of organic matter and debris and contain maximum rock size of 4 to 6 in. Frozen material should not be used and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to its use.
2. Low plasticity cohesive soil or granular soil having at least 15% low plasticity fines.
3. See Section 7.2.1 if rock fill will be utilized at the project site.

7.2.1 Rock Fill

If rock is to be used as the primary filling medium, embankments should be constructed using rock having maximum dimensions in excess of 4 inches, but no

greater than 8 inches. Rock material should be placed in horizontal layers having a thickness of approximately the maximum size of the larger rock comprising the lift, but not greater than 12 inches. Rocks or boulders too large to permit placing in a 12-inch thick lift should be reduced in size as necessary to permit placement or be bladed over the edge of the fill and not used in the compacted fill. Rock fill should not be dumped into place but should be distributed in horizontal lifts by blading and dozing in such a manner as to ensure proper placement into final position in the embankment. Finer material including rock fines and limited soil fines should be worked into the rock voids during this blading operation. Excessive soil and rock fine particles preventing interlock of cobble and boulder sized rock should be prohibited. Rock fill should be consolidated by a minimum of three (3) passes of a large diameter self-propelled vibratory compactor. Terminal fill slopes using rock may be constructed 1.5 horizontal to 1 vertical for fill height of 15 feet or less. The testing of rock fill quality should include the requirements that a representative of the Geotechnical Engineer be present daily, but not necessarily continuously during the placement of the fill to observe the placement of rock fill in order to determine fill quality and to observe that the contractors work sequence is in compliance with this specification. Progress reports indicative of the quality of the fill should be made at regular intervals to the Owner. If improper placement procedures are observed during the placement of the fill the Geotechnical Engineer should inform the Contractor, and no additional fill should be permitted on the affected area until the condition causing the low densities has been corrected and the fill has been reworked to obtain sufficient density.

7.3 Compaction Requirements

Item	Description
Subgrade Scarification Depth	At least 8 inches
Fill Lift Thickness	8-inch (loose)
Compaction Requirements[1]	• 95% Standard Proctor Density (ASTM D-698)
Moisture Content	• ± 2% optimum moisture for CL, SC, or GC soil types; or • 0 to 4% above optimum for CH soil types.
Recommended Testing Frequency	• One (1) Field Density (compaction) test for each 2,500 sq. ft. of fill within the footprint of the Self-Support Tower; • One (1) Field Density (compaction) test for each 5,000 sq. ft. of fill within non-structure areas; • A minimum of three (3) tests per lift; and • Visual observation of the compaction process should be documented with no testing required **if** a performance compaction specification (i.e. number of passes) is utilized.
1. We recommend that engineered fill (including scarified compacted subgrade) be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.	

7.4 Excavations

Based upon the subsurface conditions encountered during this investigation, the on-site soils typically classify as Type B in accordance with OSHA regulations. Temporary excavations in soils classifying as Type B with a total height of less than 20 feet should be cut no steeper than 1H:1V in accordance with OSHA guidelines. Confirmation of soil classification during construction, as well as construction safety (including shoring, if required), is the responsibility of the contractor.

8.0 TOWER FOUNDATION RECOMMENDATIONS

The proposed Self-Support Tower is anticipated to either be supported on a shallow mat foundation or on drilled pier foundations. It is understood that micropiles may be utilized in addition to a mat foundation to help resist overturning and lateral loads. Based upon the conditions encountered in the boring performed at the project site, the site subsurface materials are suitable for either a mat foundation or drilled pier foundations. Recommendations for mat foundations and drilled piers are included in the following sections.

8.1 Shallow Mat Foundations

Based upon the subsurface conditions encountered near the proposed Self-Support Tower and anticipated site grading, footings for the proposed Self-Support Tower are anticipated to bear in medium dense to very dense natural soils. Please refer to the section below for recommendations regarding shallow foundations.

