TOWN OF HOTCHKISS

PUBLIC WORKS FACILITIES

ADDENDUM NO. 1

To all prospective bidders of the Hotchkiss Public Works Facilities for which proposals were to be received until 3 pm, Wednesday April 24, 2019 at the Hotchkiss Town Hall.

The following additions, deletions, and/or modifications are hereby made to the Plans, Specifications, and Contract Documents:

CHANGE Page 1, Request for Proposals, Change the proposal due date from 3 pm, Wednesday April 24, 2019 to 3 pm Thursday April 25, 2019.

ADD: Section 01000: Add the attached geotech report as an attachment to Section 01000.

MODIFY Pg 08540-2: Modify Passage Door would types Solid wood doors may be any of the following species meeting the other requirements of the Project Specifications: Oak, Pine, Alder, Birch, Maple.

CLARIFY: Sheet C-1, Clarify that the hydrant by the tank is to remain and a new hydrant placed as shown on the C-2.

CLARIFY Sheets C-2 and P1-2. Clarify that the domestic water service line is 1.5" and the fire connection on the building is a 4" line. Each should be tapped from the 6" main that runs north south from just east of the hydrant as shown on C-2. Domestic water meter and reduced pressure backflow preventor are to be located under the stairs before the hot water heater.

ADD: Sheet A1-1: Add the attached door and window schedule to the details on sheet A1-1.

REPLACE Sheets M1-1 through E2-4 with the attached sheets with the same numbering.

CLARIFY: Clarify the following which have discrepancies between the documents:

The south overhead doors shall have a single row of windows, the north overhead is solid.
The north overhead door is in Bay 4 not Bay 5.
Bay 5 is flat, Bays 1-4 include a sloped section that goes to a drain system.

This Addendum One shall be part of the Contract Documents and receipt thereof must be acknowledged on the Bid Form.

Joanne Fagan
April 19, 2019

Window Schedule		Qty	Width	Height	Style						
1		5	5'-0"	4'-0"	Vinyl Sider boths side operable						
		windows must be compatible with metal building and project specs									
		Windows shall be meet minimum energy requirements									
Door Schedule											
Desig	Type	Qty	Width	Height	Details						
G1	Overhead	4	14-'0"	14-'0"	Single Row Window Panel						
G2	Overhead	1	16-'0"	14-'0"	Single Row Window Panel						
G3	Overhead	1	14-'0"	14-'0"	Solid Panels						
2	Exterior Egress	6	3'-0"	6'-10"	Half Light	Steel Clad, insulated, painted			Panic Hardware, keypad lock		
5	Interior Passage, hallw	1	3'-0"	6'-10"	Half Light	Solid Core Wood Panel, Self closing hardware, passage latch					
6	Interior Passage	2	3'-0"	6'-10"	Half Light	Solid Core Wood Panel, Self closing hardware, entrance lock					
7	Bathroom	1	3'-0"	6'-10"	Half Light	Solid Core Wood Panel, bathroom privacy lock					
8	Interior Passage	2	3'-0"	6'-10"	Solid	Solid Core Wood Panel, Self closing hardware, entrance lock					
9	Interior Passage	1	3'-0"	6'-10"	Half Light	Garage - Occupied Space separation door, self closing hardware,					
						weather strip, passage latch					
	Exterior doors be energy efficient and shall include a properly sized opener, all necessary flashing, be compatible										
	with steel building and installed per manufacturer's recommendations.										
	Supply door stops for each door and safety chains for exterior doors										
	Additional door details provided in Section 08540 and 08560.										

TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

GEOTECHNICAL ENGINEERING STUDY

TOWN OF HOTCHKISS BARROW MESA SHOP PROJECT

Hotchkiss, Colorado

February 1, 2019

Prepared For:
Ms. Joanne Fagan, P.E.
Town of Hotchkiss Engineer
Project Number: 55531GE

649 Tech Center Drive Suite A • Durango, CO 81301 • 970/259-5095 • Fax 970/382-2515

PN: 55531GE
February 1, 2019

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1.0 REPORT INTRODUCTION

This report presents our geotechnical engineering recommendations for the proposed Town of Hotchkiss Barrow Mesa Shop Project. This report was requested by Ms. Joanne Fagan, P.E., Town of Hotchkiss Engineer. The field study was completed on January 14, 2019. The laboratory study was completed on January 24, 2019.

We provided a previous geotechnical engineering report for a proposed shop structure located adjacent to the abandoned sewer treatment plant near the North Fork of the Gunnison River. The recommendations for this previous proposed project are presented in our November 12, 2018 report (PN: 55473GE). We understand that this project site will likely not be used for the shop structure due to costs associated with importing fill materials to raise the project site above potential flood plain elevations. For this reason, the Barrow Mesa site was explored.

The information provided in this report is applicable for the Barrow Mesa project site. Our field study consisted of observing the soils encountered in a number of backhoe advanced test holes, as well as referencing the subsurface logs and laboratory test data that we gathered for the new water tank structure project, located approximately 400 feet to the east of the proposed shop structure location. The logs of the subsurface conditions and laboratory test data for the water tank structure project may be found in our July 31, 2017 report (PN: 54812GE).

Geotechnical engineering is a discipline which provides insight into natural conditions and site characteristics such as; subsurface soil and water conditions, soil strength, swell (expansion) potential, consolidation (settlement) potential, and slope stability considerations (when needed). The information provided by the geotechnical engineer is utilized by many people including the project owner, architect or designer, structural engineer, civil engineer, the project builder and others. The information is used to help develop a design and subsequently implement construction strategies that are appropriate for the subsurface soil and water conditions, and slope stability considerations. It is important that the geotechnical engineer be consulted throughout the design and construction process to verify the implementation of the geotechnical engineering recommendations provided in this report. The recommendations and technical aspects of this report are intended for design and construction personnel who are familiar with construction concepts and techniques, and understand the terminology presented below.

The geotechnical engineering report is the beginning of a process involving the geotechnical engineering consultant on any project. It is common for unforeseen, or otherwise variable subsurface soil and water conditions to be encountered during construction. As discussed in our proposal for our services, it is imperative that we be contacted during the foundation excavation stage of the project to verify that the conditions encountered in our field exploration were representative of those encountered during construction. Compaction testing of fill material and testing of foundation concrete are equally important tasks that should be performed by the geotechnical engineering consultant during construction. We should be contacted during the

construction phase of the project and/or if any questions or comments arise as a result of the information presented below.

The following outline provides a synopsis of the various portions of this report;

- Sections 1.0 and 2.0 provide an introduction and an establishment of our scope of service.
- Sections 3.0 and 4.0 of this report present our geotechnical engineering field and laboratory studies
- Sections 5.0 through 8.0 presents our geotechnical engineering design parameters and recommendations which are based on our engineering analysis of the data obtained.
- Section 9.0 provides a brief discussion of construction sequencing and strategies which may influence the geotechnical engineering characteristics of the site.

The discussion and construction recommendations presented in Section 9.0 are intended to help develop site soil conditions that are consistent with the geotechnical engineering recommendations presented previously in the report. Ancillary information such as some background information regarding soil corrosion and radon considerations is presented as general reference. The construction considerations section is not intended to address all of the construction planning and needs for the project site, but is intended to provide an overview to aid the owner, design team, and contractor in understanding some construction concepts that may influence some of the geotechnical engineering aspects of the site and proposed development.

The data used to generate our recommendations are presented throughout this report and in the attached figures.

1.1 *Scope of Project*

We understand that the proposed project will consist of designing and constructing an approximate 9,000 square foot shop structure that is supported by a steel reinforced concrete foundation system. The floor system of the shop will be concrete slab-on-grade. We understand that an equipment storage shed will also be constructed with the project.

2.0 GEOTECHNICAL ENGINEERING STUDY

Our services include a geotechnical engineering study of the subsurface soil and water conditions for development of the proposed industrial type use.

2.1 *Geotechnical Engineering Study Scope of Service*

The scope of our study which was delineated in our proposal for services, and the order of presentation of the information within this report, is outlined below.

Field Study

- We observed the subsurface conditions encountered in four backhoe advanced test holes. The test holes were advanced in our understanding of the vicinity of the shop structure.
- We have also utilized the logs of the subsurface conditions encountered for the water tank structure located about 400 feet to the east of the proposed shop structure. The logs of these test borings have been included with the logs of the test holes in Appendix A of this report.
- Select driven sleeve and bulk soil samples were obtained from the test holes and returned to our laboratory for testing.

Laboratory Study

- The laboratory testing and analysis of the samples obtained included;
    - Moisture content,
    - Estimates of soil strength parameters based on laboratory test results, to help establish a basis for development of soil bearing capacity and lateral earth pressure values,
    - Swell/consolidation tests to help assess the expansion and consolidation potential of the support soils on this site to help estimate potential uplift associated with expansive soils and to help estimate settlement of the foundation system,
    - Plastic and liquid limit tests to determine the Plasticity Index of the soil,
    - Sieve analysis tests, and,
    - Soluble Sulfates tests to assess the corrosion potential of the native soils on Portland cement concrete.

Geotechnical Engineering Recommendations

- This report addresses the geotechnical engineering aspects of the site and provides recommendations including;

Geotechnical Engineering Section(s)

- Subsurface soil and water conditions that may influence the project design and construction considerations.

- Geotechnical engineering design parameters including;

  - ✓ Viable foundation system concepts including soil bearing capacity values,
  - ✓ settlement considerations for the foundation system concepts that are viable for this project, and,
  - ✓ Lateral Earth Pressure values for design of retaining structures (if needed).

- Soil support considerations for interior and exterior concrete flatwork.

  Construction Consideration Section

- Fill placement considerations including cursory comments regarding site preparation and grubbing operations,
- Considerations for excavation cut slopes,
- Natural soil preparation considerations for use as backfill on the site,
- Compaction recommendations for various types of backfill proposed at the site, and,
- Cursory exterior grading considerations.

- This report provides design parameters, but does not provide foundation design or design of structure components. The project architect, designer, structural engineer or builder may be contacted to provide a design based on the information presented in this report.

- Our subsurface exploration, laboratory study and engineering analysis do not address environmental or geologic hazard issues.

3.0 FIELD STUDY

3.1 *Project Location*

We understand that the water tank structure area has a designated address of 498 Clara Vista Drive. The proposed shop structure is located about 400 feet to the west of the existing water tank structures. The project site is access via a gravel road located at the east end of Clara Vista Drive, approximately 400 feet east of the intersection of Clara Vista Drive and Barrow Mesa Road. The approximate location of the project site is shown on Figure 3.1 below. The imagery used for Figure 3.1 was obtained from Google Earth (imagery date: 6/3/2014).

Figure 3.1: Approximate Project Location

3.2 *Site Description and Geomorphology*

The project site is situated on a broad mesa like feature. The ground surface in the vicinity of our understanding of the proposed shop structure slopes slightly down to the south-southwest with a slope inclination of about 15:1, horizontal to vertical (h:v) or flatter. Steeper slope surfaces exist below and to the west of the proposed shop structure (between Barrow Mesa Road and the project site), with slope inclinations down to the west ranging from about 1½:1 to 2:1 h:v, and a total vertical relief of about 20 feet. In addition, slope surfaces exist to the south of the project site with slope inclinations down to the south in the range of about 5:1 h:v to Clara Vista Drive. The total vertical relief of these slope surfaces is about 60 feet. We understand that the new tank structure will be located at least 60 feet away from the crest of the steeper slope surfaces that surround the south and west sides of the project site.

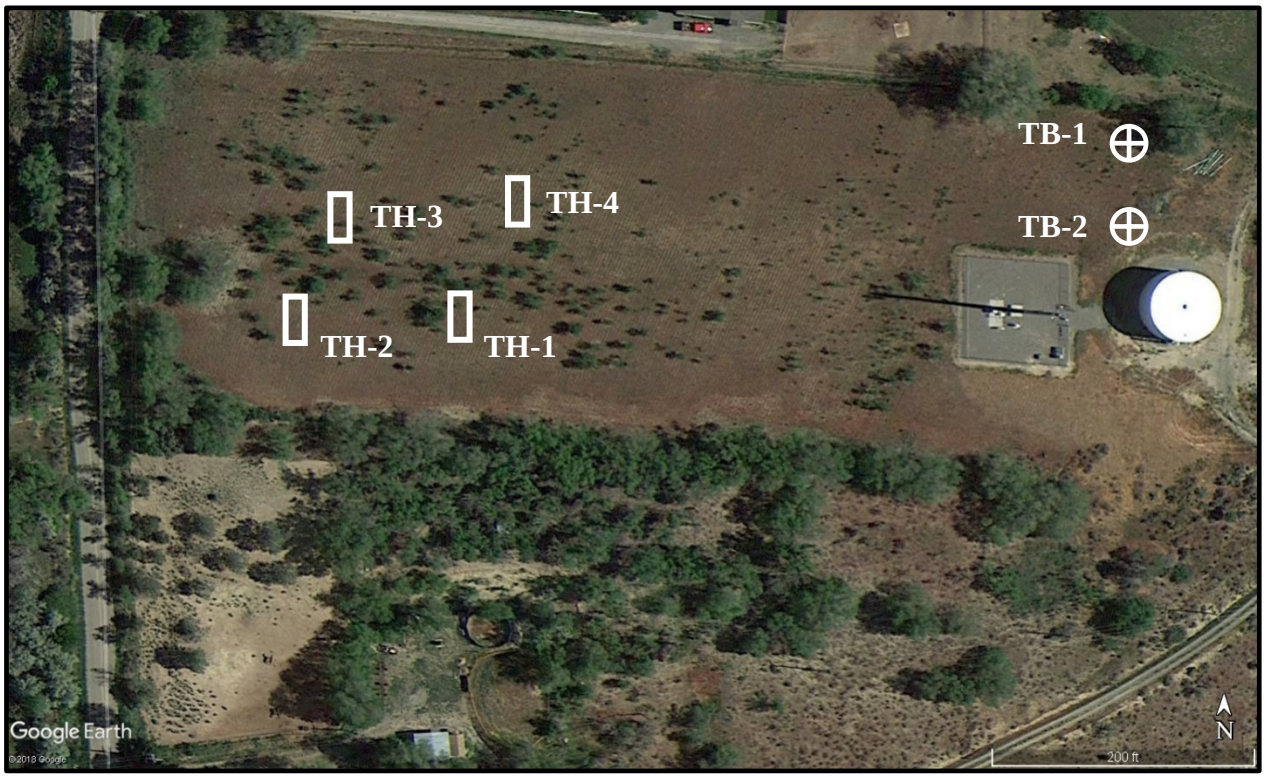
Numerous small to medium size deciduous trees exist in the area of the proposed structure. As discussed, the root zone and heavy organic matter that surrounds the root zone should be removed as part of the project excavation process.

The subsurface soil and rock deposits encountered in the vicinity of the project site generally consist of dense to very dense granular terrace gravel deposits that overlie the Mancos Shale Formation. A relatively shallow depth clay soil deposit exists above the dense gravel terrace deposits in the vicinity of the project site, such as in the area of the existing water tanks to the east of the proposed shop structure. The clay soil deposits may exhibit a moderate to high swell potential. The Mancos Shale formation that is encountered in the area consists primarily of shale and claystone materials, and often exhibits a high to very high swell potential.

3.3 *Subsurface Soil and Water Conditions*

We logged and sampled the subsurface conditions exposed in four backhoe advanced test holes that were advanced in the vicinity of the shop structure. These test holes have been designated as Test Holes TH-1 through TH-4. We also referenced the logs of the subsurface conditions that we encountered in Test Borings TB-1 and TB-2 advanced for the water tank structure project. The approximate locations of the test holes and previously advanced test borings are indicated on Figure 3.3 below. The imagery used for Figure 3.3 was obtained from Google Earth (imagery date: 6/3/2014). Note that the new water tank structure is not shown on the aerial imagery used. The logs of the soils encountered in Test Holes TH-1 through TH-4, and our previous Test Borings TB-1 and TB-2 are presented in Appendix A of this report.

Figure 3.3: Approximate Test Hole Locations and Previous Test Boring Locations



The approximate test hole and test boring locations shown on the figure above were prepared using notes taken during the field work and are intended to show the approximate test hole and test boring locations for reference purposes only.

In Test Holes TH-1 through TH-4 we generally encountered sandy clay and silt soil from the ground surface to depths ranging from about 1 to 2 feet below the ground surface elevation. Organic matter was encountered in the upper approximate 8 inches of the surface soils. Below this material we encountered dense to very dense gravel and cobbles with a sandy clay and silt soil matrix to the bottom of the test holes. The gravel content of the materials generally increased with depth. The test holes were advanced to depths ranging from about 4 to 5 feet below the ground surface elevation. The rubber tired backhoe used to advanced the test holes struggled somewhat with the excavation due to the very dense granular deposits. The sandy clay and silt soil matrix materials encountered and tested from the various test holes exhibited a low swell potential.

The test holes were loosely backfilled after completion of the test holes. Loose backfill associated with the test holes must be removed and replaced with compacted structural fill if the test holes are located under the structure or exterior concrete flatwork.

Test Borings TB-1 and TB-2 were advanced about 400 feet to the east of the proposed structure as part of our previous water tank geotechnical engineering study. In these test borings we generally encountered sandy clay soil with scattered gravel from the ground surface elevation to depths ranging from about 2 to 3 feet below the ground surface. At depths ranging from 2 to 3 feet below the ground surface elevation we encountered dense to very dense gravel and cobbles with a sandy clay soil matrix to depths ranging from about 16 to 18 feet below the ground surface elevation where we encountered the Mancos Shale Formation. It proved difficult to advance auger type borings through the very dense gravel and cobble deposits.

We encountered subsurface free water at a depth of about 12 feet below the ground surface elevation in both of our test borings. We suspect that the subsurface ground water elevation in the area is somewhat dependent on seasonal precipitation and snow melt conditions, and irrigation practices in areas up-gradient from the project site. We anticipate that the subsurface water elevation may be located at a shallower elevation in the vicinity of the proposed shop structure location.

The sandy clay soils encountered in the upper 2 to 3 feet of our test borings advanced for the water tank structure exhibited a high to very high swell potential when wetted. Although the upper surface soils encountered in the test holes advanced in the vicinity of the shop structure do not appear to be particularly expansive, we anticipate that expansive soil conditions may be present in the shallow soils in the general vicinity of the proposed shop structure. We recommend that the shallow fine-grained clay and/or silt soils be removed from areas under the proposed shop structure foundation system.

The logs of the subsurface soil conditions encountered in the test holes and our previously advanced test borings are presented in Appendix A. The logs present our interpretation of the subsurface conditions encountered exposed in the test holes and test borings at the time of our field work. Subsurface soil and water conditions are often variable across relatively short distances. It is likely that variable subsurface soil and water conditions will be encountered during construction. Laboratory soil classifications of samples obtained may differ from field classifications.

3.4 *Site Seismic Classification*

The seismic site class as defined by the 2009 International Building Code is based on some average values of select soil characteristics such as shear wave velocity, standard penetration test result values, undrained shear strength, and plasticity index.

Based on our standard penetration field tests and laboratory test results obtained from Test Borings TB-1 and TB-2, and the similar shallow subsurface conditions encountered in Test Holes TH-1 through TH-4, we feel that the subsurface conditions for the project are consistent with the criteria for a Site Class C designation as outlined in the 2009 International Building Code, Table 1613.5.2

4.0 LABORATORY STUDY

The laboratory study included tests to determine soils types, estimate the strength potential of the site soil materials, and swell and consolidation potential of the site soil materials. We performed the following tests on select samples obtained from the test borings.

Sieve Analysis and Atterberg Limits; the plastic limit, liquid limit and plasticity index as well as the material grading of select soil samples was determined. The results of the sieve analysis and Atterberg Limits tests are presented on Figures 4.1 through 4.3 of Appendix B.

The granular soil deposits that we encountered and tested at depths ranging from about 1 to 2 feet below the ground surface elevation to the bottom of the test holes generally classify as USCS type GM to GM-GP gravel with a silty sand matrix. The soil materials encountered from the ground surface to a depth of about 1 foot below the ground surface elevation in Test Hole TH-2 classified as a USCS to SM silty sand. It should be noted that more clayey soils were encountered in the upper portions of some of the test holes, and at our previous test boring locations.