8.2 Shallow Foundation Design Recommendations

Description	Mat Foundation Parameters
Net allowable bearing pressure[1]	Native Soil: 5,000 psf
Ultimate bearing pressure[2]	Native Soil: 15,000 psf
Transient (wind) loading ONLY – Allowable Bearing Pressure[3]	Native Soil: 7,500 psf
Minimum embedment below finished grade for frost protection and variation in soil moisture[4]	5 feet
Estimated total settlement[5]	1 inch or less
Allowable passive pressure[6]	800 psf
Coefficient of sliding friction[7]	0.6 (natural soils)

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. The recommended pressure considers all unsuitable and/or soft or loose soils, if encountered, are undercut and replaced with tested and approved new engineered fill. Footing excavations should be free of loose and disturbed material, debris, and water when concrete is placed. A factor of safety value of 3 has been applied to these values.
2. No factor of safety has been applied to this value.
3. The allowable bearing capacity may be increased to this value **only** for transient or wind loading.
4. For footings beneath unheated areas. It is anticipated that additional depth may be required for overturning and uplift design considerations.
5. The foundation movement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of compacted fill, and the quality of the earthwork operations.
6. Allowable passive pressure value considers a factor of safety of about 2. Passive pressure value applies to undisturbed native clay or properly compacted fill. If formed footings are constructed, the space between the formed side of a footing and excavation sidewall should be cleaned of all loose material, debris, and water and backfilled with tested and approved fill compacted to at least 95% of the material's Standard Proctor dry density. Passive resistance should be neglected for the upper 5 feet of the soil below the final adjacent grade due to strength loss from freeze/thaw and shrink/swell.
7. Coefficient of friction value is an ultimate value and does not contain a factor of safety.

8.3 Uplift

Resistance of shallow spread footings to uplift (U_p) may be based upon the dead weight of the concrete footing structure (W_C) and the weight of soil backfill contained

in an inverted cone or pyramid directly above the footings (W_S). The following parameters may be used in design:

Description	Weights
Weight of Concrete (W_c)	150 pcf
Weight of Soil Resistance (W_s)	100 pcf
Weight for on-site soils placed in accordance with Section 7	

The base of the cone or pyramid should be the top of the footing and the pyramid or cone sides should form an angle of 30 degrees with the vertical. Allowable uplift capacity (U_p) should be computed as the lesser of the two (2) equations listed below:

$$U_P = (W_S/2.0) + (W_C/1.25) \text{ or } U_P = (W_S + W_C)/1.5$$

If additional uplift and/or overturning load resistance is required for the project site consideration may be given to the use of rock anchors. Rock anchor design values are included in Section 8.4.

8.4 Rock Anchor Design Values

It is understood that a combination of mat foundations and micropiles, of Case 1 type (directly loaded piles), may be utilized for the proposed Self-Support Tower. The following tables contain passive pressures and preliminary grout to ground bond strengths needed for use in the design of micropiles. These values, at their corresponding depths, should be used in conjunction with the following micropile design values.

It is understood that a total of three (3) possible installation methods may be utilized for micropile installation at the subject sites. Due to the variable installation procedures, grout to ground bond strengths are variable between these installation methods and have been included as separate bond strengths accordingly. The installation methods are noted below:

- Micropile Type "A" – Grout is gravity installed by tremie methods after drilling. This method is generally used for rock sockets;

- Micropile Type "B" – After drilling, grout is pressure grouted through casing or hollow stem auger during casing or auger removal. Due to the pressure applied to the grout, greater bond strength is achieved over Type "A" (in soils only); and

- Micropile Type "E" – High water content grout is utilized in drilling through a continuously threaded, hollow-core steel bar then replaced with pressurized structural grout near the completion of drilling. Due to the pressure applied to the grout, greater bond strength is achieved over Type "A" (in soils only).

Stratum	Applicable Depth (ft.)	Unit Weight (pcf)	Friction Angle, ϕ (Degrees)	Coefficient of Passive Pressure	Preliminary Grout-to-Ground Ultimate Bond Strength[2] (psi)		
					A	B	E
Gravel	0 to 5	Moist: 125	Ignore	Ignore	-	-	-
Gravel	5 to 10	Moist: 125	32	3.3	20	30	30
Gravel	10 to 18	Moist: 125	32	3.3	25	35	35
Sand	18 to 35	Moist: 125	30	3.0	20	28	28
Sand[1]	Over 35 feet[1]	Moist: 125	30	3.0	25	32	32

1. Assumes soils are equal to or better than those at depths greater than the boring termination depth. This should be confirmed in the field during installation of micropiles.
2. Bond Values are based upon subsurface data obtain in 1 Boring and assume full time observation by a qualified Geotechnical Inspector experienced with micropiles during installation.

8.5 Drilled Pier Foundation Recommendations

Based upon the conditions encountered in the boring and subsequent laboratory testing, the proposed Self-Support Tower may be supported on a system of drilled piers bearing within the clayey sand. The drilled shaft should be plumb (no more than 2 percent of the shaft length off vertical), and the drilled shaft should have a relatively flat bottom. Essentially all groundwater, if encountered, should be removed from the drilled pier shaft prior to concrete placement. If it is not possible to remove nearly all (2 to 3 inches max) of the groundwater from the drilled shaft excavation, concrete should be placed via tremie methods.

The method of concrete placement and vibration should be selected by the Structural Engineer. Required strength and mix design characteristics should also be specified by the Structural Engineer or other members of the Design Team.

Generally, the well-graded gravel and clayey sand layers were excavatable with solid flight augers with increased effort. Casing may be required at the subject site due to possible collapsible gravel or sand material

8.6 Bearing Capacity and Uplift Resistance for a Drilled Shaft

The design parameters summarized in the table below may be utilized for bearing capacity and uplift capacity design for drilled shafts as described above. Allowable end bearing pressures and side friction values are summarized in the table below.

Stratum[1]	Applicable Depth (ft.)	Allowable End Bearing Pressure (ksf)[2]	Allowable Side Friction (ksf)[3]
Gravel	Ground surface to 1 shaft diameter or a minimum of 5 feet	Ignore	Ignore
Gravel	1 shaft diameter or a minimum of 5 feet to 10 feet	Not Recommended	0.4
Gravel	10 feet to 18 feet	12.0	0.7
Sand	18 feet to 30 feet	16.0	1.2
Sand	30 feet to 35 feet	20.0	1.2

1. If soft or loose soils are encountered in plan bottom of shaft during drilling, the shaft should be deepened until an acceptable bearing stratum is encountered.
2. End bearing pressure values assume a Factor of Safety of 3.0 or greater.
3. Side friction values include a Factor of Safety of ~1.5. These values should be used with ***Factored Loads*** during structural design. Side Friction may be used for computation of Uplift and Compressive Capacity in soil.

8.7 Lateral Loadings

It is anticipated that designers will most likely utilize LPILE for completion of deep foundation lateral capacity design for the tower foundations. LPILE uses finite difference computer models based on the horizontal modulus of subgrade reaction (K_h).

The values listed in the table below may be utilized for Drilled Pier Analysis in LPILE. Please also notice that the table states to “ignore” lateral support for the depth from 0 to 1 pier diameter or a minimum of 5 feet. This notation is intended to account for the fact that near-surface soils are significantly disturbed during drilled shaft excavation, which greatly reduces the lateral support provided. Designers should use their judgment and make an appropriate reduction of soil strength parameters in this zone.

Values summarized in the table below are based upon published correlations, and field and laboratory data collected during this subsurface investigation. Values shown below are ultimate values representative of in-situ soil properties, and do not include a Factor of Safety. These values may be used to compute resistance to lateral loading of the overburden soils. **The appropriate Factor of Safety should be chosen by the designer.**

Stratum (Model)	Applicable Depth	Unit Weight [1] (pcf)	Friction Angle, ϕ (Degrees)	Submerged Modulus, k (pci)	Above Water Table Modulus, k (pci)
Gravel (Sand)	Ground surface to 1 shaft diameter or a minimum of 5 feet	Moist: 125	Ignore	Ignore	Ignore
Gravel (Sand)	1 shaft diameter or a minimum of 5 feet to 10 feet	Moist: 125	32	60	90
Gravel (Sand)	10 feet to 18 feet	Moist: 135	32	125	225
Clayey Sand (Sand)	18 feet to 30 feet	Moist: 135	30	125	225
Clayey Sand (Sand)	30 feet to 35 feet	Moist: 135	30	125	225

1. Buoyant unit weight should be utilized for soils that extend below the design groundwater level. Groundwater was not encountered within the 35 feet explored at the project site.

9.0 SEISMIC CONSIDERATIONS

Code Used	Site Classification
2012 International Building Code (IBC)[1]	D

1. In general accordance with the *2012 International Building Code*, Section 1613

10.0 CONSTRUCTION OBSERVATION & TESTING

The construction process is an integral design component with respect to the geotechnical aspects of a project. Since geotechnical engineering is influenced by variable depositional and weathering processes and because we sample only a small portion of the soils affecting the performance of the proposed Self-Support Tower, unanticipated or changed conditions can be disclosed during grading. Proper geotechnical observation and testing during construction is imperative to allow the Geotechnical Engineer the opportunity to evaluate assumptions made during the design

process. Therefore, we recommend that PPI be kept apprised of design modifications and construction schedule of the proposed project to observe compliance with the design concepts and geotechnical recommendations, and to allow design changes in the event that subsurface conditions or methods of construction differ from those assumed while completing this study. We recommend that during construction all earthwork be monitored by a representative of PPI, including site preparation, placement of all engineered fill and trench backfill, and all foundation excavations as outlined below.