Swell-Consolidation Tests; the one dimensional swell-consolidation potential of some of the samples obtained from the formational claystone materials was determined in general accordance with constant volume methodology. The soil samples tested were exposed to varying loads and inundated with water at surcharge loads of 100 and 500 pounds per square foot. The one-dimensional swell-consolidation response of the soil sample to the loads and water are represented graphically on Figures 4.4 through 4.9 of Appendix B. The samples tested exhibited a relatively low swell potential.

Soluble Sulfates Tests: We performed soluble sulfate content tests on soil samples obtained from select samples obtained from the test holes. The results of our tests are tabulated below.

Sample Designation	Water Soluble Sulfate in Soil (percent by weight)
TB-2, 36”-48”	< 0.01
TB-4, 12”-18”	< 0.01

The American Concrete Institute (ACI) indicates that soil with a soluble sulfate content of less than 0.1 percent constitutes a negligible exposure to sulfate attack on Portland cement concrete. However, based on our experience in the vicinity of the project, moderate to high sulfate content soils are commonly encountered. We recommend a maximum water/cement ratio of 0.45 and either a type II, IP(MS), IS(MS), P(MS), I(PM)(MS), or a I(SM)(MS) cement be used for the project.

5.0 FOUNDATION RECOMMENDATIONS

Based on the results of our field study and laboratory testing, the structures may be supported by conventional spread footings. Our recommendations for spread footings are provide in Section 5.1 below. We are available to provide recommendations for alternative types of foundation systems at your request.

The integrity and long-term performance of any type of foundation system is influenced by the quality of workmanship which is implemented during construction. It is imperative that all excavation and fill placement operations be conducted by qualified personnel using appropriate equipment and techniques to provide suitable support conditions for the foundation system.

The loose soil materials used to backfill the test holes that were advanced as part of our field study must be removed and replaced with compacted structural fill if the test holes are located within the building footprint area or exterior concrete flatwork areas.

5.1 *Spread Footings*

Properly designed and constructed continuous spread footings with stem walls (or beams) have the ability to distribute the forces associated with volume changes in the support soils. The rigidity of the system helps reduce differential movement and associated damage to the overlying structure. Volume changes in the soils supporting isolated pad footings will result in direct movement of the columns and structural components supported by the columns. If possible, we recommend that isolated pad footings be avoided and that the foundation system be designed as rigid as is reasonably possible.

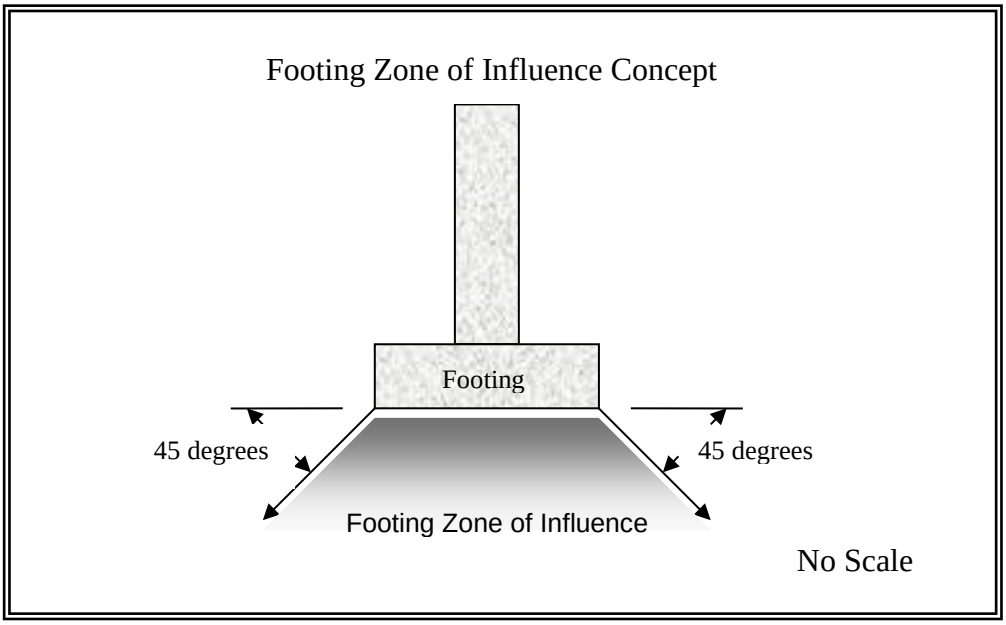
Spread footings should be supported by a leveling course of structural fill that extends to the dense gravel and cobble soils that we observed at depths ranging from about 1 to 2 feet below the ground surface elevation in the test holes. The primary reason for the structural fill leveling course is to provide more uniform support conditions immediately below the footings due to the cobble sized materials that will be encountered in the foundation excavations.

The following general construction procedures should be used to construct the spread footings;

- The foundation excavation should be excavated to the dense gravel and cobble materials, and to a depth of about 6 to 8 inches below the proposed bottom of footing elevation.
- The native gravel and cobble soils deposits should be scarified to a depth of about 8 inches and moisture conditioned to optimum to about 2 percent above optimum moisture content. The scarified and moisture conditioned soils should then be compacted.
- A 6 to 8 inch thick leveling course of structural fill should then be placed and compacted to establish the footing support elevation. The compacted structural fill should extend a minimum distance of at least 6 inches beyond each edge of the footings. Additional widths of structural fill may be needed if for some reason the depth of structural fill is increased. (see Figure 5.1 below).

The zone of influence of the footing (at elevations close to the bottom of the footing) is often approximated as being between two lines subtended at 45 degree angles from each bottom corner of the footing. The compacted structural fill should extend beyond the zone of influence of the footing as shown in Figure 5.1 below.

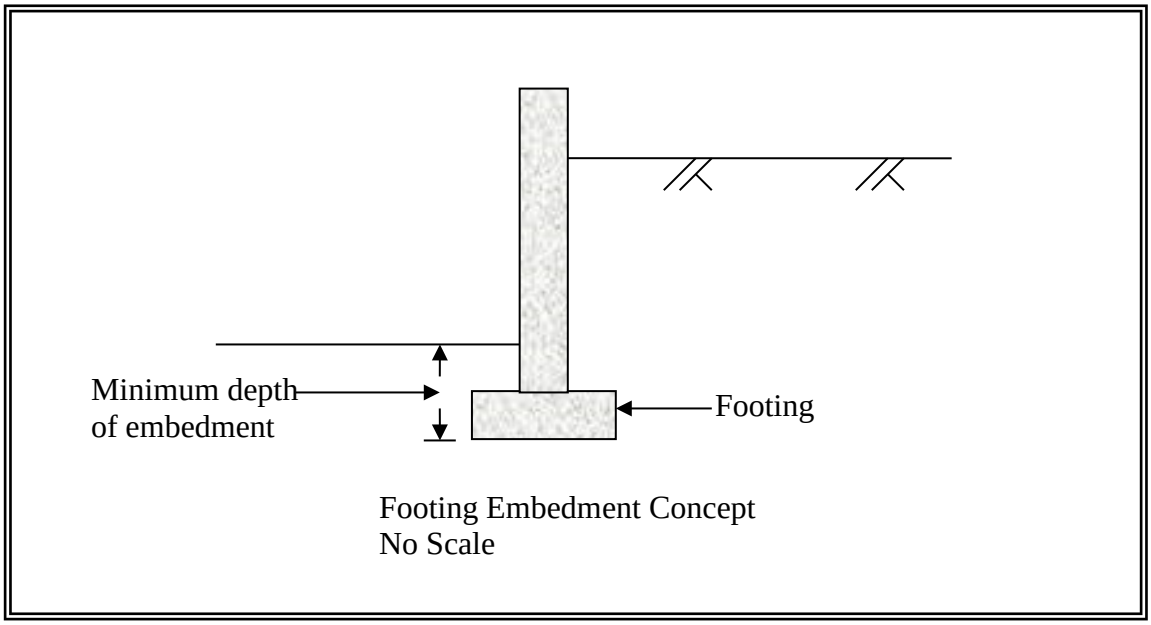
Figure 5.1: Structural Fill Zone of Influence Below Footings



A general and simple rule to apply to the geometry of the compacted structural fill blanket is that it should extend beyond each edge of the footing a distance which is equal to the fill thickness.

All footings should have a minimum depth of embedment of at least 1 foot. The embedment concept is shown below on Figure 5.2.

Figure 5.2: Footing Embedment



An allowable bearing capacity of 3,500 pounds per square foot may be used for the design of the project spread footings. This bearing capacity value is appropriate for continuous footing widths ranging from about 1.5 to 3 feet, and isolated footing widths ranging from about 3 to 5 feet. The bearing capacity value may be increased by 20 percent for transient conditions associated with wind and seismic loads. Snow loads are not transient loads. We estimate that the continuous spread footings designed and constructed above will have a total post construction settlement in the range of about 1/2 inch, while isolated footings may exhibit a post construction settlement in the range of about 1/2 to 2/3 inch.

All footings should be support at an elevation deeper than the maximum depth of frost penetration for the area. This recommendation includes exterior isolated footings and column supports. Please contact the local building department for specific frost depth requirements.

The post construction differential settlement may be reduced by designing footings that will apply relatively uniform loads on the support soils. Concentrated loads should be supported by footings that have been designed to impose similar loads as those imposed by adjacent footings.

Under no circumstances should any footing be supported by more than 3 feet of compacted structural fill material unless we are contacted to review the specific conditions supporting these footing locations.

The design concepts and parameters presented above are based on the soil conditions encountered in our test borings. We should be contacted during the initial phases of the foundation excavation at the site to assess the soil support conditions and to verify our recommendations.

Some movement and settlement of any shallow foundation system will occur after construction. Movement associated with swelling soils also occurs occasionally. Utility line connections through and foundation or structural component should be appropriately sleeved to reduce the potential for damage to the utility line. Flexible utility line connections will further reduce the potential for damage associated with movement of the structure.

6.0 RETAINING STRUCTURES

We understand that a basement level below the structure will not be constructed, however we anticipate that laterally loaded walls such as grease/oil pits may be constructed as part of this site development. We have provided lateral earth pressure values for both the native granular soils and imported granular soils if needed for the project. We must be contacted if extensive laterally loaded walls will be constructed as part of the project.

Lateral loads will be imposed on the retaining structures by the adjacent soils and, in some cases, surcharge loads on the retained soils. The loads imposed by the soil are commonly referred to as lateral earth pressures. The magnitude of the lateral earth pressure forces is partially dependent on the soil strength characteristics, the geometry of the ground surface adjacent to the retaining structure, the subsurface water conditions and on surcharge loads.

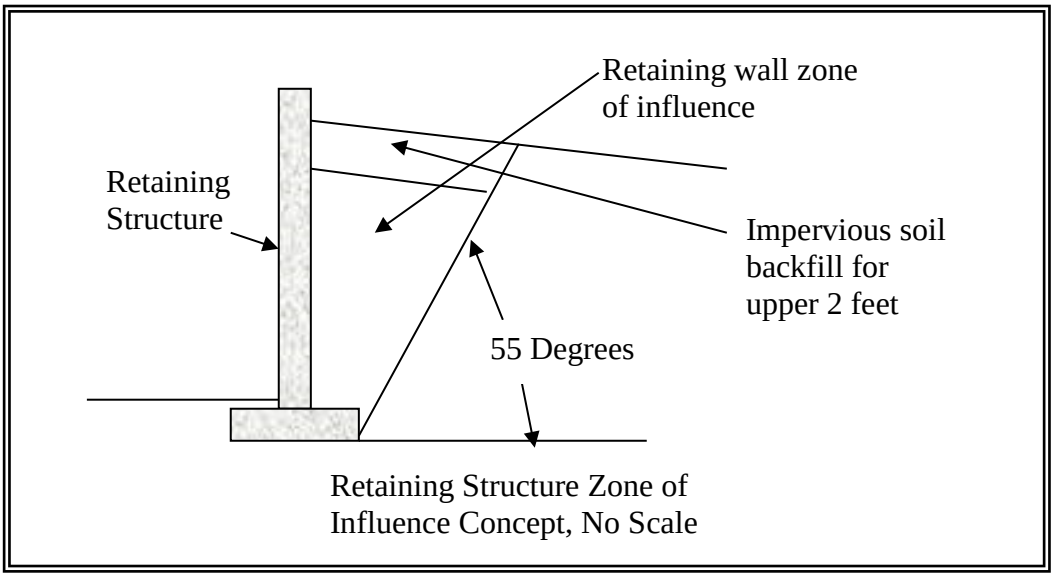
The retaining structures may be designed using the values tabulated below.

Lateral Earth Pressure Values

Type of Lateral Earth Pressure	Level Native Granular Soil Backfill (pounds per cubic foot/foot)*	Level Granular Soil Backfill (pounds per cubic foot/foot)
Active	40	35
At-rest	60	55
Passive	455	460
Allowable Coefficient of Friction	0.43	0.45

The values tabulated above are for well drained backfill soils. The values provided above do not include any forces due to adjacent surcharge loads or sloped soils. If the backfill soils become saturated the imposed lateral earth pressures will be significantly higher than those tabulated above.

The granular imported soil backfill values tabulated above are appropriate for material with an angle of internal friction of 35 degrees, or greater. The granular backfill must be placed within the retaining structure zone of influence as shown below in order for the lateral earth pressure values tabulated above for the granular material to be appropriate.



Retaining Structure Zone of Influence Concept, No Scale

If a granular backfill is chosen it should not extend to the ground surface. Some granular soils allow ready water migration which may result in increased water access to the foundation soils. The upper few feet of the backfill should be constructed using an impervious soil such as silty-clay and clay soils from the project site, if these soils are available.

Backfill should not be placed and compacted behind the retaining structure unless approved by the project structural engineer. Backfill placed prior to construction of all appropriate structural members such as floors, or prior to appropriate curing of the retaining wall concrete (if used) may result in severe damage and/or failure of the retaining structure.

7.0 SUBSURFACE DRAIN SYSTEM

Due to the relatively granular nature of the subsurface soils, low swell potential of the native soils, and lack of crawl space areas, we do not see the need for a subsurface drain system around the perimeter of the foundation system. Retaining structures should incorporate drain systems to reduce the potential for hydrostatic pressures to develop within the retained soils. Exterior retaining structures may be constructed with weep holes to allow subsurface water migration through the retaining structures.

8.0 CONCRETE FLATWORK

We understand that both interior and exterior concrete flatwork will be included in the project design. Concrete flatwork is typically lightly loaded and has a limited capability to resist shear forces associated with volume changes in the support soils, including frost heave. It is prudent for the design and construction of concrete flatwork on this project to be able to accommodate some movement associated with swelling soil conditions.

Based on our subsurface field study and laboratory test data, the subsurface materials encountered on the project site did not exhibit a substantial swell potential. We anticipate that the primary potential for movement of concrete flatwork on this project site is from consolidation of the upper sandy clay/silt soils that we encountered from the ground surface to depths ranging from about 1 to 2 feet below the ground surface elevation, or possibly movement from frost heave for exterior concrete flatwork. We have recommended that concrete flatwork be supported by a composite support section that consists of a layer of moisture conditioned native soils and a layer of compacted structural fill. Properly moisture conditioning and compacting the finer grain sandy silt and clay soils must be performed to help reduce the potential for movement of concrete flatwork on this project site. The potential for movement can be further reduced if the upper sandy silt/clay soils are removed from areas under concrete flatwork.

8.1 *Interior Concrete Slab-on-Grade Floors*

A primary goal for the design and construction of interior concrete slab-on-grade floors is to reduce the amount of post construction uplift associated with swelling soils, or downward movement due to consolidation of soft soils. A parallel goal is to reduce the potential for damage to the structure associated with any movement of the slab-on-grade which may occur. There are limited options available to help mitigate the influence of volume changes in the support soil for concrete slab-on-grade floors, these include;

- Preconstruction scarification, moisture conditioning and re-compaction of the natural soils in areas proposed for support of concrete flatwork, and/or,
- Placement and compaction of granular compacted structural fill material.

Damage associated with movement of interior concrete slab-on-grade floor can be reduced by designing the floors as “floating” slabs. Floating concrete slabs are not structurally tied to the foundations or the overlying structure. Interior walls or columns are not supported on the interior floor slabs with a true floating slab system. Interior walls may be structurally supported from framing above the floor, or interior walls and support columns may be supported on interior portions of the foundation system if a floating slab system is used.

The only means to completely mitigate the influence of volume changes on the performance of interior floors is to structurally support the floors. Floors that are suspended by the foundation system will not be influenced by volume changes in the site soils. The suggestions and recommendations presented below are intended to help reduce the influence of volume changes in the support soils on the performance of the concrete slab-on-grade floors.

Interior concrete slab-on-grade floors may be supported by a composite fill blanket which is composed of a 12 inch thick lower layer of scarified, moisture conditioned natural soil that is overlain by a 12 inch thick blanket of compacted structural fill. The scarified fill material and the compacted structural fill material should be constructed as discussed under the Construction Considerations, "*Fill Placement Considerations*" section of this report below."

The project structural engineer should be contacted regarding the structural characteristics and thickness of the interior shop floor slabs. We generally recommend that a minimum concrete thickness of 7 to 8 inches be used for areas that will be exposed to repeated heavy equipment loads. A modulus of subgrade reaction of 175 pounds per cubic inch may be used for the composite slab support section provided above.

Capillary and vapor moisture rise through the slab support soil may provide a source for moisture in the concrete slab-on-grade floor. This moisture may promote development of mold or mildew in poorly ventilated areas and may influence the performance of floor coverings and mastic placed directly on the floor slabs. The type of floor covering, adhesives used, and other considerations that are not related to the geotechnical engineering practice will influence the design. The architect, builder and particularly the floor covering/adhesive manufacturer should be contacted regarding the appropriate level of protection required for their products.

Comments for Reduction of Capillary Rise

One option to stop capillary rise through the floor slab is to place a layer of clean aggregate material, such as washed concrete aggregate for the upper 4 to 6 inches of fill material supporting the concrete slabs.

Comments for Reduction of Vapor Rise

To reduce vapor rise through the floors slab a moisture barrier such as a 6 mil (or thicker) plastic, or similar impervious geotextile material is often be placed below the floor slab. The material used should be protected from punctures that will occur during the construction process.

There are proprietary barriers that are puncture resistant that may not need the underlying layer of protective material. Some of these barriers are robust material that may be placed below the compacted structural fill layer. We do not recommend placement of the concrete directly on a moisture barrier unless the concrete contractor has had previous experience with curing of

concrete placed in this manner. As mentioned above, the architect, builder and particularly the floor covering/adhesive manufacturer should be contacted regarding the appropriate level of moisture and vapor protection required for their products.

The project structural engineer should be contacted to provide steel reinforcement design considerations for the proposed floor slabs. Any steel reinforcement placed in the slab should be placed at the appropriate elevations to allow for proper interaction of the reinforcement with tensile stresses in the slab. Reinforcement steel that is allowed to cure at the bottom of the slab will not provide adequate reinforcement.

8.2 Exterior Concrete Flatwork Considerations

Exterior concrete flatwork includes concrete driveway slabs, aprons, patios, and walkways. The desired performance of exterior flatwork typically varies depending on the proposed use of the site and each owner's individual expectations. As with interior flatwork, exterior flatwork is particularly prone to movement and potential damage due to movement of the support soils. This movement and associated damage may be reduced by following the recommendations discussed under interior flatwork, above. Unlike interior flatwork, exterior flatwork may be exposed to frost heave, particularly on sites with high silt-content soils. It may be prudent to remove silt soils from exterior flatwork support areas where movement of exterior flatwork will adversely affect the project, such as near the interface between the driveway and the interior garage floor slab. If silt soils are encountered, they should be removed to the maximum depth of frost penetration for the area where movement of exterior flatwork is undesirable.

As discussed in Section 8.1 above, we recommend that a relatively thick concrete section be used for exterior concrete flatwork that will be exposed to heavy equipment loads. The project structural engineer should be contacted for the steel reinforcement design.

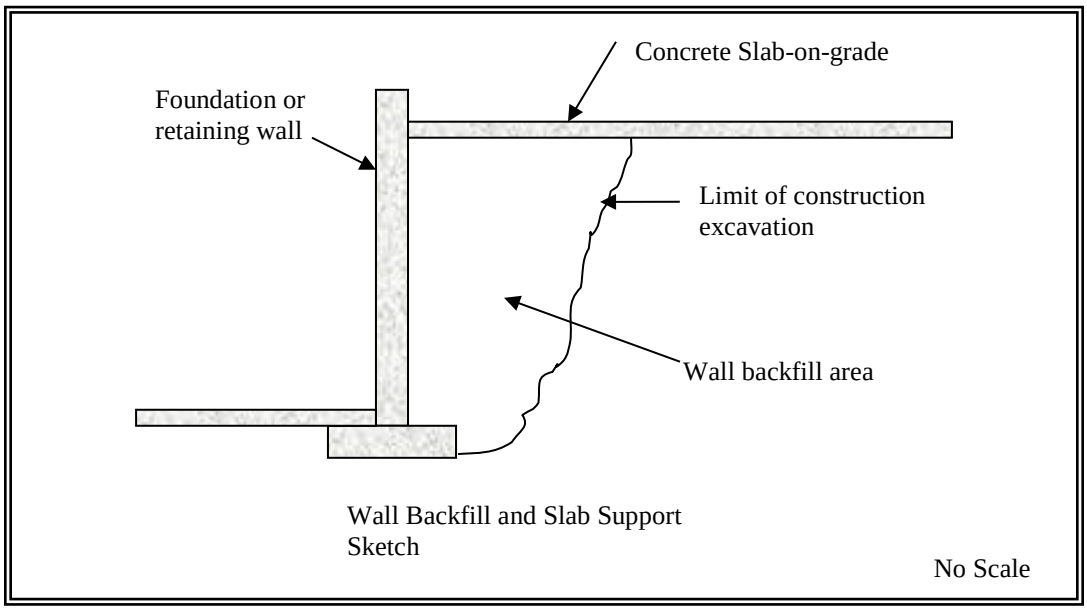
If some movement of exterior flatwork is acceptable, we suggest that the support areas be prepared by scarification, moisture conditioning and re-compaction of 8 inches of the natural soils followed by placement of at least 8 inches of compacted granular fill material for light duty exterior flatwork, and at least 12 inches of compacted structural fill for heavy duty exterior flatwork that will be subjected to heavy equipment loads. The scarified material and granular fill materials should be placed as discussed under the Construction Considerations, *"Fill Placement Recommendations"* section of this report, below.

It is important that exterior flatwork be separated from exterior column supports, masonry veneer, finishes and siding. No support columns, for the structure or exterior decks, should be placed on exterior concrete unless movement of the columns will not adversely affect the supported structural components. Movement of exterior flatwork may cause damage if it is in contact with portions of the structure exterior.

Exterior flatwork should not be placed on soils prepared for support of landscaping vegetation. Cultivated soils will not provide suitable support for concrete flatwork.

8.3 General Concrete Flatwork Comments

It is relatively common that both interior and exterior concrete flatwork is supported by areas of fill adjacent to either shallow foundation walls or basement retaining walls. A typical sketch of this condition is shown below.



Settlement of the backfill shown above will create a void and lack of soil support for the portions of the slab over the backfill. Settlement of the fill supporting the concrete flatwork is likely to cause damage to the slab-on-grade. Settlement and associated damage to the concrete flatwork may occur when the backfill is relatively deep, even if the backfill is compacted.

If this condition is likely to exist on this site it may be prudent to design the slab to be structurally supported on the retaining or foundation wall and designed to span to areas away from the backfill area as designed by the project structural engineer. We are available to discuss this with you.

9.0 CONSTRUCTION CONSIDERATIONS

This section of the report provides comments, considerations and recommendations for aspects of the site construction which may influence, or be influenced by the geotechnical engineering considerations discussed above. The information presented below is not intended to discuss all aspects of the site construction conditions and considerations that may be encountered as the project progresses. If any questions arise as a result of our recommendations presented above, or if unexpected subsurface conditions are encountered during construction we should be contacted immediately.

9.1 *Fill Placement Recommendations*

There are several references throughout this report regarding both natural soil and compacted structural fill recommendations. The recommendations presented below are appropriate for the fill placement considerations discussed throughout the report above.

All areas to receive fill, structural components, or other site improvements should be properly prepared and grubbed at the initiation of the project construction. The grubbing operations should include scarification and removal of organic material and soil. No fill material or concrete should be placed in areas where existing vegetation or fill material exist.

We suspect that man-placed fill and subterranean structures may be encountered as the project construction progresses. All existing fill material including the loose fill materials used to backfill the test holes associated with this geotechnical engineering study, should be removed from areas planned for support of structural components. Excavated areas and subterranean voids should be backfilled with properly compacted fill material as discussed below.

9.1.1 *Natural Soil Fill*

Any natural soil used for any fill purpose should be free of all deleterious material, such as organic material and construction debris. Natural soil fill includes excavated and replaced material or in-place scarified material.

The natural soils should be moisture conditioned, either by addition of water to dry soils, or by processing to allow drying of wet soils. The proposed fill materials should be moisture conditioned to between about optimum and about 2 percent above optimum soil moisture content. This moisture content can be estimated in the field by squeezing a sample of the soil in the palm of the hand. If the material easily makes a cast of soil which remains in-tact, and a minor amount of surface moisture develops on the cast, the material is close to the desired moisture content. Material testing during construction is the best means to assess the soil moisture content.

Moisture conditioning of clay or silt soils may require many hours of processing. If possible, water should be added and thoroughly mixed into fine grained soil such as clay or silt the day prior to use of the material. This technique will allow for development of a more uniform moisture content and will allow for better compaction of the moisture conditioned materials.

The moisture conditioned soil should be placed in lifts that do not exceed the capabilities of the compaction equipment used and compacted to at least 90 percent of maximum dry density as defined by ASTM D1557, modified Proctor test. We typically recommend a maximum fill lift thickness of 6 inches for hand operated equipment and 8 to 10 inches for larger equipment. Care should be exercised in placement of utility trench backfill so that the compaction operations do not damage the underlying utilities. The maximum rock size should be less than about 3 inches.

The soils encountered in our test borings included cobbles and boulders that are larger than 3 inches. These larger rocks may be either be screened and removed from the natural soil prior to use as structural fill, or the soil may be processed and crushed with a portable on-site crusher to produce a material with no rocks larger than 3 inches.

9.1.2 *Granular Compacted Structural Fill*

Granular compacted structural fill is referenced in numerous locations throughout the text of this report. Granular compacted structural fill should be constructed using an imported commercially produced rock product such as aggregate road base. Many products other than road base, such as clean aggregate or select crusher fines may be suitable, depending on the intended use. If a specification is needed by the design professional for development of project specifications, a material conforming to the Colorado Department of Transportation (CDOT) "Class 6" aggregate road base material can be specified. This specification can include an option for testing and approval in the event the contractor's desired material does not conform to the Class 6 aggregate specifications. We have provided the CDOT Specifications for Class 6 material below

Grading of CDOT Class 6 Aggregate Base-Course Material	
Sieve Size	Percent Passing Each Sieve
¾ inch	100
#4	30 – 65
#8	25 – 55
#200	3 – 12

Liquid Limit less than 30

All compacted structural fill should be moisture conditioned and compacted to at least 90 percent of maximum dry density as defined by ASTM D1557, modified Proctor test. Areas where the structural fill will support traffic loads under concrete slabs or asphalt concrete should be compacted to at least 95 percent of maximum dry density as defined by ASTM D1557,

modified Proctor test.

9.2 *Excavation Considerations*

Unless a specific classification is performed, the site soils should be considered as an Occupational Safety and Health Administration (OSHA) Type C soil and should be sloped and/or benched according to the current OSHA regulations. Excavations should be sloped and benched to prevent wall collapse. Any soil can release suddenly and cave unexpectedly from excavation walls, particularly if the soils is very moist, or if fractures within the soil are present. Daily observations of the excavations should be conducted by OSHA competent site personnel to assess safety considerations.

If possible, excavations should be constructed to allow for water flow from the excavation the event of precipitation during construction. If this is not possible it may be necessary to remove water from snowmelt or precipitation from the foundation excavations to help reduce the influence of this water on the soil support conditions and the site construction characteristics.

9.2.1 *Excavation Cut Slopes*

We anticipate that some permanent excavation cut slopes may be included in the site development. Temporary cut slopes should not exceed 5 feet in height and should not be steeper than about 1:1, horizontal to vertical for most soils. Permanent cut slopes of greater than 5 feet or steeper than 2½:1, h:v must be analyzed on a site specific basis.

We did not observe evidence of existing unstable slope areas influencing the site, but due to the steepness and extent of the slopes in the area we suggest that the magnitude of the proposed excavation slopes be minimized and/or supported by retaining structures.

9.3 *Utility Considerations*

Subsurface utility trenches will be constructed as part of the site development. Utility line backfill often becomes a conduit for post construction water migration. If utility line trenches approach the proposed project site from above, water migrating along the utility line and/or backfill may have direct access to the portions of the proposed structure where the utility line penetrations are made through the foundation system. The foundation soils in the vicinity of the utility line penetration may be influenced by the additional subsurface water. There are a few options to help mitigate water migration along utility line backfill. Backfill bulkheads constructed with high clay content soils and/or placement of subsurface drains to promote utility line water discharge away from the foundation support soil.

Some movement of all structural components is normal and expected. The amount of movement may be greater on sites with problematic soil conditions. Utility line penetrations

through any walls or floor slabs should be sleeved so that movement of the walls or slabs does not induce movement or stress in the utility line. Utility connections should be flexible to allow for some movement of the floor slab.

9.4 *Exterior Grading and Drainage Comments*

The ground surface adjacent to the structure should be sloped to promote water flow away from the foundation system and flatwork. Snow storage areas should not be located in areas which will allow for snowmelt water access to support soils for the foundation system or flatwork.

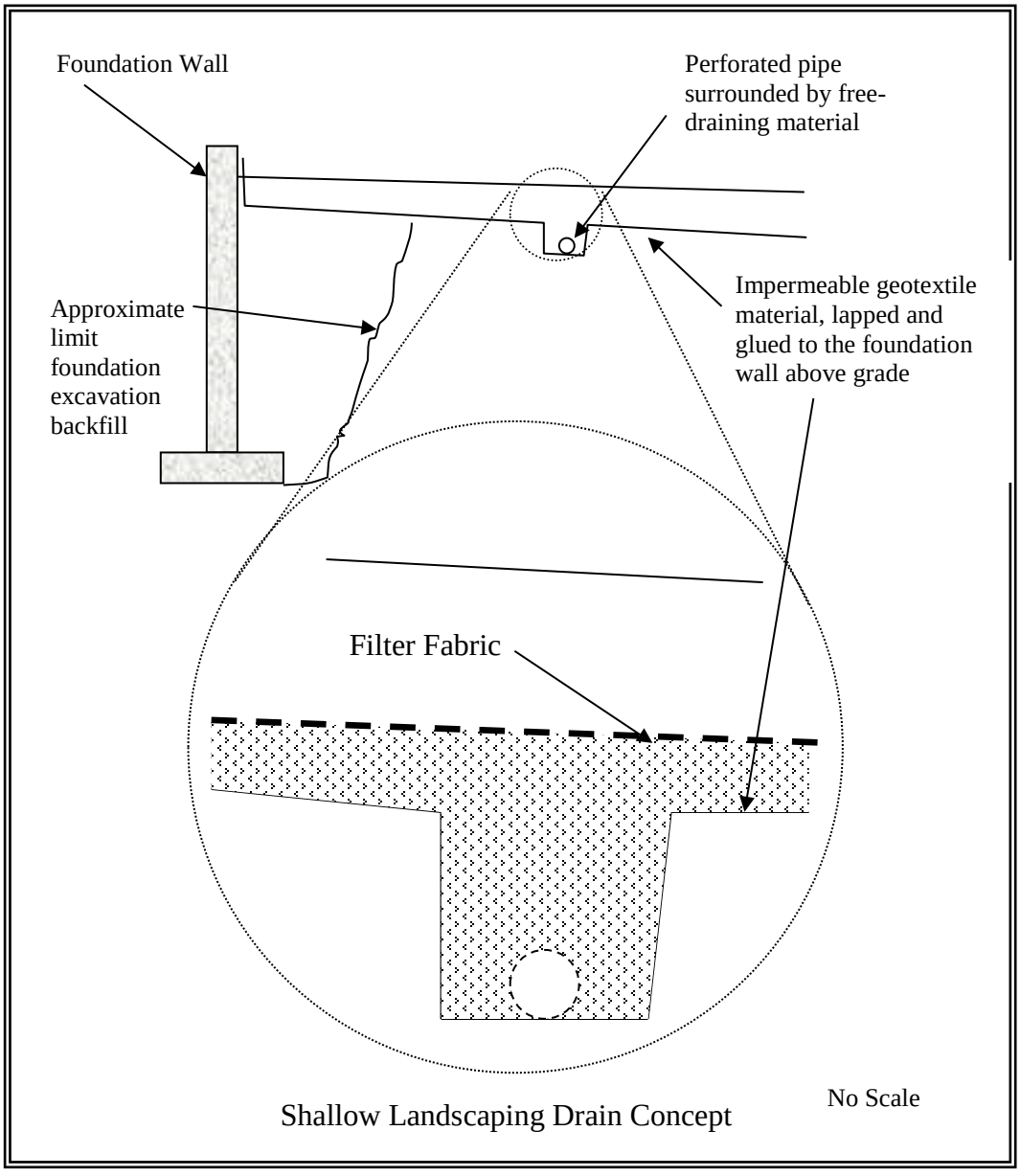
Water flow from the roof of the structure should be captured and directed away from the structure. If the roof water is collected in an eave gutter system, or similar, the discharge points of the system must be located away from areas where the water will have access to the foundation backfill or any structure support soils. If downspouts are used, provisions should be made to either collect or direct the water away from the structure.

The project civil engineering consultant or builder should develop a drainage scheme for the site. We typically suggest a minimum fall of about 8 to 10 percent away from the structure, in the absence of design criteria from others. Care should be taken to not direct water onto adjacent property or to areas that would negatively influence existing structures or improvements.

9.5 *Landscaping Considerations*

We recommend against construction of landscaping which requires excessive irrigation. Generally landscaping which uses abundant water requires that the landscaping contractor install topsoil which will retain moisture. The topsoil is often placed in flattened areas near the structure to further trap water and reduce water migration from away from the landscaped areas. Unfortunately almost all aspects of landscape construction and development of lush vegetation are contrary to the establishment of a relatively dry area adjacent to the foundation walls. Excess water from landscaped areas near the structure can migrate to the foundation system or flatwork support soils, which can result in volume changes in these soils.

A relatively common concept used to collect and subsequently reduce the amount of excess irrigation water is to glue or attach an impermeable geotextile fabric or heavy mill plastic to the foundation wall and extend it below the topsoil which is used to establish the landscape vegetation. A thin layer of sand can be placed on top of the geotextile material to both protect the geotextile from punctures and to serve as a medium to promote water migration to the collection trench and perforated pipe. The landscape architect or contractor should be contacted for additional information regarding specific construction considerations for this concept which is shown in the sketch below.



Shallow Landscaping Drain Concept

A free draining aggregate or sand may be placed in the collection trench around the perforated pipe. The perforated pipe should be graded to allow for positive flow of excess irrigation water away from the structure or other area where additional subsurface water is undesired. Preferably the geotextile material should extend at least ten (10) or more feet from the foundation system.

Care should be taken to not place exterior flatwork such as sidewalks or driveways on soils that have been tilled and prepared for landscaping. Tilled soils will settle which can cause damage to the overlying flatwork. Tilled soils placed on sloped areas often "creep" down-slope. Any structure or structural component placed on this material will move down-slope with the tilled soil and may become damaged.

9.6 *Radon Issues*

The requested scope of service of this report did not include assessment of the site soils for radon production. Many soils and formational materials in western Colorado produce Radon gas. The structure should be appropriately ventilated to reduce the accumulation of Radon gas in the structure. Several Federal Government agencies including the Environmental Protection Agency (EPA) have information and guidelines available for Radon considerations and home construction. If a radon survey of the site soils is desired, please contact us.

10.0 CONSTRUCTION MONITORING AND TESTING

Construction monitoring including engineering observations and materials testing during construction is a critical aspect of the geotechnical engineering contribution to any project. Unexpected subsurface conditions are often encountered during construction. The site foundation excavation should be observed by the geotechnical engineer or a representative during the early stages of the site construction to verify that the actual subsurface soil and water conditions were properly characterized as part of field exploration, laboratory testing and engineering analysis. If the subsurface conditions encountered during construction are different than those that were the basis of the geotechnical engineering report then modifications to the design may be implemented prior to placement of fill materials or foundation concrete.

Compaction testing of fill material should be performed throughout the project construction so that the engineer and contractor may monitor the quality of the fill placement techniques being used at the site. We recommend that compaction testing be performed for any fill material that is placed as part of the site development. Compaction tests should be performed on each lift of material placed in areas proposed for support of structural components. In addition to compaction testing we recommend that the grain size distribution, clay content and swell potential be evaluated for any imported materials that are planned for use on the site. Concrete tests should be performed on foundation concrete and flatwork.

We are available to provide testing of asphaltic concrete materials, if used. We are available to develop a testing program for soil, aggregate materials, concrete and asphaltic concrete for this project.

11.0 CONCLUSIONS AND CONSIDERATIONS

The information presented in this report is based on our understanding of the proposed construction that was provided to us and on the data obtained from our field and laboratory studies. We recommend that we be contacted during the design and construction phase of this project to aid in the implementation of our recommendations. Please contact us immediately if you have any questions, or if any of the information presented above is not appropriate for the proposed site construction.

The recommendations presented above are intended to be used only for this project site and the proposed construction which was provided to us. The recommendations presented above are not suitable for adjacent project sites, or for proposed construction that is different than that outlined for this study.

Our recommendations are based on limited field and laboratory sampling and testing. Unexpected subsurface conditions encountered during construction may alter our recommendations. We should be contacted during construction to observe the exposed subsurface soil conditions to provide comments and verification of our recommendations. We are available to review and tailor our recommendations as the project progresses and additional information which may influence our recommendations becomes available.

Please contact us if you have any questions, or if we may be of additional service.