- An experienced Geotechnical Engineer should observe the subgrade throughout the proposed project site immediately following stripping to evaluate the native soils, identify areas requiring undercutting, and evaluate the suitability of the exposed surface for fill placement;
- An experienced Engineer or Engineering Technician should monitor and test all fill placed within the Self-Support Tower area to determine whether the type of material, moisture content, and degree of compaction are within recommended limits; and
- An experienced Technician or Engineer should observe drilled pier excavations. Where unsuitable bearing conditions are observed, PPI should be contacted to provide remedial procedures.

11.0 REPORT LIMITATIONS

This report has been prepared in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Palmerton & Parrish, Inc. observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. Palmerton & Parrish's findings and conclusions must be considered not as scientific certainties, but as opinions based on our professional judgment concerning the significance of the data gathered during the course of this investigation. Other than this, no warranty is implied or intended.

S:_MASTER PROJECT FILE\2019\WY\Hemphill-261436-WY, CO & UT Registrations-Sub\Drilled\2020\Gray Reef\Gray Reef - CAD.

SCALE: 1" = 25'

LEGEND

Boring Location

NOTES

- Aerial image from Google Earth Pro.
- Not intended for use in design.

Project: Grey Reef- Self Support Tower - Alcova, Wyoming
Client: Hemphill, LLC

Boring Location Plan

DATE: April 24, 2020

Project Number: 261436

PALMERTON & PARRISH, INC.
GEOTECHNICAL AND MATERIALS ENGINEERS/MATERIALS TESTING LABORATORIES/ENVIRONMENTAL SERVICES

FIGURE 1

4168 W. Kearney
Springfield, Missouri 65803
Telephone: (417) 864-6000
Fax: (417) 864-6004

GEOTECHNICAL BORING LOG

BORING NUMBER 1

CLIENT Hemphill, LLC
PROJECT NAME Grey Reef Self-Support Tower
PROJECT NO. 261436
PROJECT LOCATION Natrona County, Alcova, Wyoming
DATE STARTED 4/23/20 **COMPLETED** 4/25/20
SURFACE ELEVATION _____ **BENCHMARK EL.** _____
DRILLER CW **DRILL RIG** CME-550x
GROUND WATER LEVELS
HAMMER TYPE Auto
AT TIME OF DRILLING None
LOGGED BY CJ **CHECKED BY** RTH
AT END OF DRILLING _____
NOTES _____

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf) 20 40 60 80 100 N VALUE 20 40 60 80 PL MC LL 20 40 60 80 SHEAR STRENGTH (ksf) 1 2 3 4	ELEVATION (ft)
0	CFA - 4.5" O.D.		WELL-GRADED GRAVEL, w/ Clay and Sand, Granite Gravel, Brown, Moist to Slightly Moist, Medium Dense to Very Dense (GW-GC)	SPT 1		5-10-13 (23)	2.5		
				SPT 2		13-14-8 (22)			
5				SPT 3		10-16-26 (42)			
				SPT 4		9-9-21 (30)			
10									
				SPT 5		10-22-51 (73)			
15			18.0 ft						
			CLAYEY SAND, w/ Gravel Limestone Nodules, Brown, Moist to Slightly Moist, Very Dense (SC)	SPT 6		18-39-52 (91)			
20									
				SPT 7		21-39-66 (105)			
25	AIR ROTARY - 2.9" O.D. Tricone		- Dense from 28.5' to 33.5'	SPT 8		21-14-26 (40)			
30									
			35.0 ft	SPT 9		47-66/4"			
35			Bottom of borehole at 35.0 feet.						