Respectfully submitted,
TRAUTNER GEOTECH

Jonathan P. Butler, P.E.
Senior Geotechnical Engineer

APPENDIX A

Logs of Test Borings

TRAUTNER GEOTECH LLC

Field Engineer	: J. Butler
Drilling Method	: Backhoe Pit
Sampling Method	: Mod. California Sampler
Date Drilled	: 1/14/2019
Total Depth	: 4.5 feet
Location	: See Figure

LOG OF BORING TH-1

Hotchkiss Barrow Mesa Shop Structure
Hotchkiss, CO
Ms. Joanne Fagan, P.E.
Town of Hotchkiss Engineer

PN: 55531GE

Sample Type
- Mod. California Sampler
- Bag Sample
- Standard Split Spoon

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0	CLAY, sandy, organics, medium stiff, slightly moist, brown	CL					
1	GRAVEL, COBBLES, CLAY, sandy, dense, slightly moist, tan	GC/CL			Hand drive		Some caliche material from 1 foot to 3 feet
3	GRAVEL, COBBLES, sandy, slightly clayey, very dense, moist, light brown	GP-GC					
4	Bottom of test boring at 4.5 feet						
5							
6							

TRAUTNER GEOTECH LLC

Field Engineer	: J. Butler
Drilling Method	: Backhoe Pit
Sampling Method	: Bag Sample
Date Drilled	: 1/14/2019
Total Depth	: 4.5 feet
Location	: See Figure

LOG OF BORING TH-2

Hotchkiss Barrow Mesa Shop Structure
Hotchkiss, CO
Ms. Joanne Fagan, P.E.
Town of Hotchkiss Engineer

PN: 55531GE

Sample Type
- Mod. California Sampler
- Bag Sample
- Standard Split Spoon

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0	CLAY, sandy, medium stiff, slightly moist, brown	CL					
1	GRAVEL, COBBLES, CLAY, sandy, dense, slightly moist, tan	GC					Caliche material at 14 inches
3	GRAVEL, COBBLES, sandy, slightly clayey, very dense, slightly moist, light brown	GP-GC					
4	Bottom of test boring at 4.5 feet						
5							
6							

TRAUTNER GEOTECH LLC

Field Engineer	: J. Butler
Drilling Method	: Backhoe Pit
Sampling Method	: Bag Sample
Date Drilled	: 1/14/2019
Total Depth	: 5 feet
Location	: See Figure

LOG OF BORING TH-3

Hotchkiss Barrow Mesa Shop Structure
Hotchkiss, CO
Ms. Joanne Fagan, P.E.
Town of Hotchkiss Engineer

PN: 55531GE

Sample Type
- Mod. California Sampler
- Bag Sample
- Standard Split Spoon

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0	CLAY, sandy, organics, medium stiff, moist, brown	CL					
1	GRAVEL, SAND, cobbles, clayey, dense, slightly moist, tan	GC					Some white chemical deposits from 1 foot to 5 feet
2							
3							
4							
5	Bottom of test boring at 5 feet						
6							

TRAUTNER GEOTECH LLC

Field Engineer	: J. Butler
Drilling Method	: Backhoe Pit
Sampling Method	: Bag Sample
Date Drilled	: 1/14/2019
Total Depth	: 4 feet
Location	: See Figure

LOG OF BORING TH-4

Hotchkiss Barrow Mesa Shop Structure
Hotchkiss, CO
Ms. Joanne Fagan, P.E.
Town of Hotchkiss Engineer

PN: 55531GE

Sample Type
- Mod. California Sampler
- Bag Sample
- Standard Split Spoon

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0	CLAY, sandy, organics, medium stiff, moist, brown	CL					
1	CLAY, sandy, chemical deposits, stiff, slightly moist, tan	CL					
2	GRAVEL, CLAY, sandy, cobbles, dense, slightly moist, tan	GC					
3	GRAVEL, COBBLES, sandy, slightly clayey, very dense, slightly moist, light brown	GP-GC					
4	Bottom of test boring at 4 feet						
5							
6							

TRAUTNER GEOTECH LLC

Field Engineer	: J. Butler
Hole Diameter	: 3.25 inch I.D. Hollow Stem
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 6/27/2017
Total Depth (approx.)	: 25 feet
Location	: See Figure One

LOG OF BORING TB-1

Town of Hotchkiss Water Tank
Hotchkiss, Colorado
Ms. Joanne Fagan, P.E.
Town of Hotchkiss Engineering

Project Number: 54812GE

Sample Type
- Mod. California Sampler
- Bag Sample
- Standard Split Spoon

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0–3	CLAY, sandy, few gravels, stiff, slightly moist, brown	CL					
3–5	CLAY, GRAVEL, sandy, white chemical deposits at three (3) to five (5) feet, stiff/dense, slightly moist, tan to white	CL/GC			14/6 35/6		
5–12	GRAVEL, COBBLES, sandy, clayey, very dense, moist, brown to tan	GC-GP			9/6 11/6 33/6		
12–18	GRAVEL, COBBLES, sandy, clayey, very dense, wet, brown	GC-GP			7/6 13/6 14/6	▽	Water level at eleven and seventy-five hundredths (11.75) feet after drilling
18–25	FORMATIONAL MATERIAL at eighteen (18) feet, Claystone, very hard, wet to nineteen (19) feet then moist, tan, Mancos Shale Formation	FX			50/6 19/6 50/4		
25	Bottom of test boring at twenty-five (25) feet						

TRAUTNER GEOTECH LLC

Field Engineer	: J. Butler
Hole Diameter	: 3.25 inch I.D. Hollow Stem
Drilling Method	: Continuous Flight Auger
Sampling Method	: Standard Split Spoon
Date Drilled	: 6/27/2017
Total Depth (approx.)	: 20 feet
Location	: See Figure One

LOG OF BORING TB-2

Town of Hotchkiss Water Tank
Hotchkiss, Colorado
Ms. Joanne Fagan, P.E.
Town of Hotchkiss Engineering

Project Number: 54812GE

Sample Type
- Mod. California Sampler
- Bag Sample
- Standard Split Spoon

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0–2	CLAY, sandy, stiff, slightly moist, brown	CL					
2–11	GRAVEL, COBBLES, clayey, sandy, white chemical deposits at two (2) feet, very dense, slightly moist, tan to white	GC-GP			17/6 18/6 28/6 27/6 24/6 10/0 bounce		
11–16	GRAVEL, COBBLES, clayey, sandy, very dense, wet, tan	GC-GP			15/6 15/6 11/6	▽	Water level at eleven and eight tenths (11.8) feet after drilling
16–20	FORMATIONAL MATERIAL at sixteen (16) feet, Claystone, hard to very hard, wet in upper one (1) to two (2) feet, Mancos Shale Formation	FX			24/6 50/5		
20–25	Bottom of test boring at twenty (20) feet						

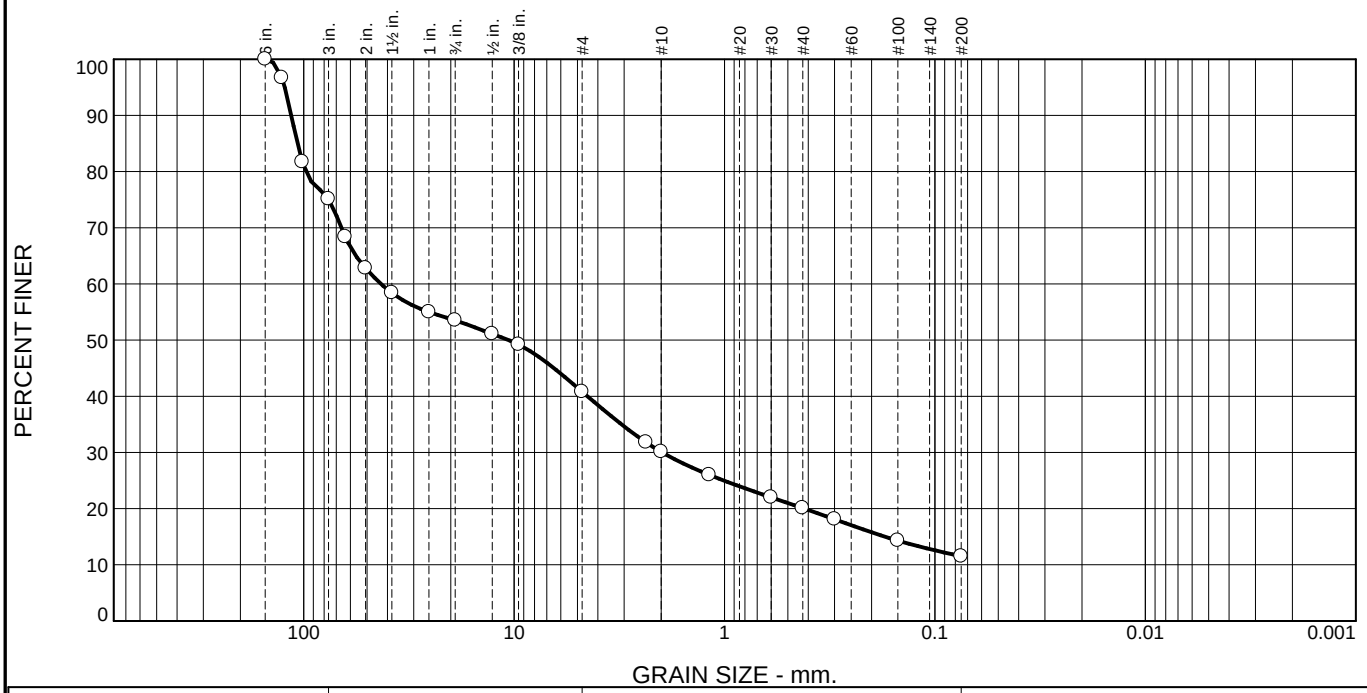
APPENDIX B

Laboratory Test Result

Atterberg Limits and Sieve Analyses
Swell-Consolidation Tests

TRAUTNER GEOTECH LLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
24.9	21.6	12.7	10.7	10.0	8.6	11.5	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
6	100.0		
5	96.7		
4	81.7		
3	75.1		
2.5	68.4		
2	62.8		
1.5	58.4		
1	55.0		
.75	53.5		
.50	51.1		
.375	49.2		
#4	40.8		
#8	31.8		
#10	30.1		
#16	26.0		
#30	22.0		
#40	20.1		
#50	18.1		
#100	14.3		
#200	11.5		

* (no specification provided)

Material Description

GM Silty gravel with sand

Atterberg Limits (ASTM D 4318)

PL= 33 **LL=** 44 **PI=** 11

Classification

USCS (D 2487)= GM **AASHTO (M 145)=** A-2-7(0)

Coefficients

D_{90}= 114.5745 D_{85}= 107.1174 D_{60}= 42.9250
D_{50}= 10.6207 D_{30}= 1.9791 D_{15}= 0.1727
D_{10}= C_u= C_c=

Remarks

Date Received: 1/15/19 **Date Tested:** 1/23/19

Tested By: R. Barrett

Checked By: J. Butler

Title: P.E.

Location: TH-1
Sample Number: C10213-A **Depth:** 2'-3'

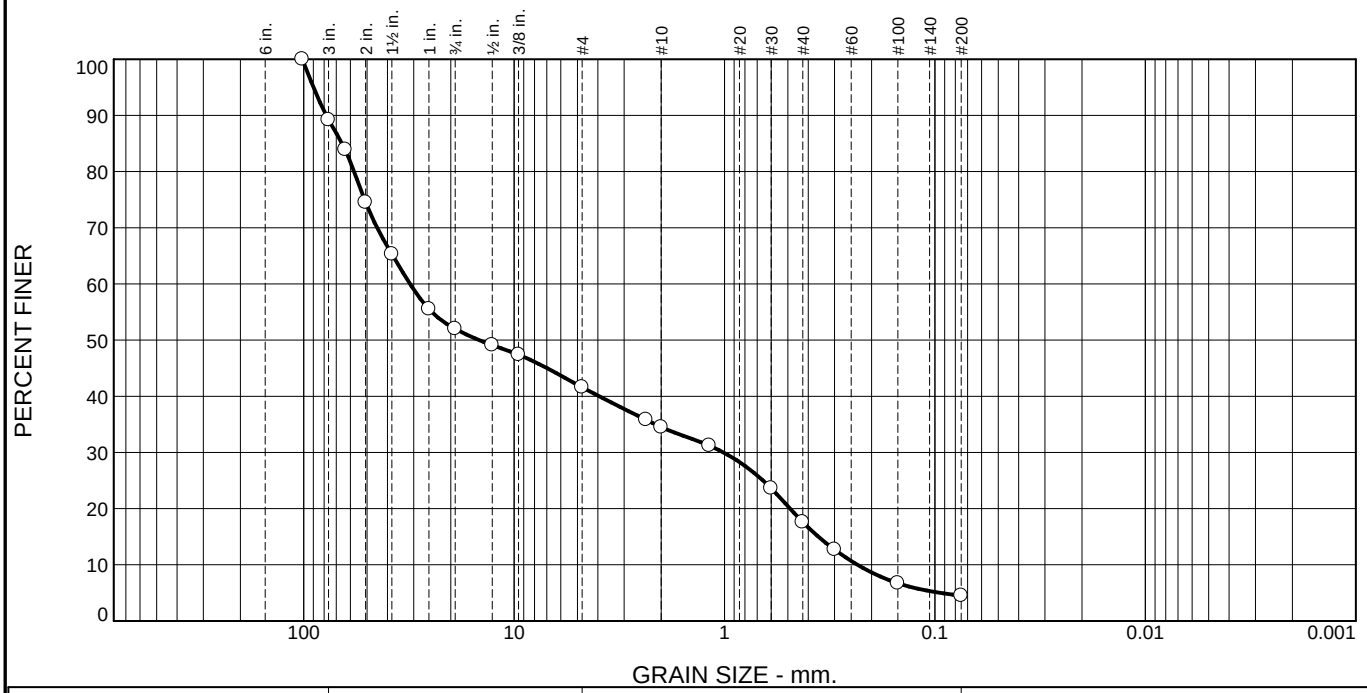
Date Sampled: 1/14/19

TRAUTNER GEOTECH LLC

Client: Ms. Joanne Fagan, P.E., Town of Hotchkiss Engineer
Project: Hotchkiss Barrow Mesa Shop Structure, Hotchkiss, CO

Project No: 55531GE **Figure** 4.1

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
10.8	37.2	10.4	7.1	16.9	13.1	4.5	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
4	100.0		
3	89.2		
2.5	83.9		
2	74.5		
1.5	65.3		
1	55.5		
.75	52.0		
.50	49.1		
.375	47.4		
#4	41.6		
#8	35.8		
#10	34.5		
#16	31.2		
#30	23.6		
#40	17.6		
#50	12.7		
#100	6.7		
#200	4.5		

* (no specification provided)

Material Description

GP-GM Poorly graded gravel with silt and sand

Atterberg Limits (ASTM D 4318)

PL= 0 **LL=** 0 **PI=** 0

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 78.2066 D_{85}= 65.6535 D_{60}= 31.2540
D_{50}= 14.6674 D_{30}= 1.0124 D_{15}= 0.3583
D_{10}= 0.2335 C_u= 133.84 C_c= 0.14

Remarks

Date Received: 1/15/19 **Date Tested:** 1/23/19

Tested By: R. Barrett

Checked By: J. Butler

Title: P.E.

Location: TH-1
Sample Number: C10213-B **Depth:** 3'-4'

Date Sampled: 1/14/19

TRAUTNER GEOTECH LLC

Client: Ms. Joanne Fagan, P.E., Town of Hotchkiss Engineer
Project: Hotchkiss Barrow Mesa Shop Structure, Hotchkiss, CO

Project No: 55531GE **Figure** 4.2

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.0	8.8	14.3	20.4	48.5	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75	100.0		
.50	99.2		
.375	97.4		
#4	92.0		
#8	85.0		
#10	83.2		
#16	78.7		
#30	72.6		
#40	68.9		
#50	64.8		
#100	55.8		
#200	48.5		

* (no specification provided)

Material Description

SM Silty sand

Atterberg Limits (ASTM D 4318)

PL= 27 **LL=** 40 **PI=** 13

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-6(4)

Coefficients

D_{90}= 3.8112 D_{85}= 2.3597 D_{60}= 0.2086
D_{50}= 0.0875 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 1/15/19 **Date Tested:** 1/23/19

Tested By: R. Barrett

Checked By: J. Butler

Title: P.E.

Location: TH-2
Sample Number: C10213-E **Depth:** 0'-1'

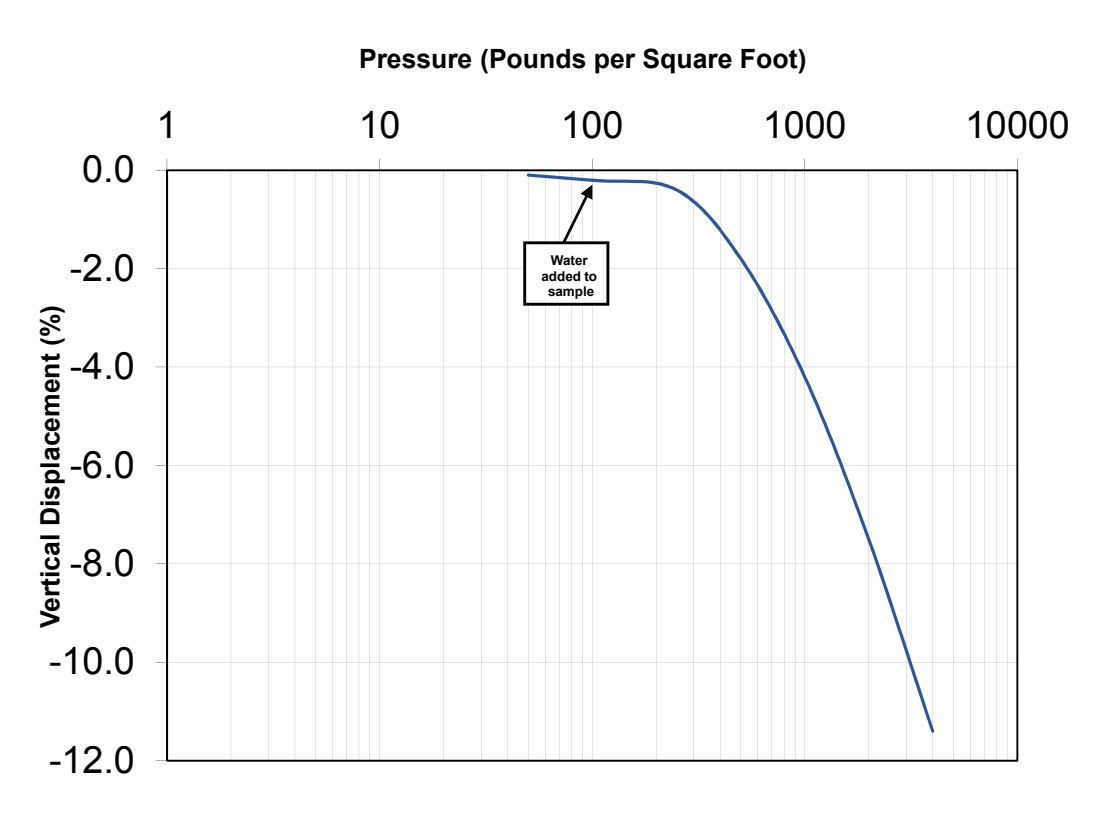
Date Sampled: 1/14/19

TRAUTNER GEOTECH LLC

Client: Ms. Joanne Fagan, P.E., Town of Hotchkiss Engineer
Project: Hotchkiss Barrow Mesa Shop Structure, Hotchkiss, CO

Project No: 55531GE **Figure** 4.3

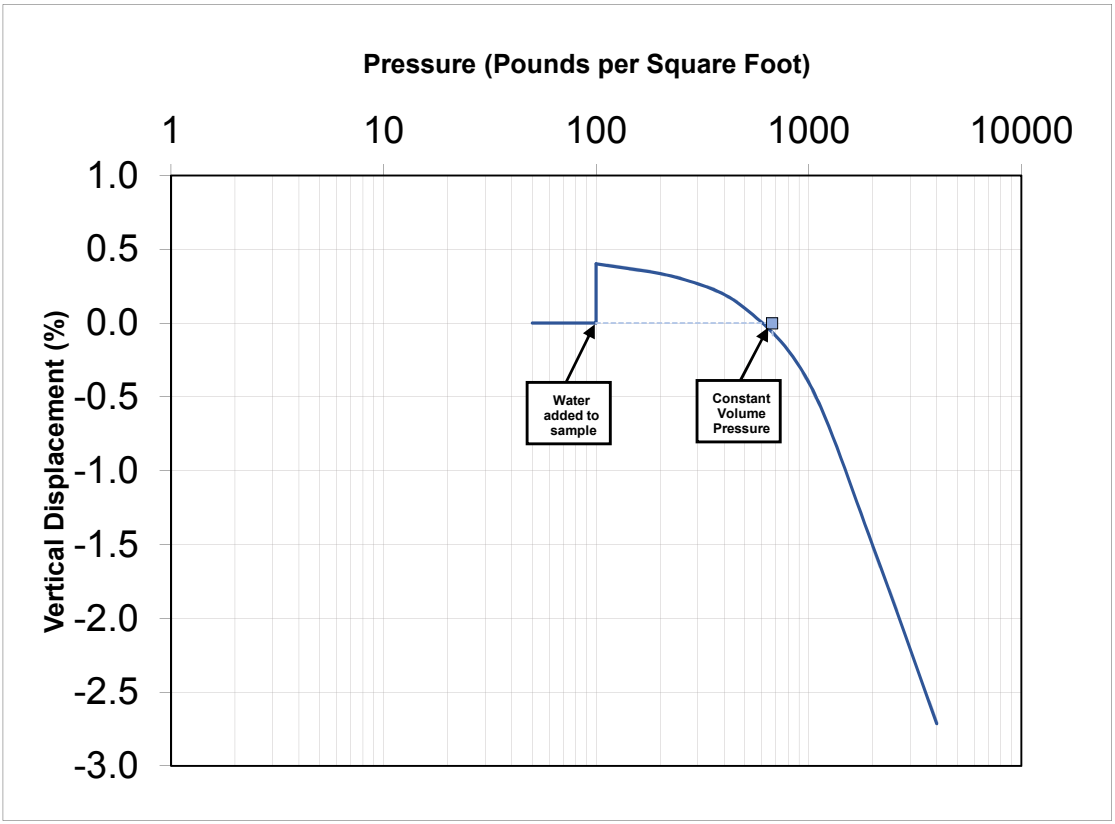
SWELL - CONSOLIDATION TEST



SUMMARY OF TEST RESULTS		
Sample Source:	TH-1@1'	
Visual Soil Description:	SC Clayey Sand	
Swell Potential (%)	0.0%	
Constant Voume Swell Pressure (lb/ft^2):	350	
	Initial	**Final**
Moisture Content (%):	12.2	28.5
Dry Density (lb/ft^3):	84.9	95.3
Height (in.):	1.000	0.886
Diameter (in.):	1.94	1.94

Project Number:	55531GE
Sample ID:	C10213-C
Figure:	4.4

SWELL - CONSOLIDATION TEST

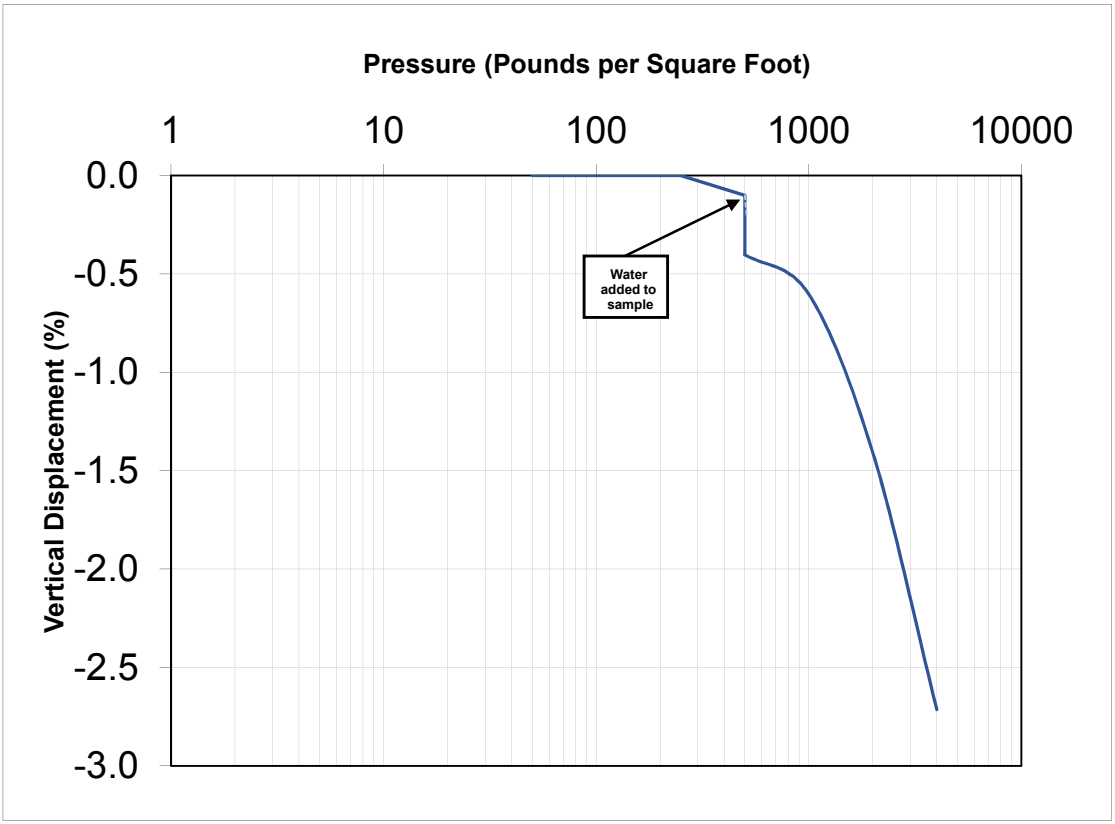


SUMMARY OF TEST RESULTS		
Sample Source:	TH-2@18"-30"	
Visual Soil Description:	CL Sandy lean clay	
Swell Potential (%)	0.4%	
Constant Voume Swell Pressure (lb/ft^2):	670	
	Initial	**Final**
Moisture Content (%):	8.9	28.9
Dry Density (lb/ft^3):	92.4	94.2
Height (in.):	0.995	0.968
Diameter (in.):	1.94	1.94

Note: Remolded Sample; Molded from the portion of sample passing a #10 sieve. Consolidated under 500 PSF prior to initiating load sequence and wetting. Initial values represent the conditions under 50 PSF following the pre-consolidation under 500 PSF.

Project Number:	55531GE
Sample ID:	C10213-F
Figure:	4.5

SWELL - CONSOLIDATION TEST

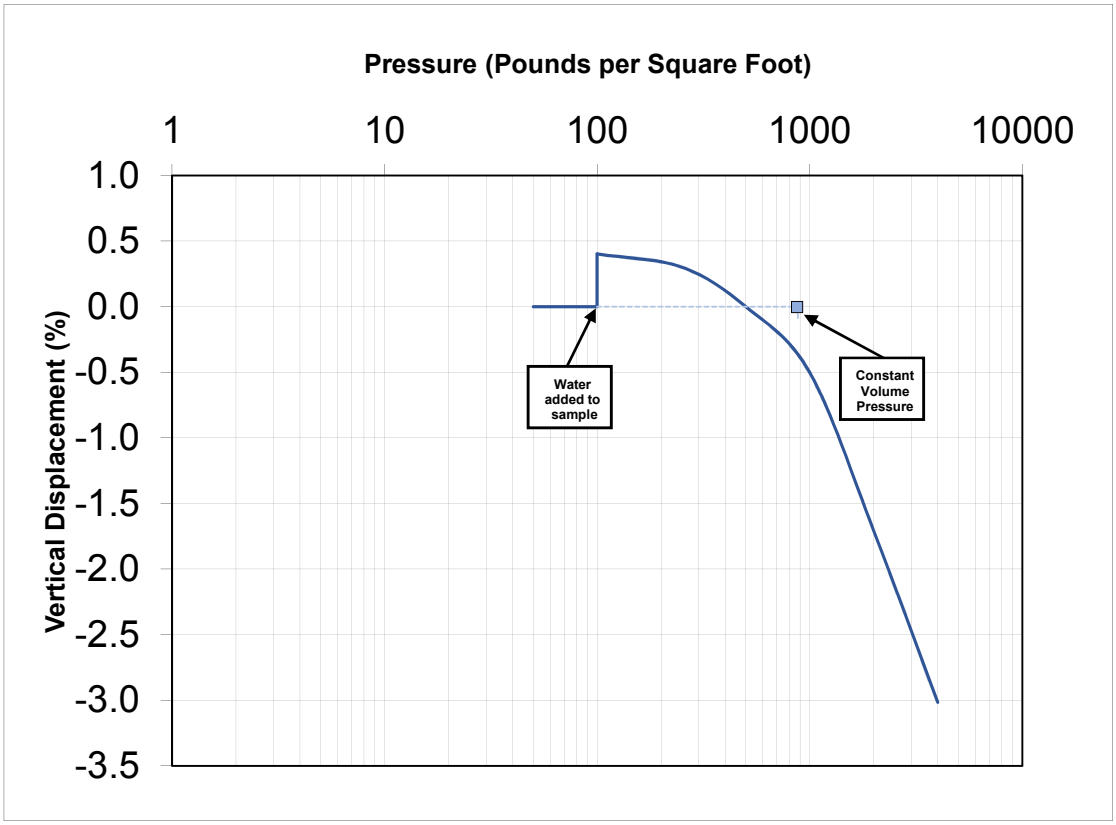


SUMMARY OF TEST RESULTS		
Sample Source:	TH-2@3'-4'	
Visual Soil Description:	SP Sand	
Swell Potential (%)	Consolidated	
Constant Voume Swell Pressure (lb/ft^2):	N/A	
	Initial	**Final**
Moisture Content (%):	6.5	21.5
Dry Density (lb/ft^3):	104.9	107.1
Height (in.):	0.995	0.968
Diameter (in.):	1.94	1.94

Note: Remolded Sample; Molded from the portion of sample passing a #10 sieve. Consolidated under 500 PSF prior to initiating load sequence and wetting. Initial values represent the conditions under 50 PSF following the pre-consolidation under 500 PSF.

Project Number:	55531GE
Sample ID:	C10213-G
Figure:	4.6

SWELL - CONSOLIDATION TEST

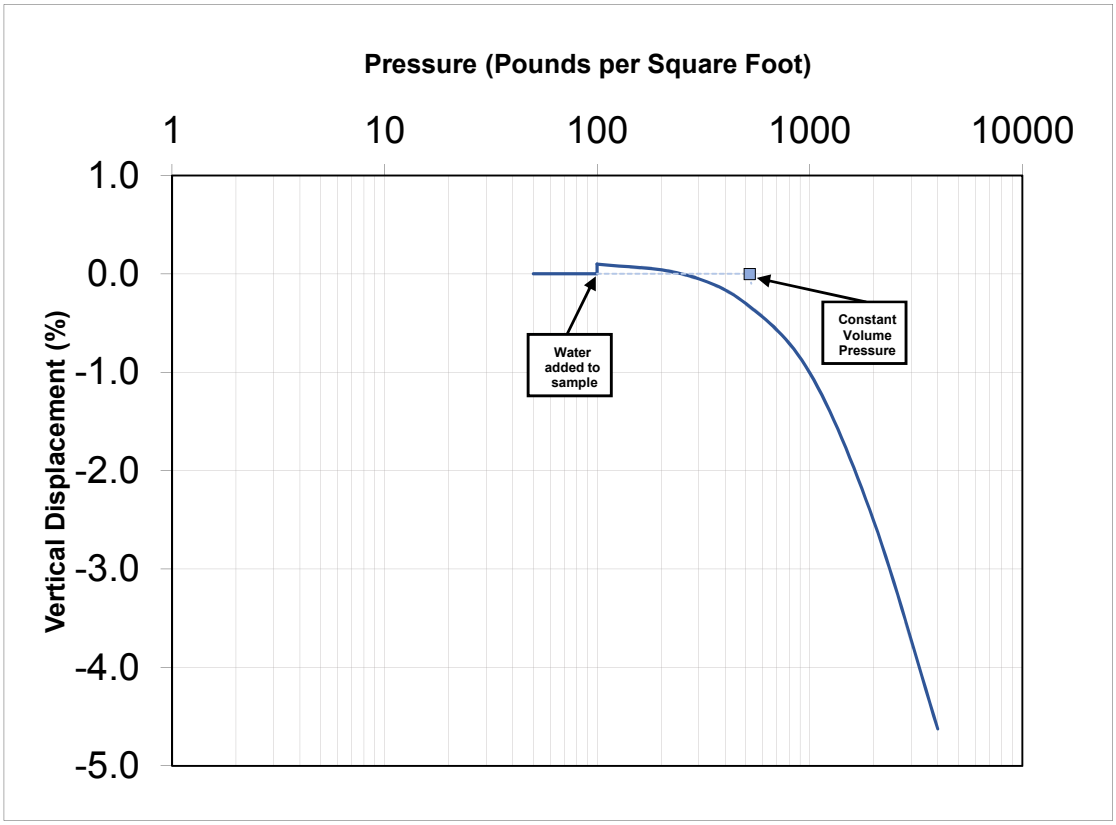


SUMMARY OF TEST RESULTS		
Sample Source:	TH-3@18"-30"	
Visual Soil Description:	SC Clayey Sand	
Swell Potential (%)	0.4%	
Constant Voume Swell Pressure (lb/ft^2):	870	
	Initial	**Final**
Moisture Content (%):	12.9	34.0
Dry Density (lb/ft^3):	85.9	88.1
Height (in.):	0.995	0.965
Diameter (in.):	1.94	1.94

Note: Remolded Sample; Molded from the portion of sample passing a #10 sieve. Consolidated under 500 PSF prior to initiating load sequence and wetting. Initial values represent the conditions under 50 PSF following the pre-consolidation under 500 PSF.

Project Number:	55531GE
Sample ID:	C10213-I
Figure:	4.7

SWELL - CONSOLIDATION TEST

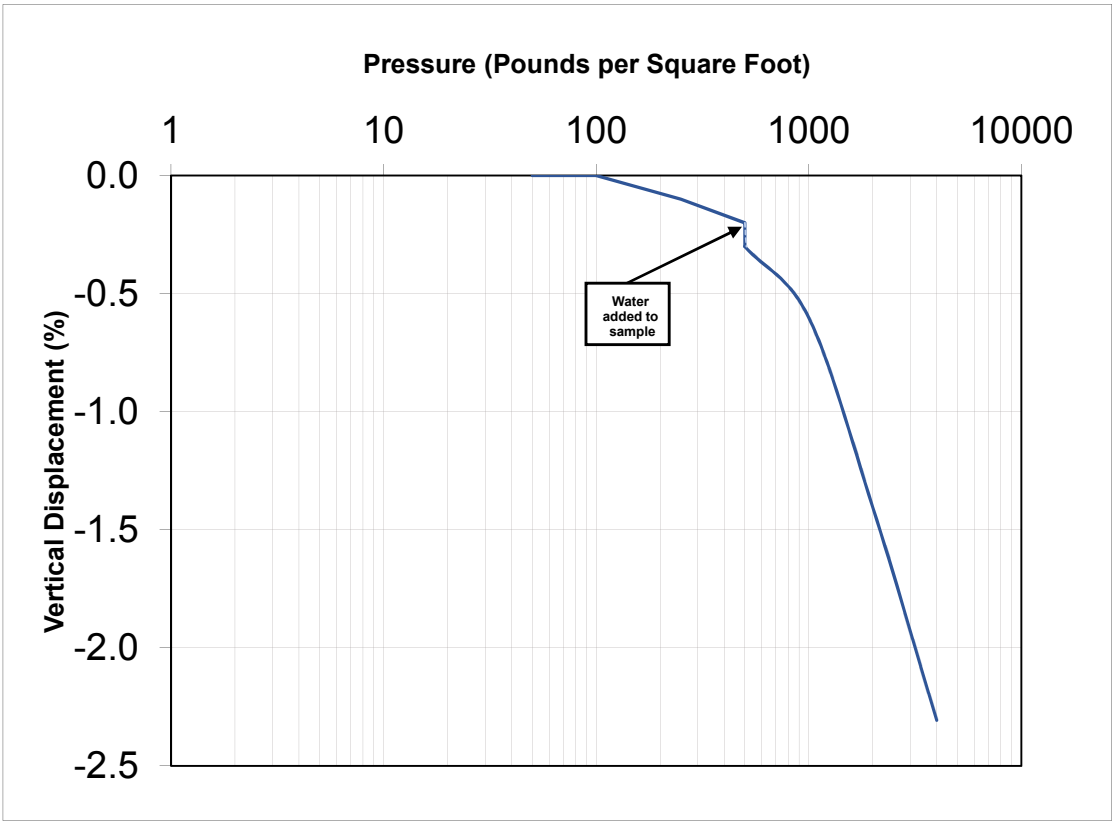


SUMMARY OF TEST RESULTS		
Sample Source:	TH-4@18"-30"	
Visual Soil Description:	CL-ML Silty Clay	
Swell Potential (%)	0.1%	
Constant Voume Swell Pressure (lb/ft^2):	520	
	Initial	**Final**
Moisture Content (%):	13.3	39.0
Dry Density (lb/ft^3):	77.4	80.6
Height (in.):	0.995	0.949
Diameter (in.):	1.94	1.94

Note: Remolded Sample; Molded from the portion of sample passing a #10 sieve. Consolidated under 500 PSF prior to initiating load sequence and wetting. Initial values represent the conditions under 50 PSF following the pre-consolidation under 500 PSF.

Project Number:	55531GE
Sample ID:	C10213-K
Figure:	4.8

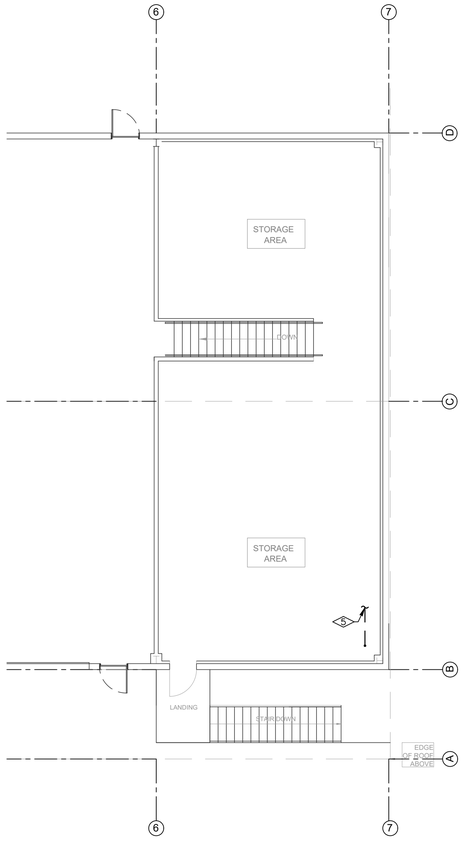
SWELL - CONSOLIDATION TEST

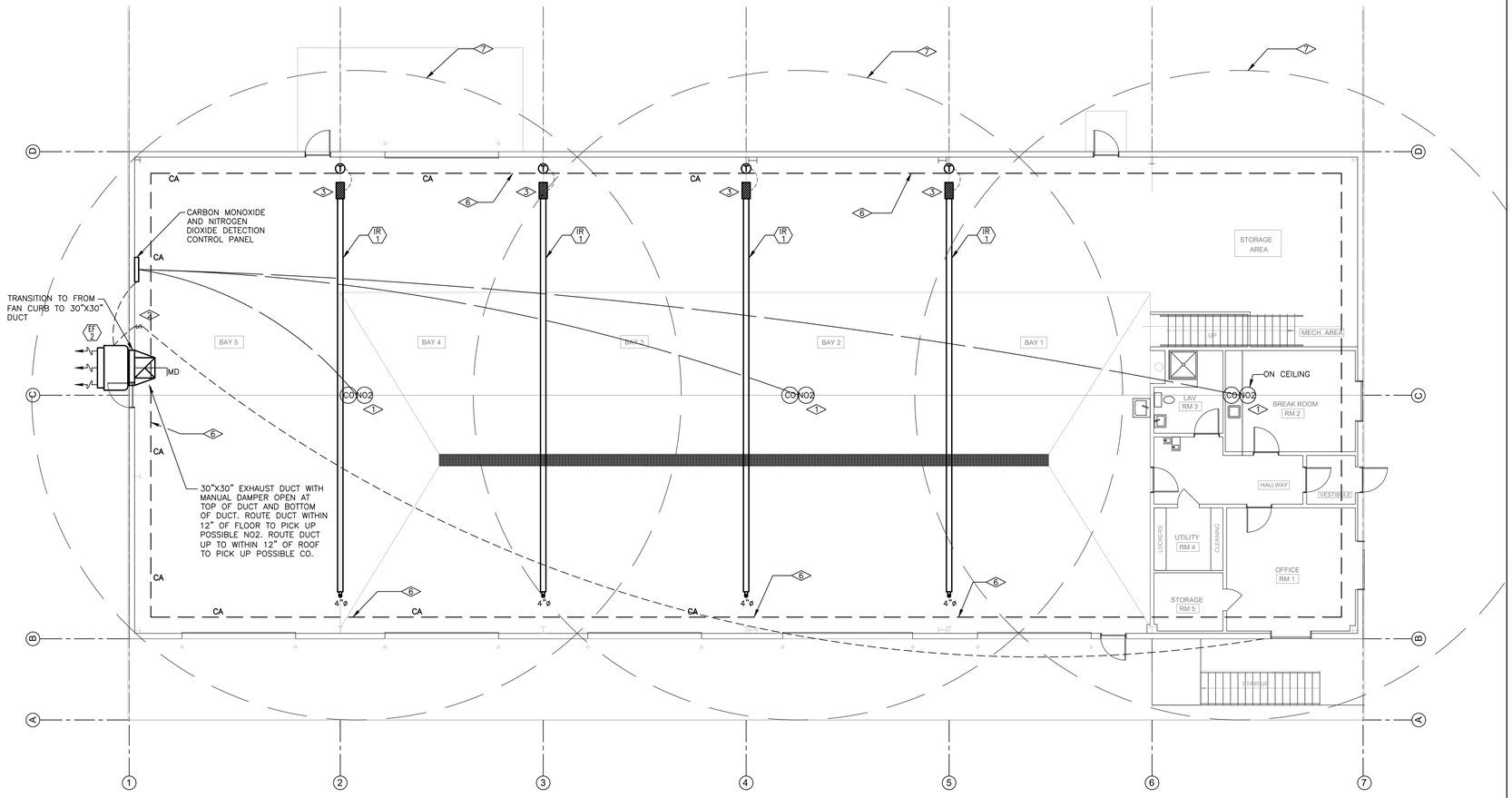


SUMMARY OF TEST RESULTS		
Sample Source:	TH-4@36"-48"	
Visual Soil Description:	SC Clayey Sand	
Swell Potential (%)	Consolidated	
Constant Voume Swell Pressure (lb/ft^2):	N/A	
	Initial	**Final**
Moisture Content (%):	7.4	23.2
Dry Density (lb/ft^3):	103.0	104.3
Height (in.):	0.997	0.974
Diameter (in.):	1.94	1.94

Note: Remolded Sample; Molded from the portion of sample passing a #10 sieve. Consolidated under 500 PSF prior to initiating load sequence and wetting. Initial values represent the conditions under 50 PSF following the pre-consolidation under 500 PSF.