4168 W. Kearney
Springfield, Missouri 65803
Telephone: (417) 864-6000
Fax: (417) 864-6004

KEY TO SYMBOLS

CLIENT Hemphill, LLC
PROJECT NAME Grey Reef Self-Support Tower
PROJECT NO. 261436
PROJECT LOCATION Natrona County, Alcova, Wyoming

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)


GW-GC: USCS Well-graded Gravel with Clay


SC: USCS Clayey Sand

SAMPLER SYMBOLS


Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

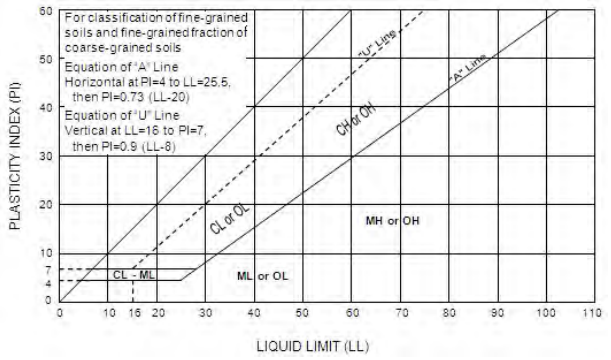
LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)
TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION
▽ Water Level at Time Drilling, or as Shown
▼ Water Level at End of Drilling, or as Shown
▼ Water Level After 24 Hours, or as Shown

GENERAL NOTES

SOIL PROPERTIES & DESCRIPTIONS

COHESIVE SOILS

Consistency	Unconfined Compressive Strength (Qu)	Pocket Penetrometer Strength	N-Value
	(psf)	(tsf)	(blows/ft)
Very Soft	<500	<0.25	0-1
Soft	500-1000	0.25-0.50	2-4
Medium Stiff	1001-2000	0.50-1.00	5-8
Stiff	2001-4000	1.00-2.00	9-15
Very Stiff	4001-8000	2.00-4.00	16-30
Hard	>8000	>4.00	31-60
Very Hard			>60



Group Symbol	Group Name
CL –	Lean Clay
ML –	Silt
OL –	Organic Clay or Silt
CH –	Fat Clay
MH –	Elastic Silt
OH –	Organic Clay or Silt
PT –	Peat
CL-CH –	Lean to Fat Clay

Plasticity		Moisture	
Description	Liquid Limit (LL)	Descriptive Term	Guide
Lean	<45%	Dry	No indication of water
Lean to Fat	45-49%	Moist	Indication of water
Fat	≥50%	Wet	Visible water

Fine Grained Soil Sub Classification	Percent (by weight) of Total Sample
Terms: SILT, LEAN CLAY, FAT CLAY, ELASTIC SILT	PRIMARY CONSTITUENT
Sandy, gravelly, abundant cobbles, abundant boulders with sand, with gravel, with cobbles, with boulders scattered sand, scattered gravel, scattered cobbles, scattered boulders a trace sand, a trace gravel, a few cobbles, a few boulders	>30-50] >15-30] – secondary coarse grained constituents 5-15] <5]
The relationship of clay and silt constituents is based on plasticity and normally determined by performing index tests. Refined classifications are based on Atterberg Limits tests and the Plasticity Chart.	

NON-COHESIVE (GRANULAR) SOILS

RELATIVE DENSITY	N-VALUE
Very Loose	0-4
Loose	5-10
Medium Dense	11-24
Dense	25-50
Very Dense	≥51

MOISTURE CONDITION	
Descriptive Term	Guide
Dry	No indication of water
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table.

**GRAIN SIZE IDENTIFICATION		
Name	Size Limits	Familiar Example
Boulder	12 in. or more	Larger than basketball
Cobbles	3 in. to 12 in.	Grapefruit
Coarse Gravel	¾-in. to 3 in.	Orange or lemon
Fine Gravel	No. 4 sieve to ¾-in.	Grape or pea
Coarse Sand	No. 10 sieve to No. 4 sieve	Rock salt
Medium Sand	No. 40 sieve to No. 10 sieve	Sugar, table salt
Fine Sand*	No. 200 sieve to No. 40 sieve	Powdered sugar
Fines	Less than No. 200 sieve	
*Particles finer than fine sand cannot be discerned with the naked eye at a distance of 8 inches.		

Coarse Grained Soil Sub Classification	Percent (by weight) of Total Sample
Terms: GRAVEL, SAND, COBBLES, BOULDERS	PRIMARY CONSTITUENT
Sandy, gravelly, abundant cobbles, abundant boulders with gravel, with sand, with cobbles, with boulders scattered gravel, scattered sand, scattered cobbles, scattered boulders a trace gravel, a trace sand, a few cobbles, a few boulders	>30-50] >15-30] – secondary coarse grained constituents 5-15] <5]
Silty (MH & ML)*, clayey (CL & CH)* (with silt, with clay)* (trace silt, trace clay)*	<15] 5-15] – secondary fine grained constituents <5]
*Index tests and/or plasticity tests are performed to determine whether the term "silt" or "clay" is used.	

*Modified after Ref. ASTM D2487-93 & D2488-93
**Modified after Ref. Oregon DOT 1987 & FHWA 1997
***Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

GENERAL NOTES

BEDROCK PROPERTIES & DESCRIPTIONS

ROCK QUALITY DESIGNATION (RQD)	
Description of Rock Quality	*RQD (%)
Very Poor	< 25
Poor	25-50
Fair	50-75
Good	75-90
Excellent	90-100

*RQD is defined as the total length of sound core pieces 4 in. or greater in length, expressed as a percentage of the total length cored. RQD provides an indication of the integrity of the rock mass and relative extent of seams and bedding planes.

SCALE OF RELATIVE ROCK HARDNESS		
Term	Field Identification	Approx. Unconfined Compressive Strength (tsf)
Extremely Soft	Can be indented by thumbnail	2.6-10
Very Soft	Can be peeled by pocket knife	10-50
Soft	Can be peeled with difficulty by pocket knife	50-260
Medium Hard	Can be grooved 2 mm deep by firm pressure of knife	260-520
Moderately Hard	Requires one hammer blow to fracture	520-1040
Hard	Can be scratched with knife or pick only with difficulty	1040-2610
Very Hard	Cannot be scratched by knife or sharp pick	>2610

DEGREE OF WEATHERING	
Slightly Weathered	Rock generally fresh, joints stained and discoloration extends into rock up to 25mm (1 in), open joints may contain clay, core rings under hammer impact.
Weathered	Rock mass is decomposed 50% or less, significant portions of rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.
Highly Weathered	Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

GRAIN SIZE (TYPICALLY FOR SEDIMENTARY ROCKS)		
Description	Diameter (mm)	Field Identification
Very Coarse Grained	>4.76	
Coarse Grained	2.0-4.76	Individual grains can easily be distinguished by eye.
Medium Grained	0.42-2.0	Individual grains can be distinguished by eye.
Fine Grained	0.074-0.42	Individual grains can be distinguished by eye with difficulty.
Very Fine Grained	<0.074	Individual grains cannot be distinguished by unaided eye.

VOIDS	
Pit	Voids barely seen with the naked eye to 6mm *1/4-inch)
Vug	Voids 6 to 50mm (1/4 to 2 inches) in diameter
Cavity	50 to 6000mm (2 to 24 inches) in diameter
Cave	> 600mm

BEDDING THCKNESS	
Very Thick Bedded	> 3' Thick
Thick Bedded	1' to 3' Thick
Medium Bedded	4" to 1' Thick
Thin Bedded	1-1/4" to 4" Thick
Very Thin Bedded	½" to 1-1/4" Thick
Thickly Laminated	1/8" to ½" Thick
Thinly Laminated	1/8" or less (paper thin)

DRILLING NOTES

Drilling & Sampling Symbols		
NQ – Rock Core (2-inch diameter)	CFA- Continuous Flight (Solid Stem) Auger	WB – Wash Bore or Mud Rotary
HQ – Rock Core (3-inch diameter)	SS – Split Spoon Sampler	TP – Test Pit
HSA – Hollow Stem Auger	ST – Shelby Tube	HA – Hand Auger

Soil Sample Types

Shelby Tube Samples: Relatively undisturbed soil samples were obtained from the borings using thin wall (Shelby) tube samplers pushed hydraulically into the soil in advance of drilling. This sampling, which is considered to be undisturbed, was performed in accordance with the requirements of ASTM D 1587. This type of sample is considered best for the testing of "in-situ" soil properties such as natural density and strength characteristics. The use of this sampling method is basically restricted to soil containing little to no chert fragments and to softer shale deposits.

Split Spoon Samples: The Standard Penetration Test is conducted in conjunction with the split-barrel sampling procedure. The "N" value corresponds to the number of blows required to drive the last 1 foot of an 18-inch long, 2-inch O.D. split-barrel sampler with a 140 lb. hammer falling a distance of 30 inches. The Standard Penetration Test is carried out according to ASTM D-1586.

Water Level Measurements

Water levels indicated on the boring logs are levels measured in the borings at the times indicated. In permeable materials, the indicated levels may reflect the location of groundwater. In low permeability soils, shallow groundwater may indicate a perched condition. Caution is merited when interpreting short-term water level readings from open bore holes. Accurate water levels are best determined from piezometers.

Automatic Hammer

Palmerton and Parrish, Inc.'s CME's are equipped with automatic hammers. The conventional method used to obtain disturbed soil samples used a safety hammer operated by company personnel with a cat head and rope. However, use of an automatic hammer allows a greater mechanical efficiency to be achieved in the field while performing a Standard Penetration resistance test based upon automatic hammer efficiencies calibrated using dynamic testing techniques.