Project Number:	55531GE
Sample ID:	C10213-L
Figure:	4.9





MECHANICAL - MEZZANINE FLOOR PLAN

SCALE: 1/8"=1'-0"

NORTH

MECHANICAL - SHOP FLOOR PLAN

SCALE: 1/8"=1'-0"

NORTH

MECHANICAL GENERAL NOTES:

1. DRAWING IS DIAGRAMMATIC IN NATURE. LOCATIONS AND SIZES MAY VARY DURING FIELD COORDINATION & INSTALLATION OF MECHANICAL, PLUMBING, & ELECTRICAL. DRAWINGS DO NOT NECESSARILY INDICATE EVERY REQUIRED OFFSET, FITTING, ETC. DRAWINGS ARE NOT TO BE SCALED FOR DIMENSIONS. TAKE ALL DIMENSIONS FROM ARCHITECTURAL DRAWINGS, CERTIFIED EQUIPMENT DRAWINGS AND FROM THE STRUCTURE ITSELF BEFORE FABRICATING ANY WORK. VERIFY ALL SPACE REQUIREMENTS COORDINATING WITH OTHER TRADES, AND INSTALL THE SYSTEMS IN THE SPACE PROVIDED WITHOUT EXTRA CHARGES TO THE OWNER.

2. ALL REFRIGERANT LINES ARE TO BE LIMITED TO 75' EQUIVALENT LINE LENGTH. ALL REFRIGERANT LINES SHALL BE INSULATED PER IECC REQUIREMENTS. ALL REFRIGERANT LINES SHALL BE SIZED PER MANUFACTURER'S RECOMMENDATION.

3. INDOOR HEAT PUMPS SHALL BE PROVIDED WITH AUXILLARY CONDENSATE PUMP, 240V/1PH/60HZ "ASPEN-PUMP". CONDENSATE SHALL BE ROUTED THROUGH 3/4"ø TYPE L COPPER TO NEAREST PLUMBING FIXTURE GROUP. DISCHARGE INDIRECTLY THROUGH AIR GAP SIZED PER IPC.

FLAG NOTES:

1. MACURCO CM-6, TX-6-ND CARBON MONOXIDE & NITROGEN DIOXIDE SENSORS. SENSORS TO BE INTERLOCKED WITH EF-2 AND LR-1. EXHAUST FANS SHALL TURN ON AT DETECTION OF 10PPM FOR CO & 50 PPB FOR NO2. ALARMS SHALL BE TRIGGERED AT DETECTION OF 25 PPM FOR CO & 100 PPB FOR NO2. LOUVERS TO OPEN UPON ACTIVATION OF EXHAUST FAN. LOUVERS ARE TO FAIL OPEN. INSTALL CO & NO2 DETECTORS PER MANUFACTURER'S INSTRUCTIONS, EACH SENSOR COVERS A CIRCULAR AREA OF APPROXIMATELY 5,000 SQF. RADIUS OF 39'. INSTALL PER MANUFACTURERS REQUIREMENTS.

2. EF-2 TO BE INTERLOCKED WITH VARIABLE SPEED WALL MOUNTED SWITCH.

3. INFRARED HEATER, MAINTAIN MANUFACTURER'S REQUIRED CLEARANCES FROM ALL COMBUSTIBLES. INSTALL INFRARED HEATER PER MANUFACTURER'S RECOMMENDATIONS.

4. ROUTE COMPRESSED AIR TO MEZZANINE

5. COMPRESSED AIR FROM LOOP BELOW. PROVIDED WITH QUICK CONNECT FITTING.

6. COMPRESSED AIR DROP.

7. CIRCLE TO SHOW THE EFFECTIVE RANGE OF CO AND NO2 SENSORS.

Bighorn Consulting Engineers, Inc.
Mechanical & Electrical Engineers
386 Indian Road
Grand Junction, CO 81501
Phone: 970-241-8709

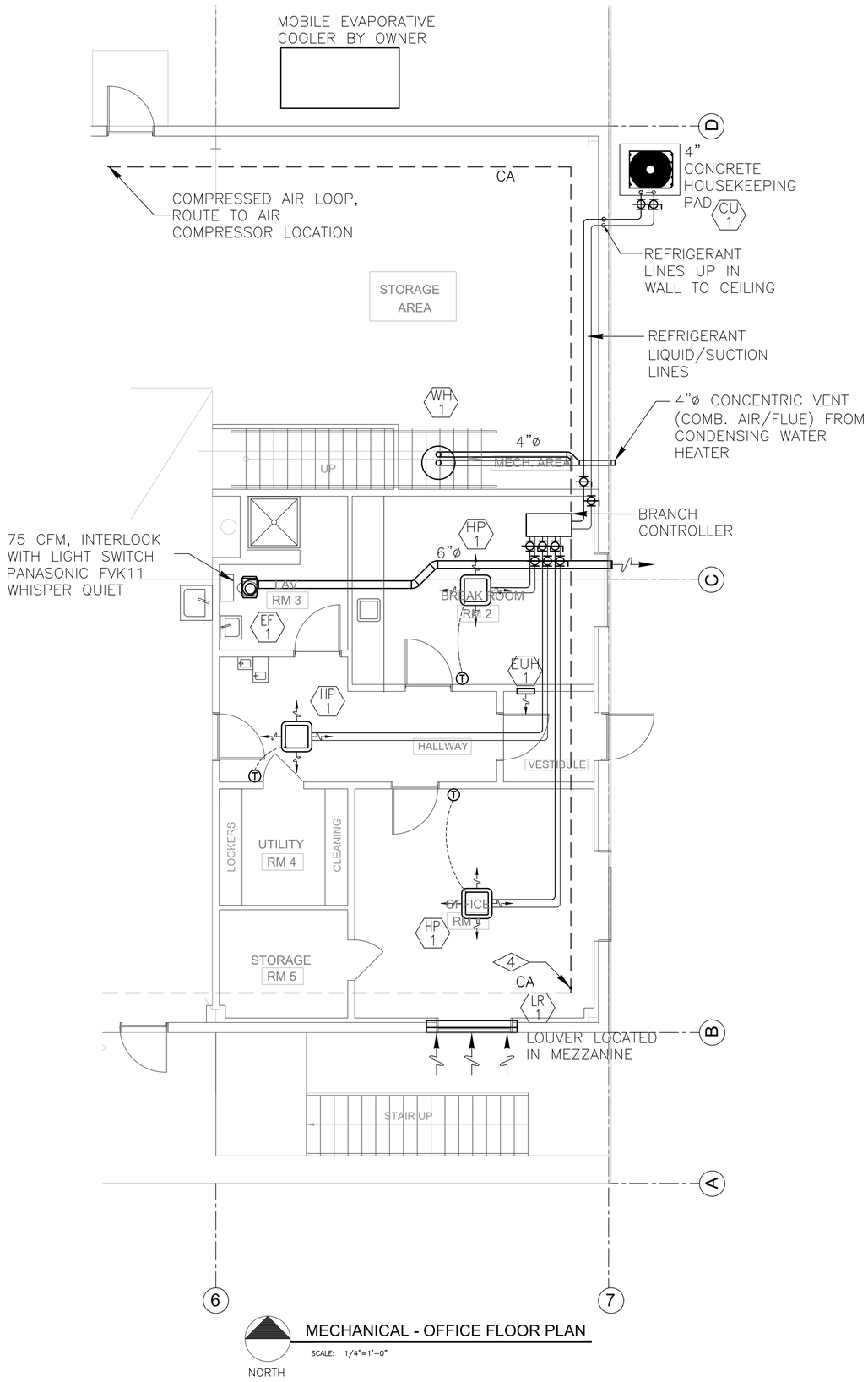
TOWN OF HOTCHKISS
PUBLIC WORKS FACILITY

TBD BARROW MESA RD
HOTCHKISS, COLORADO

DATE:	ISSUED FOR:
03/21/19	REVISED 50% DD

DATE:	03/21/19
JOB NO:	18-159
DRAWN BY:	BCE
CHECKED BY:	BCE
SCALE:	AS SHOWN
SHEET NUMBER:	M1-1

March 25, 2019 - 3:18:10pm



MECHANICAL - OFFICE FLOOR PLAN

SCALE: 1/4"=1'-0"

Bighorn Consulting Engineers, Inc.
Mechanical & Electrical Engineers
386 Indian Road
Grand Junction, CO 81501
Phone: 970-241-8709

TOWN OF HOTCHKISS
PUBLIC WORKS FACILITY

TBD BARROW MESA RD
HOTCHKISS, COLORADO

DATE:	ISSUED FOR:
03/21/19	REVISED 50% DD

DATE:	03/21/19
JOB NO:	18-159
DRAWN BY:	BCE
CHECKED BY:	BCE
SCALE:	AS SHOWN
SHEET NUMBER:	M1-2

March 25, 2019 - 3:18:10pm

MECHANICAL PROVISIONS

1. SCOPE OF WORK

A. THE CONTRACTOR IS RESPONSIBLE FOR ALL WORK, MATERIALS, AND LABOR TO SATISFY A COMPLETE WORKING SYSTEM WHETHER SPECIFIED OR IMPLIED.
B. ALL WORK IS TO BE PERFORMED IN STRICT COMPLIANCE WITH ALL LOCAL CODES AND ALL OTHER REGULATION GOVERNING WORK OF THIS NATURE.
C. THE CONTRACTOR SHALL, BEFORE SUBMITTING ANY PROPOSAL, EXAMINE THE PROPOSED SITE AND SHALL DETERMINE FOR HIMSELF THE CONDITIONS THAT MAY EFFECT THE WORK. NO ALLOWANCE SHALL BE MADE IF THE CONTRACTOR FAILS TO MAKE SUCH EXAMINATIONS.
D. ALL EQUIPMENT AND MATERIALS SHALL BE AS SPECIFIED OR "APPROVED EQUAL" BY THE ENGINEER OR ARCHITECT.

2. PERMITS

A. THE CONTRACTOR SHALL SECURE ALL PERMITS OR APPLICATIONS AND PAY ANY AND ALL FEES.

3. SHOP DRAWINGS

A. SUBMIT MATERIAL LIST AND SHOP DRAWINGS FOR MAJOR EQUIPMENT TO THE ACHITECT/ENGINEER FOR APPROVAL. THE CONTRACTOR SHALL SUBMIT FIVE SETS OF SHOP DRAWINGS AND THEY SHALL BE CLEARLY LABELED.

4. FLEXIBLE DUCT WORK

A. FLEXIBLE TYPE DUCT SHALL BE OF TWO ELEMENT SPIRAL CONSTRUCTION COMPOSED OF A CORROSION RESISTANT METAL SUPPORTING SPIRAL AND COATED FABRIC WITH A MINERIAL BASE. FLEXIBLE DUCT CONNECTORS SHALL BE LISTED BY U.L., CLASS 1 DUCTS, AND SHALL HAVE A FLAME SPREAD RATING NOT EXCEEDING 25 AND A SMOKE DEVELOPED RATING NOT EXCEEDING 50.
B. USE OF FLEXIBLE DUCTWORK SHALL BE LIMITED TO NO MORE THAN 6 LINEAR FEET PER RUN.
C. CONTRACTOR SHALL BE CAREFUL SO AS NOT TO KINK OR COLLAPSE FLEXIBLE DUCT.

5. REFRIGERENT

A. PIPING CONTRACTOR SHALL PROVIDE AND INSTALL REFRIGERANT PIPING IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND IN SUCH A WAY AS TO BE INCONSPICIOUS AND FREE FROM ANY POSSIBLE CONDENSATION.
B. INSULATE REFRIGERANT LINES WITH ARMOUR-FLEX TYPE INSULATION, SHALL BE TYPE "K" COPPER TUBING, WITH WROUGHT COPPER SOLDER TYPE FITTINGS SUITABLE FOR CONNECTION WITH SILVER SOLDER.

6. DUCTWORK

A. THE DUCTWORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE "SMACNA" APPLICABLE MANUALS.
B. ALL DUCTWORK SHALL BE THE LOW VELOCITY TYPE, UNLESS SPECIFIED OTHERWISE.
C. CONTRACTOR SHALL PROVIDE AND INSTALL APPROVED FIRE DAMPERS AND ACCESS PANELS IN ANY AND ALL DUCTWORK WHICH PENETRATES A HORIZONTAL OR VERTICAL FIRE PARTITION, OR AS OTHERWISE SHOWN ON DRAWINGS.
D. ALL BRANCH DUCTS TO HAVE VOLUME DAMPERS, SMOOTH TURN RADIUS DUCTWORK OR TURNING VANES SHALL BE USED THROUGHOUT WHERE FLOW EXCEEDS 150 CFM.
E. ALL DUCT JOINTS TO BE SEALED IN ACCORDANCE WITH "SMACNA" STANDARDS AND ACCEPTED GOOD PRACTICE.
F. ALL DUCT DIMENSIONS SHOWN ARE NET INSIDE VALUES.DIMENSIONS MAY BE CHANGED SO LONG AS THE NET FREE FACE AREA IS MAINTAINED.
G. ALL CONCEALED DUCTWORK SHALL BE INSULATED WITH 1-1/2" FIBERGLASS INSULATING BLANKET WITH ALUMINUM FOIL FACING.
H. ALL SUPPLY AND RETURN DUCTWORK 15 FEET DOWNSTREAM OF THE HVAC UNIT SHALL BE INTERNALLY LINED WITH A 1/2" ACOUSTICAL DUCT LINER UNLESS OTHERWISE NOTED ON THE DRAWINGS.

7. DRAINAGE PIPING

A. (CONDENSATE) SHALL BE SCHEDULE 40 PVC OR TYPE L COPPER PER ASTM B306 PIPE WITH SOLVENT JOINTS.
PITCH HORIZONTAL LINES 1" IN 10'-0". CONDENSATE DRAINS SHALL BE ROUTED TO FLOOR DRAIN, ROOF DRAIN OR INDIRECT WASTE DRAIN.

8. HVAC CONTROLS

A. CONTRACTOR TO SUPPLY AND INSTALL ALL CONTROL WIRING AND THERMOSTATS AS REQUIRED.

9. ELECTRICAL

A. CONTRACTOR TO COORDINATE WITH ELECTRICAL CONTRACTOR FOR LOCATION OF WIRING FOR EACH HVAC UNIT.

10. PIPE SUPPORTS

A. ALL PIPE SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE IN A NEAT AND WORKMANLIKE MANNER. THE USE OF WIRE OR METAL STRAP TO SUPPORT PIPES WILL NOT BE PERMITTED. SPACING OF PIPE SUPPORTS SHALL NOT EXCEED 8 FEET FOR ALL PIPING. PLASTIC PIPING TO BE SUPPORTED EVERY 4 FEET.

11. GAS PIPING

A. PIPING SHALL BE SCHEDULE 40 BLACK STEEL PIPE WITH MALLEABLE IRON FITTINGS.
WHERE GAS PIPE CONNECTS TO EQUIPMENT, IT SHALL BE PROVIDED WITH A DRIP LEG THE FULL SIZE OF THE RUNOUT, A 100% SHUT-OFF VALVE AND A UNION. GAS PIPING CONTAINING PRESSURE GREATER THAN 9" W.G. SHALL BE SCHEDULE 40 BLACK STEEL PIPE WITH WELDED JOINTS.

12. MISCELLANEOUS

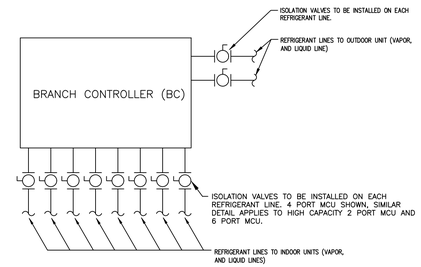
A. ALL EXTERIOR OPENINGS TO BE PROPERLY CAULKED AND SEALED WITH A SEALANT OF HIGH QUALITY AND LONG LIFE, TO PREVENT INFILTRATION OF OUTSIDE AIR INTO CONDITIONED SPACE.
COORDINATE INSTALLATION OF ALL ROOF FLASHING AT ROOF PENETRATION.
B. DO NOT SCALE THIS DRAWING FOR EXACT DIMENSIONS.
C. VERIFY ALL FIGURES, CONDITIONS, AND DIMENSIONS AT THE JOB SITE.
D. THE MECHANICAL PLANS ARE INTENDED TO BE DIAGRAMMATIC AND ARE BASED ON ONE MANUFACTURE'S EQUIPMENT. THEY ARE NOT INTENDED TO SHOW EVERY ITEM IN ITS EXACT LOCATION, THE EXACT DIMENSIONS, OR ALL THE DETAILS OF THE EQUIPMENT.
E. THE CONTRACTOR SHALL VERIFY THE ACTUAL DIMENSIONS OF THE EQUIPMENT PROPOSED TO ENSURE THAT THE EQUIPMENT WILL FIT IN THE AVAILABLE SPACE.

13. TESTING AND BALANCING

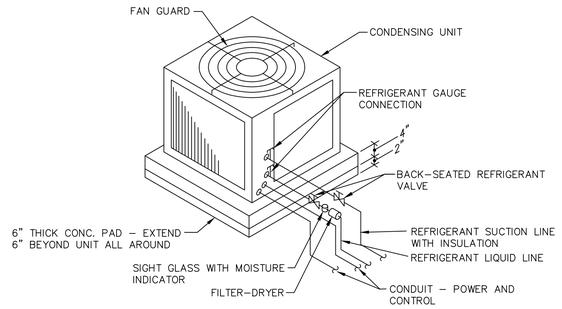
A. THE HVAC SYSTEM SHALL BE TESTED AND AND BALANCED BY AN INDEPENDENT AGENCY, UNDER THE SUPERVISION OF A LICENSED PROFESSIONAL ENGINEER. A SEALED TYPE WRITTEN REPORT SHALL BE SUBMITTED TO THE ARCHITECT/ENGINEER FOR REVIEW AND APPROVAL.

14. GUARANTEE

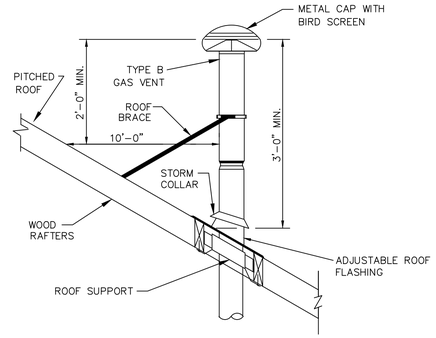
A. MATERIALS, EQUIPMENT AND INSTALLATION SHALL BE GUARANTEED FOR A PERIOD OF ONE(1) YEAR FROM DATE OF ACCEPTANCE. DEFECTS WHICH APPEAR DURING THAT PERIOD SHALL BE CORRECTED AT THIS CONTRACTOR'S EXPENSE.
B. FOR THE SAME PERIOD, THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO PREMISES CAUSED BY DEFECTS IN WORKMANSHIP OR IN THE WORK OR EQUIPMENT FURNISHED AND/OR INSTALLED BY HIM.



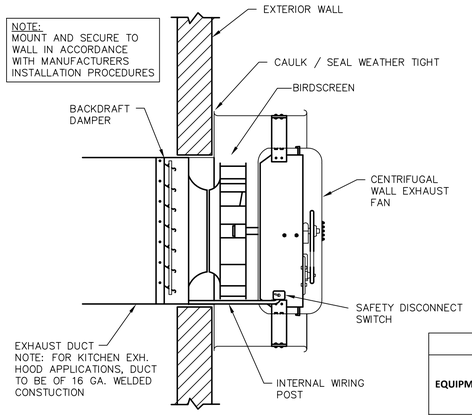
TYPICAL BRANCH CONTROLLER UNIT VALVE LAYOUT
NOT TO SCALE



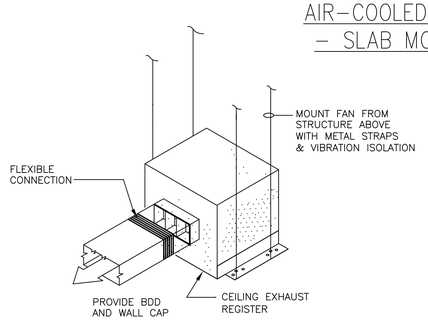
AIR-COOLED CONDENSING UNIT - SLAB MOUNTED AT GRADE
N.T.S.