*Modified after Ref. ASTM D2487-93 & D2488-93
**Modified after Ref. Oregon DOT 1987 & FHWA 1997
***Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

4168 W. Kearney
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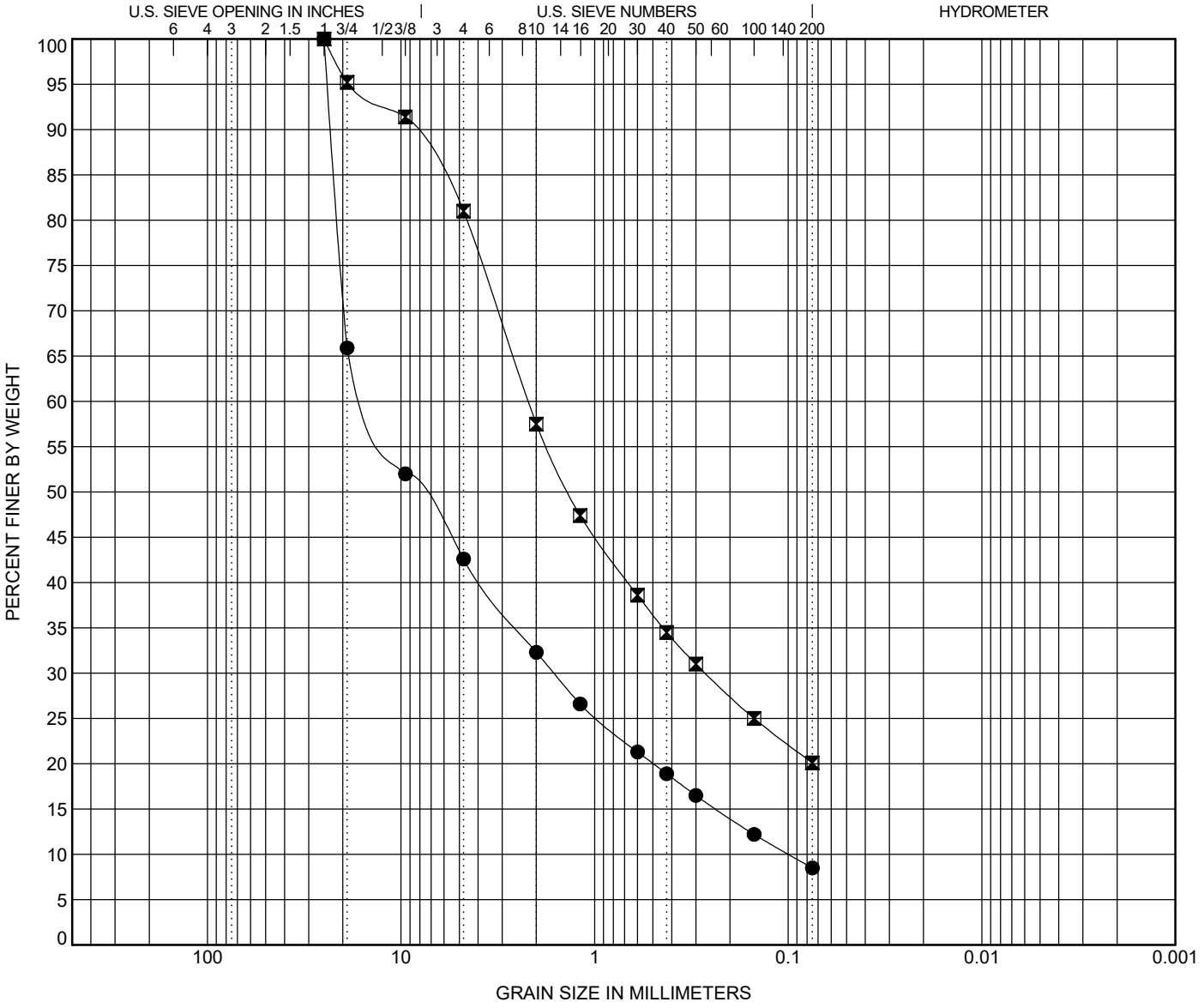
GRAIN SIZE DISTRIBUTION

CLIENT Hemphill, LLC **PROJECT NAME** Grey Reef Self-Support Tower

PROJECT NO. 261436 **PROJECT LOCATION** Natrona County, Alcova, Wyoming



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	1	6.0	**WELL-GRADED GRAVEL, with Clay and Sand**				1.87	142.52
⊠	1	18.5	**CLAYEY SAND, with Gravel**					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	1	6.0	25	14.157	1.621	0.099	57.4	34.1	8.5	
⊠	1	18.5	25	2.193	0.267		19.0	60.9	20.1	

GRAIN SIZE - PPI STD TEMPLATE.GDT - 5/12/20 11:00 - S:_MASTER PROJECT FILE\2019\WY\HEMPHILL-261436-WY, CO & UT REGISTRATIONS-SUB\DRILLED\2020\GREY REEF\LOGS\GRAY REEF - GINT.GPJ

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

CONDITIONAL USE PERMIT REQUEST

FOR A

TELECOMMUNICATION SITE

CUP20-5

Staff Report: Trish Chavis
June 9, 2020

For

July 14, 2020
Planning and Zoning Commission

And

August 4, 2020
Board of County Commissioner Meeting

Applicant: Declan Murphy, Union Wireless/Hemphill

Request: Construct an 84-foot self-supporting communication tower to allow for the expansion of an existing Union Wireless site. The applicant is requesting 100-feet total height to include all appurtenances.

Location and Zoning

The parcel is located east of the Highway 220 and north of Grey Reef Rd.

The subject parcel and all surrounding parcels are zoned Ranching, Agricultural and Mining (RAM).

Proposal

Union has applied for a CUP to construct an 84-foot communication tower to replace their existing 45' tower. The applicant is request the CUP to have a total height of 100-feet. This will include the additional antennas and lightening rod.

The proposed upgrades are necessary to allow Union Wireless to continue providing service to the adjacent community, in addition to enhancing emergency service capabilities through FirstNet.

FirstNet is the First Responder Network Authority, and is an independent authority authorized by Congress in 2012, to develop, build and operate the nationwide, broadband network that equips first responders.

General Standards
For
Conditional Use Permits

Criteria for Approval

1. Will granting the Conditional Use Permit contribute to an overburdening of county services?

   Proposed Finding of Fact. Granting the Conditional Use permit will not contribute to an overburdening of county services. County services and infrastructure will not be necessary for this permit. The tower would provide needed cell service to the area, which will add E-911 capabilities through the carrier's networks, and promote greater coverage and reach for local law enforcement and emergency services.

2. Will granting the Conditional Use Permit cause undue traffic, parking, population density or environmental problems?

   Proposed Finding of Fact. The facility is unmanned and will not cause undue traffic or parking. Routine maintenance for the tower and antennas will be limited. There will be no affects to population density.

3. Will granting the Conditional Use Permit impair the use of adjacent property or alter the character of the neighborhood?

   Proposed Finding of Fact. The surrounding ranch consists of approximately 218 acres. The addition of a taller communication tower will not impair the use of adjacent properties.

4. Will granting the Conditional Use Permit detrimentally affect the public health, safety and welfare, or nullify the intent of the Development Plan or Zoning Resolution?

   The addition of the proposed tower would not be damaging or inconsistent with the surrounding area. The proposed tower is consistent with the intent of both the Development Plan and the Zoning Resolution.

   Proposed Finding of Fact. The proposed tower will be constructed in accordance with all applicable building, electrical and plumbing codes. With an approved CUP, the tower will comply with the Zoning Resolution and the Development Plan. This site will provide wireless coverage to residents and travelers as well as provides for valuable E911 services and FirstNet capabilities.

Key Communication Tower Regulations

Artificially Lighted: There is no requirement for lighting until the tower reaches 200 feet. The proposed tower does not meet the requirement for FAA review.

Setbacks: Setbacks from roads and structures is 110% of the tower height. The nearest road is approximately 900-feet away and does meet setbacks.

Documentation demonstrating need: The proposed site is situated to provide effective coverage to the area. The existing tower's current loading and height is insufficient to provide adequate service so a taller tower would be needed.

Public Comment

As of the date of this staff report there have been no comment received.

Staff sent the public notice to 34 neighbors within 3 miles.

Recommendation

Staff proposes a motion and vote by the Planning and Zoning Commission to recommend approval of the requested Conditional Use Permit, by the Board of County Commissioners with the following condition:

1) Union Wireless provide an updated lease with landowner within 6 months of BOCC approval.

Staff also recommends that the Planning Commission incorporate by reference all findings of fact set forth herein and make them a part thereof.