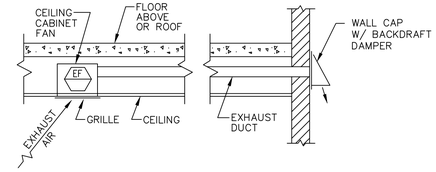
GAS VENT THROUGH PITCHED ROOF DETAIL
NOT TO SCALE



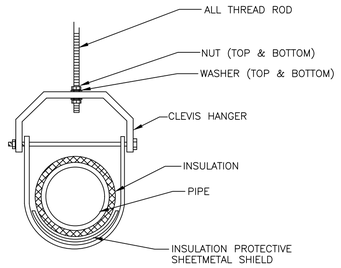
CENTRIFUGAL WALL EXHAUST FAN DETAIL
N.T.S.



CEILING EXHAUST FAN DETAIL
NOT TO SCALE



CEILING MOUNTED EXHAUST FAN DETAIL - SIDEWALL DISCHARGE
N.T.S.



TYPICAL CLEVIS HANGER DETAIL
NOT TO SCALE

RADIANT HEATER SCHEDULE

EQUIPMENT NO.	SERVICE	HEATING			IGNITION TYPE	TUBE LENGTH(FT)	TUBE DIAMETER	MIN. EFFICIENCY	ELECTRICAL		MANUFACTURER & MODEL	OPTIONS/ACCESSORIES
		FUEL TYPE	INPUT CAPACITY (MBH)	OUTPUT CAPACITY (MBH)					V./PH./HZ.	AMPS		
IR-1	BAY	NATURAL GAS	205	164	DIRECT SPARK	50	4"	78%	120/1/60	1.0	SUPERIOR RADIANT PRODUCTS, UXR-205	NOTE-1

NOTES:
1. PROVIDE WITH TERMINATION VENT KIT, POWER DISCONNECT, GAS SHUT-OFF VALVE, REFLECTORS, WALL MOUNTED INFRARED SENSOR/THERMOSTAT, HEAT TREATED ALUMINIZED STEEL HEAT EXCHANGER AND BURNER CONTROLS.

AIR CONDITIONING EQUIPMENT SCHEDULE

EQUIPMENT NO.	SERVICE	NOMINAL COOLING CAPACITY (BTU/HR.)	NOMINAL HEATING CAPACITY (BTU/HR.)	CFM	EER (EFFICIENCY)	REFRIGERANT PIPING		ELECTRICAL		MANUFACTURER & MODEL	OPTIONS/ACCESSORIES
						LIQUID	SUCTION	MCA (AMPS)	V./PH./HZ.		
HP-1	OFFICE	12,000	13,000	335	12	1/4	3/8	0.3	208-230/1/60	MITSUBISHI - SLZ-KF12NA	NOTE-1

NOTES:
1. PROVIDE WITH WALL MOUNTED 7-DAY PROGRAMMABLE THERMOSTAT, POWER DISCONNECT, CONDENSATE PUMP, OUTSIDE AIR SENSOR, GRILLE, DRAIN PAN LEVEL SENSOR, VIBRATION ISOLATION MOUNTING KIT.

AIR COOLED CONDENSING UNIT SCHEDULE

EQUIPMENT NO.	SERVICE	NOMINAL COOLING CAPACITY (BTUH)	NOMINAL HEATING CAPACITY (BTUH)	SEER	REFRIG. PIPING		ELECTRIC			MANUFACTURER & MODEL	OPTIONS/ACES SORIES
					LIQUID	VAPOR	V/PH/HZ	MOCP (A)	MCA (A)		
CU-1	OFFICE	48,000	54,000	19	3/8	5/8"	208-230/1/60	50	42	MITSUBISHI - MXZ-8C48NAHZ	NOTE-1

NOTES:
1. PROVIDE LINE SET AS RECOMMENDED BY MANUFACTURER, POWER DISCONNECT, CONCRETE HOUSEKEEPING PAD, HYPER-HEAT OPERATION, 18" TALL ANGLE IRON STAND, VIBRATION ISOLATION, 5 PORT BRANCH BOX. SEER = 18.9, EER = 12.0, HSPF = 11.

EXHAUST FAN SCHEDULE

EQUIPMENT NO.	SERVICE	LOCATION	CFM	EXTERNAL STATIC PRESS (IN. W.G.)	MOTOR				MANUFACTURER & MODEL	OPTIONS/ACCESSORIES
					WATTS	HP	RPM	VOLT/PH/HZ		
EF-1	RESTROOM	CEILING	75	0.25	10.00		814	115/1/60	PANASONIC FV-05-11VK1	NOTE - 1
EF-2	RESTROOM	SIDEWALL	9272	0.375	-	3/4	305	115/1/60	GREENHECK - CUBE-420	NOTE - 2

NOTES:
1. PROVIDE WITH POWER DISCONNECT, VIBRATION ISOLATION, GRAVITY BACKDRAFT DAMPER, INTERLOCK OPERATION WITH LIGHTSWITCH, EXHAUST TERMINATION WITH UL LISTED CAP.
2. PROVIDE WITH POWER DISCONNECT, HINGED CURB, BIRD SCREEN, ALUMINUM CONSTRUCTION, PERMATECTOR COATED, MECHANICAL BACKDRAFT DAMPER, MOTOR STARTER, VARIABLE SPEED BELT DRIVEN MOTOR. INTERLOCK OPERATION WITH WALL MOUNTED CO & NO2 MACURACO DETECTION CONTROL PANEL (FAN SHALL RAMP UP TO FULL SPEED AFTER RECIEVING SIGNAL FROM CONTROL PANEL). INTERLOCK OPERATION WITH WALL MOUNTED VARIABLE SPEED SWITCH.

LOUVER SCHEDULE

EQUIPMENT NO.	SERVICE	WIDTH (IN)	HEIGHT (IN)	THICKNESS OF LOUVER	MATERIAL	INSECT/BIRD SCREEN	MANUFACTURER & MODEL	OPTIONS/ACCESSORIES
LR-1	OUTSIDE/EXHAUST	72"	72"	4"	STEEL	1/2" BIRD	GREENHECK FDS-402	NOTE - 1, 2

NOTES:
1. DRAINABLE LOUVER, PROVIDE BIRDSCREEN AND KYNAR FINISH WITH COLOR TO BE SELECTED BY THE ARCHITECT.
2. PROVIDE LOW LEAKAGE MOTORIZED DAMPER IN SLEEVE BEHIND LOUVER. INTERLOCK DAMPER OPERATION WITH EF-2. LOUVER SHALL OPEN WHEN EF-2 IS ENERGIZED.

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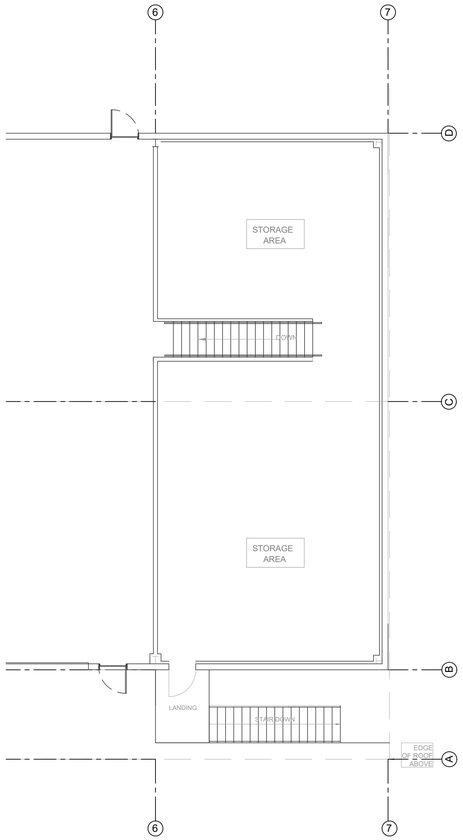
TOWN OF HOTCHKISS
PUBLIC WORKS FACILITY
TBD BARROW MESA RD
HOTCHKISS, COLORADO

DATE:	ISSUED FOR:
03/21/19	REVISED 50% DD

DATE: 03/21/19
JOB NO: 18-159
DRAWN BY: BCE
CHECKED BY: BCE
SCALE: AS SHOWN
SHEET NUMBER: M1-3

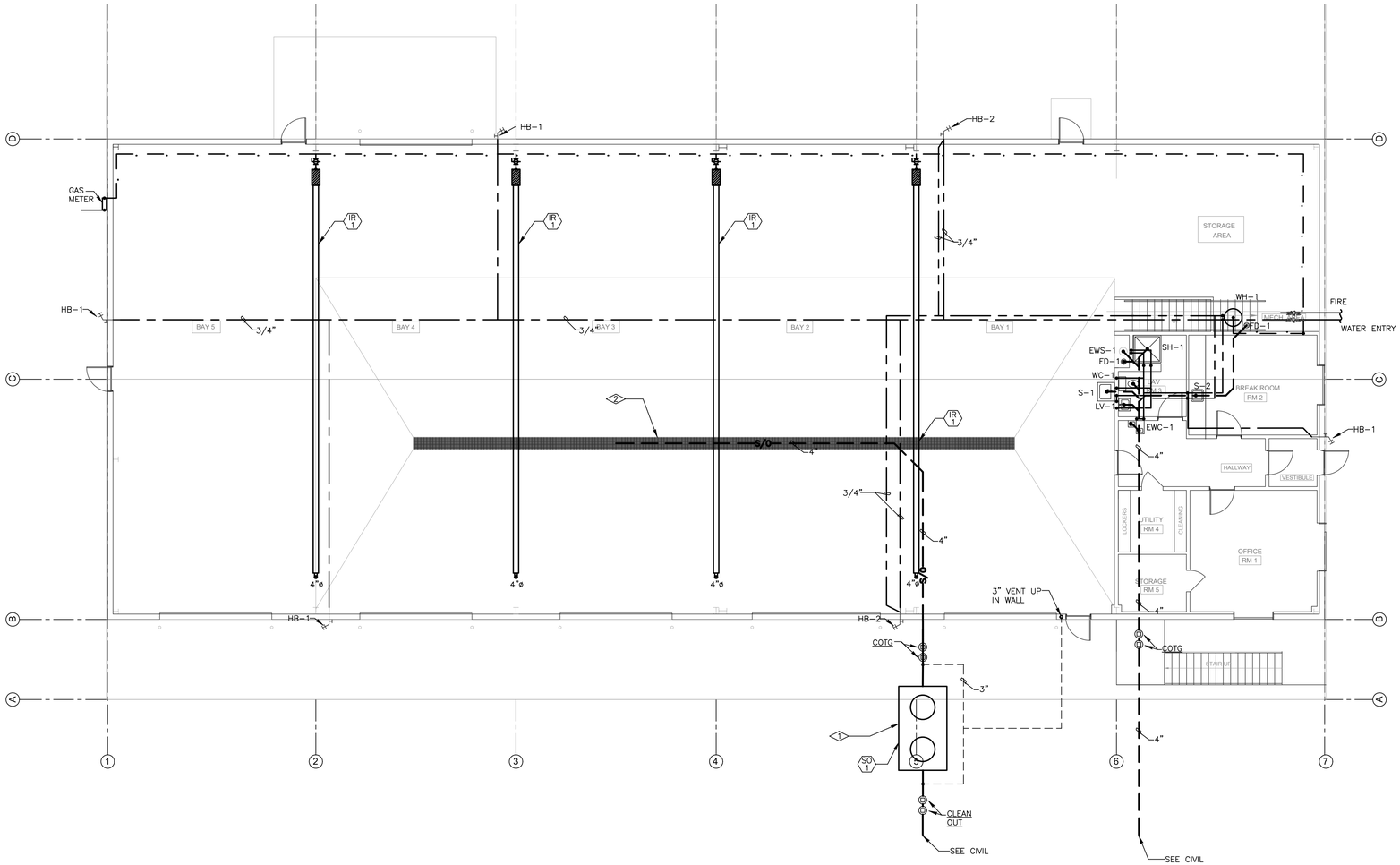
March 25, 2019 - 3:18:11pm



PLUMBING - MEZZANINE FLOOR PLAN

SCALE: 1/8"=1'-0"

NORTH



FLAG NOTES:

1. SAND OIL INTERCEPTOR LOCATION TO BE COORDINATED WITH SITE PLAN.
2. TRENCH DRAIN TO BE PROVIDED BY GENERAL CONTRACTOR. GRATE TO BE TRAFFIC RATED AND SLOPED PER IPC.
3.

PLUMBING - SHOP FLOOR PLAN

SCALE: 1/8"=1'-0"

NORTH

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PUBLIC WORKS FACILITY

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HOTCHKISS, COLORADO

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03/21/19	REVISED 50% DD

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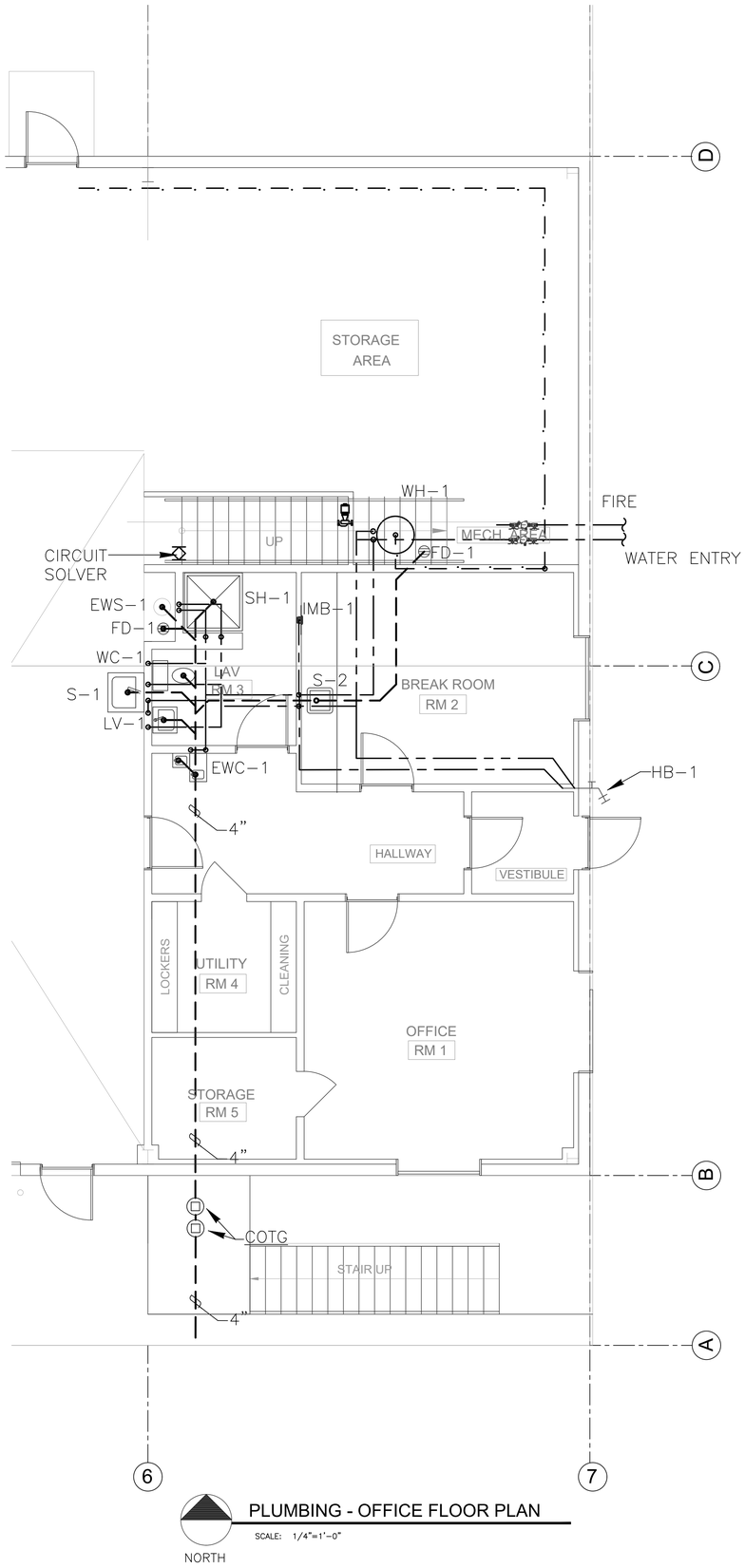
CHECKED BY:	BCE
SCALE:	AS SHOWN
SHEET NUMBER:	P1-1

March 25, 2019 - 3:18:16pm



PLUMBING - OFFICE FLOOR PLAN

SCALE: 1/4"=1'-0"

NORTH

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Grand Junction, CO 81501
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PUBLIC WORKS FACILITY

TBD BARROW MESA RD
HOTCHKISS, COLORADO

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03/21/19	REVISED 50% DD

DATE:	03/21/19
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DRAWN BY:	BCE
CHECKED BY:	BCE
SCALE:	AS SHOWN
SHEET NUMBER:	P1-2

March 25, 2019 - 3:18:17pm

PLUMBING FIXTURE SCHEDULE

FIXTURE NO.	DESCRIPTION	MANUFACTURER	MODEL	TRIM	PIPING CONNECTIONS				OPTIONS-ACCESSORIES
					S/W	VENT	C.W.	HW	
EWC-1	ELECTRIC WATER COOLER	ELKAY	LZWS-LRPBM28K		1-1/2"	1-1/2"	1/2"	1/2"	HIGH-LOW, 304 SS SATIN FINISH, WITH BOTTLE FILLER.
EWS-1	EYE WASH SHOWER	GUARDIAN	GBF1909SSH		-	-	3/4"	3/4"	FLOOR MOUNTED, PROVIDE WITH MIXING VALVE, FLOOR DRAIN, HAND PADLE OPERATION. WATER DELIVERED SHOWER SHALL BE TEPID MINIMUM 60°F TO 100°F.
FD-1	FLOOR DRAIN	ZURN	Z300	BRONZE	4"	2"	-	-	PROVIDE NICKEL BRONZE STRAINER, MECHANICAL TRAP SEAL SIMILAR TO J.R. SMITH QUAD CLOSE.
HB-1	FREEZE PROOF HOSE BIB	WOODFORD	B67		-	-	3/4"	1/2"	PROVIDE LOCKING BOX WITH ANTI-SIPHON AND VACUMN BREAKER, FREEZE PROOF.
HB-2	FREEZE PROOF HOSE BIB	WOODFORD	V22		-	-	3/4"	1/2"	PROVIDE LOCKING BOX WITH ANTI-SIPHON AND VACUMN BREAKER, FREEZE PROOF.
LV-1	WALL MOUNTED BATHROOM SINK	AMERICAN STANDARD-REGALYN	4867.008	PROVIDE AMERICAN STANDARD MONTERREY .35 GPM FAUCET	1 1/2"	1 1/2"	1/2"	1/2"	GRID DRAIN, P TRAP, LOCAL MIXING VALVE, WALL HANGER KIT.
S-1	1 COMPARTMENT SINK ADA WALL HUNG SINK	JUST	JH-ADA-3620-S-CP	JUST-JSL-46-AC SELECTRONIC BACKSPLASH MOUNT FAUCET	1-1/2"	1-1/2"	1/2"	1/2"	SINK STRAINER, P-TRAP, LOCAL MIXING VALVE, ADDITIONAL ACCESSORIES COORDINATE WITH OWNER.
S-2	1 COMPARTMENT SINK COUNTER MOUNTED	JUST	SLN-1815-A-GR	JUST JV-174-A COUNTER MOUNTED SINK	1-1/2"	1-1/2"	1/2"	1/2"	SINK STRAINER, P-TRAP, LOCAL MIXING VALVE, ADDITIONAL ACCESSORIES COORDINATE WITH OWNER.
SH-1	ADA SHOWER ENCLOSURE	CHICAGO FAUCETS	SH-PB1-00-013	ADA TERRAZO BASIN, TILE WITH GREEN BOARD.	1-1/2"	1-1/2"	1/2"	1/2"	TERRAZO BASIN, PRESSURE BALANCED MIXING VALVE POLYPROPYLENE WALLS, CURTAIN ROD, SIONGLE LEVER VALVE, GRID FLOOR DRAIN, GRAB BARS, SEAT.
SO-1	SAND/ OIL INTERCEPTOR				4"	2"	-	-	4000 PSI CONCRETE, K-25 TRAFFIC RATED.
WC-1	ADA WATER CLOSET	AMERICAN STANDARD-CHAMPION	2034.314	1.6 GPF FLUSH TANK WATER CLOSET	4"	2"	3/4"	-	VACUUM BREAKER, COORDINATE COLOR WITH OWNER, PROVIDE ELONGATED SEAT.

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A. UNDERGROUND: PROVIDE TYPE "K" SOFT DRAWN COPPER TUBING WITH BRAZED CONNECTIONS.
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D. ALL COLD WATER PIPING TO BE INSULATED WITH ½" FOAM INSULATION.

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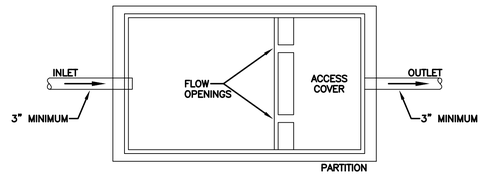
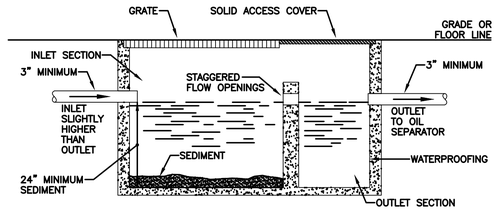


PLAN VIEW



SECTION VIEW

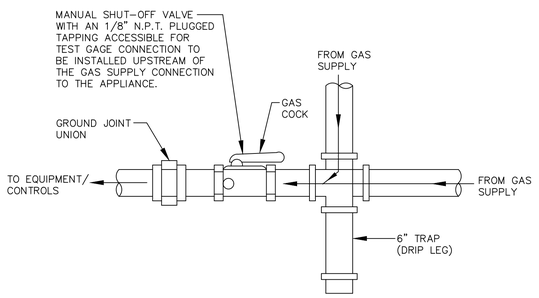
SAND INTERCEPTOR FOR USE WITH OIL INTERCEPTOR DETAIL

NOT TO SCALE

GAS FIRED WATER HEATER SCHEDULE

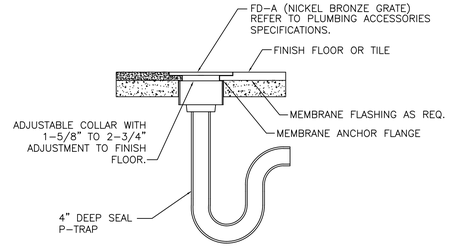
EQUIPMENT NO	CAPACITY (GAL)	RECOVERY @100 DEG F. RISE	BTU PER HR.	GAS CONN.	WATER CONN.	MANUFACTURER & MODEL	OPTIONS/ACCESSORIES
WH-1	80	145	150	1/2"	3/4"	BRADFORD WHITE- PDV-80S-150-3N	NOTE-1

NOTES:
1. ASME RELIEF VALVE, POWER VENTED, HOUSKEEPING PAD, PIPE DISCHARGE FROM WATER HEATER 3/4" TYPE L COPPER FULL SIZE TO NEAREST FLOOR DRAIN. 80% EFFICIENT AT STANDARD CONDITIONS.



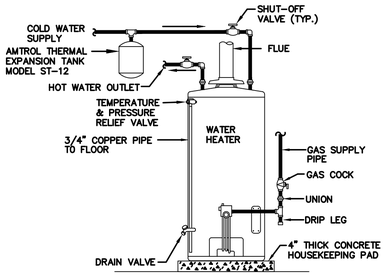
GAS CONNECTION TO EQUIPMENT DETAIL

NOT TO SCALE



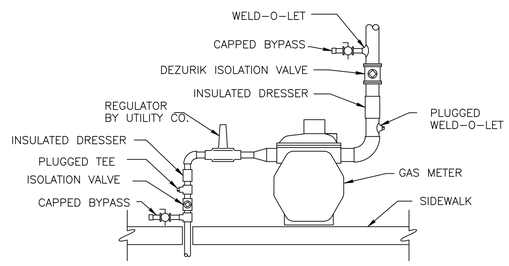
TOILET AREA FLOOR DRAIN

NOT TO SCALE



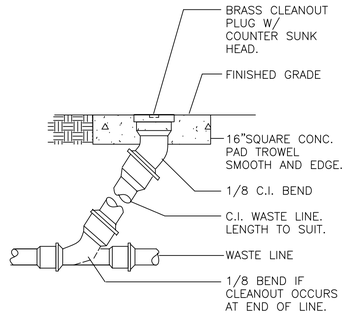
GAS WATER HEATER DETAIL

NOT TO SCALE



GAS METER DETAIL

NOT TO SCALE



CLEANOUT TO GRADE

NOT TO SCALE

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March 25, 2019 - 3:18:18pm

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ABBREVIATIONS

AAV	AUTOMATIC AIR VENT	DN	DOWN	FTR	FINNED TUBE RADIATION	NC	NORMALLY CLOSED
ABV	ABOVE	DWG	DRAWING	FV	FACE VELOCITY	NEG	NEGATIVE
ADR	AREA DRAIN (SEE SYMBOLS)	DX	DIRECT EXPANSION	FXC	FLEXIBLE CONNECTION	NIC	NOT IN CONTRACT
AFF	ABOVE FINISHED FLOOR	EA	EACH	GA	GAUGE	No	NUMBER
ALUM	ALUMINUM	EAT	ENTERING AIR TEMPERATURE	GAL	GALLON	NO	NORMALLY OPEN
AP	ACCESS PANEL	EC	ELECTRICAL CONTRACTOR	GALV	GALVANIZED	NOM	NOMINAL
ATC	AUTOMATIC TEMPERATURE CONTROL	ECC	ECCENTRIC	GC	GENERAL CONTRACTOR	NTS	NOT TO SCALE
AVER	AVERAGE	EFF	EFFICIENCY	GPM	GALLONS PER MINUTE	OA	OUTSIDE AIR
AWT	AVERAGE WATER TEMPERATURE	EJ	EXPANSION JOINT	GR	GRILLE	OB	OFF BOTTOM
BDD	BACK DRAFT DAMPER	EL	ELEVATION	GRS/LB	GRAINS PER POUND	OD	OUTSIDE DIMENSION
BFP	BACK FLOW PREVENTOR	ELEC	ELECTRIC	HT	HEIGHT	OC	ON CENTER
BLDG	BUILDING	ELEV	ELEVATOR	H_2O	WATER	OCC	OCCUPIED
BLW	BELOW	ENT	ENTERING	HB	HOSE BIBB	OGH	OUTSIDE GROUND HYDRANT
BSMT	BASEMENT	EQ	EQUAL	HD	HEAD (SEE SCHEDULES)	OPG	OPENING
BTU	BRITISH THERMAL UNIT	EQUIP	EQUIPMENT	HP	HORSEPOWER	OT	OFF TOP
CAP	CAPACITY	EQUIV	EQUIVALENT	HR	HOUR	OZ	OUNCE
CBV	CIRCUIT BALANCING VALVE	ER	EXHAUST REGISTER	HTR	HEATER	PART	PARTIAL
CFH	CUBIC FEET PER HOUR	ES	END SWITCH	HZ	HERTZ	PDR	PLENUM DRAIN
CFM	CUBIC FEET PER MINUTE	EWT	ENTERING WATER TEMPERATURE	ID	INTERNAL DIAMETER	PD	PRESSURE DROP (SEE SCHEDULE)
CHP	CONCRETE HOUSEKEEPING PAD	EX	EXHAUST	IN	INCHES	PERF	PERFORATED
CI	CAST IRON	EXPAN	EXPANSION	INCL	INCLUDING	PH	PHASE
℄	CENTER LINE	EXT	EXTERNAL	INT	INTERNAL	PNEU	PNEUMATIC
CLG	CEILING	°F	DEGREES FAHRENHEIT	INV	INVERT	POS	POSITIVE
CMU	CONCRETE MASONRY UNIT	FA	FROM ABOVE	KW	KILOWATT	PRESS	PRESSURE
CO	CLEAN OUT	FB	FROM BELOW	L	LENGTH	PS	PRESSURE SWITCH
COL	COLUMN	FC	FAIL CLOSED	LAT	LEAVING AIR TEMPERATURE	PSI	POUNDS PER SQUARE INCH
COMP	COMPRESSOR	FCV	FLOW CONTROL VALVE	LB	POUND	PT	PRESSURE TRANSMITTER
CON	CONCENTRIC	FD	FLOOR DRAIN	LD	LINEAR DIFFUSER	PV	PLUG VALVE
CONC	CONCRETE	F/D	FIRE DAMPER	LIN	LINEAR	PVC	POLYVINYL CHLORIDE
COND	CONDENSATE	FIN	FINISHED	LIQ	LIQUID	QUAN	QUANTITY
CONN	CONNECTION	FL	FLANGE	LRA	LOCK ROTOR AMPS	R	REGISTER
CONT'N	CONTINUATION	FLA	FULL LOAD AMPS	LVG	LEAVING	RA	RETURN AIR
CONTR	CONTRACTOR	FLEX	FLEXIBLE	LVR	LOUVER	RD	ROOF DRAIN
DA	DIRECT ACTING	FLR	FLOOR	LWT	LEAVING WATER TEMPERATURE	RE	ROUNDED ENTRANCE/EXIT
DAMP	DAMPER	FO	FAIL OPEN	MC	MECHANICAL CONTRACTOR	REL	RELIEF
DB	DRY BULB	FP	FIRE PROTECTION	MBH	THOUSANDS OF BTU PER HOUR	REQD	REQUIRED
DEPT	DEPARTMENT	FPM	FEET PER MINUTE	MED	MEDIUM	RET	RETURN
DIA	DIAMETER	FPS	FEET PER SECOND	MFR	MANUFACTURER	RH	RELATIVE HUMIDITY
DIAG	DIAGRAM	FRICT	FRICTION	MH	MANHOLE	RICW	RUN IN CASEWORK
DIFF	DIFFERENTIAL	FS	FLOW SWITCH	MIN	MINIMUM	RIE	RUN IN ENCLOSURE
DISCH	DISCHARGE	F/S/D	FIRE/SMOKE DAMPER WITH ACCESS DOOR	MISC	MISCELLANEOUS	RIW	RISE IN WALL
DIV	DIVISION			MTD	MOUNTED	RLA	RATED LOAD AMPS
DIW	DOWN IN WALL	FT	FEET				
DL	DOOR LOUVER						

RM	ROOM
ROD	ROOF OVERFLOW DRAIN
RPM	REVOLUTIONS PER MINUTE
SA	SUPPLY AIR
SAD	SUPPLY AIR DIFFUSER
SCH	SCHEDULE
SCHEM	SCHEMATIC
SH	SENSIBLE HEAT
SP	STATIC PRESSURE
SPEC	SPECIFICATION
SQ	SQUARE
SS	STAINLESS STEEL
STD	STANDARD
STL	STEEL
STM	STEAM
STR	STRUCTURAL
SUCT	SUCTION
SYS	SYSTEM
TAD	TRANSFER AIR DUCT
TDH	TOTAL DYNAMIC HEAD
TEMP	TEMPERATURE
THT	TOTAL HEAT
TP	TOTAL PRESSURE
TT	TEMPERATURE TRANSMITTER
TYP	TYPICAL
UC	UNDERCUT
UNOCC	UNOCCUPIED
V	VOLTS
VA	VALVE
VB	VACUUM BREAKER
VEL	VELOCITY
VI	VIBRATION ISOLATOR
VOLT	VOLTAGE
VTR	VENT THRU ROOF
W	WIDTH
W/	WITH
W/O	WITHOUT
WB	WET BULB
WC	WATER COLUMN
WG	WATER GAUGE

ABBREVIATIONS (CONTINUED)

AC	AIR CONDITIONING UNIT	ESP	EXTERNAL STATIC PRESSURE	NC	NORMALLY CLOSED
AD	ACCESS DOOR	ET	EXPANSION TANK	NO	NORMALLY OPEN
AFF	ABOVE FINISHED FLOOR	EWT	ENTERING WATER TEMPERATURE	NIC	NOT IN CONTRACT
AH	AIR HANDLER (SPLIT REFRIG)	EWC	ELECTRIC WATER COOLER	NK	NECK
AHU	AIR HANDLING UNIT	FA	FREE AREA	OA	OUTSIDE AIR
AL	ACOUSTICAL LINING	FX	FLEXIBLE CONNECTION	OAI	OUTSIDE AIR INTAKE
AP	ACCESS PANEL	FC	FAN COIL UNIT	OAT	OUTSIDE AIR TEMPERATURE
BB	ELECTRIC BASEBOARD RADIATION	FD	FIRE DAMPER	OC	ON CENTER
B	BOILER	FLR	FLOOR	OD	OUTSIDE DIAMETER
BDD	BACK DRAFT DAMPER	FOB	FLAT ON BOTTOM	OBD	OPPOSED BLADE DAMPER
BFC	BELOW FINISHED CEILING	FOT	FLAT ON TOP	PBD	PARALLEL BLADE DAMPER
BOB	BOTTOM OF BEAM	FOP	FUEL OIL PUMP	PRV	PRESSURE REDUCING VALVE
BOD	BOTTOM OF DUCT	FP	FIRE PUMP	PTAC	PACKAGED TERMINAL AIR CONDITIONER
BOP	BOTTOM OF PIPE	FPM	FEET PER MINUTE	RA	RETURN AIR
C	CHILLER	FTR	FINNED TUBE RADIATION	RAG	RETURN AIR GRILLE
CD	CEILING DIFFUSER	GC	GENERAL CONTRACTOR	RAR	RETURN AIR REGISTER
CFM	CUBIC FEET PER MINUTE	GPH	GALLONS PER HOUR	RCP	REFLECTED CEILING PLAN
CHWP	CHILLED WATER PUMP	GPM	GALLONS PER MINUTE	RHC	REHEAT COIL
CHWR	CHILLED WATER RETURN	HD	HAND DAMPER	RF	RETURN FAN
CHWS	CHILLED WATER SUPPLY	HP	HEAT PUMP	SA	SUPPLY AIR
CO	CLEAN OUT	HV	HEATING AND VENTILATING UNIT	SAR	SUPPLY AIR REGISTER
CP	CONDENSATE PUMP	HWC	HOT WATER CONVERTER	SCG	SMOKE CONTROL GRILLE
CWR	CONDENSER WATER RETURN	HWP	HOT WATER PUMP	SD	SMOKE DAMPER
CWS	CONDENSER WATER SUPPLY	HWR	HEATING HOT WATER RETURN	SEF	SMOKE EXHAUST FAN
CT	COOLING TOWER	HWS	HEATING HOT WATER SUPPLY	SF	SUPPLY FAN
CU	CONDENSING UNIT	HX	HEAT EXCHANGER	SP	STATIC PRESSURE
CUH	CABINET UNIT HEATER	HZ	HERTZ	TG	TRANSFER GRILLE
CVB	CONSTANT VOLUME BOX	ID	INSIDE DIAMETER	TYP	TYPICAL
CWP	CONDENSER WATER PUMP	LAT	LEAVING AIR TEMPERATURE	UH	UNIT HEATER
DB	DRY BULB	LWT	LEAVING WATER TEMPERATURE	UON	UNLESS OTHERWISE NOTED
DS	DUCT SILENCER	LD	LINEAR DIFFUSER	VAV	VARIABLE AIR VOLUME UNIT
DWP	DOMESTIC WATER PUMP	LF	LINEAR FEET	VD	VOLUME DAMPER
EAT	ENTERING AIR TEMPERATURE	MC	MECHANICAL CONTRACTOR	VTR	VENT THRU ROOF
EC	ELECTRICAL CONTRACTOR	MTD	MOUNTED	WB	WET BULB
EF	EXHAUST FAN	MOD	MOTOR OPERATED DAMPER	WMS	WIRE MESH SCREEN
EJ	EXPANSION JOINT	MUA	MAKE–UP AIR UNIT		
ER	EXHAUST REGISTER				

PLUMBING LEGEND

LINE DESIGNATIONS

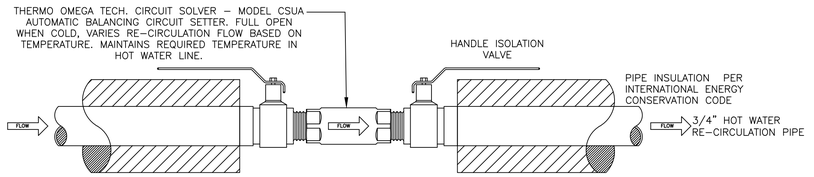
- (E)(NAME) — EXISTING PIPING TO REMAIN
- (NAME) — EXISTING PIPING TO BE REMOVED
- DOMESTIC COLD WATER (CW)
- DOMESTIC HOT WATER (HW)
- DOMESTIC HOT WATER RECIR. (HWR)
- SANITARY DRAIN BELOW GRADE
- SANITARY VENT
- D — EQUIPMENT DRAIN
- LW — LAB WASTE
- LV — LAB VENT
- F — FIRE MAIN
- PS — PURE STEAM
- PSC — PURE STEAM CONDENSATE
- CA — COMPRESSED AIR
- SP — SPRINKLER PIPE
- ST — STORM WATER
- OD — OVERFLOW STORM WATER
- HPS — HIGH PRESSURE STEAM
- HPC — HIGH PRESSURE CONDENSATE
- LPS — LOW PRESSURE STEAM
- LPC — LOW PRESSURE CONDENSATE
- TWS — TOWER WATER SUPPLY
- TWR — TOWER WATER RETURN
- G — NATURAL GAS
- PG — PROPANE GAS
- DIS — DISTILLED WATER SUPPLY
- DIR — DISTILLED WATER RETURN
- DES — DEIONIZED WATER SUPPLY
- DER — DEIONIZED WATER RETURN
- WFIS — WATER FOR INJECTION SUPPLY
- WFIR — WATER FOR INJECTION RETURN
- USPS — USP PURIFIED WATER SUPPLY
- PHWR — PROCCESS HOT WATER RECIRC.
- PW — PUMPED WASTE
- PV — PROCESS VENT
- HE — HELIUM
- N2 — NITROGEN
- O2 — OXYGEN
- H2 — HYDROGEN
- N2O — NITROUS OXIDE
- MA — MEDICAL AIR
- VAC — VACUUM
- DC — DECONTAMINATION PIPING

PIPING ELEMENTS/VALVING

- PRESSURE REDUCING VALVE (PRV)
- GATE VALVE
- GLOBE VALVE
- PLUG VALVE
- BUTTERFLY VALVE
- VALVE IN RISE OR DROP
- BALL VALVE
- SWING CHECK VALVE
- LIFT CHECK VALVE
- GATE VALVE, ANGLE
- GLOBE VALVE, ANGLE
- THREE WAY CONTROL VALVE
- TWO WAY CONTROL VALVE
- SOLENOID VALVE
- TEMPERATURE AND PRESSURE RELIEF VALVE
- RELIEF/SAFETY VALVE
- GAS COCK
- GAS PRESSURE REGULATOR
- STRAINER
- STRAINER WITH BLOW OFF VALVE
- FLEXIBLE–CONNECTION
- SPRINKLER HEAD
- PIPE RISING UP
- PIPE DROPPING DOWN
- UNION – SCREWED OR FLANGED
- FS — FLOW SWITCH
- TT — TEMPERATURE TRANSMITTER
- PT/PS — PRESSURE TRANSMITTER OR PRESSURE SWITCH
- TH/TI — THERMOMETER/TEMPERATURE INDICATOR
- PI/GA — GAUGE WITH GAUGE COCK/ PRESSURE INDICATOR
- BACKFLOW PREVENTOR (REDUCED ZONE)
- BACKFLOW PREVENTOR (DOUBLE CHECK VALVE ASSEMBLY)
- SA — WATER HAMMER ARRESTER
- CBV — CIRCUIT SETTING BALANCING VALVE
- HB — HOSE BIBB
- RD — ROOF DRAIN
- OS — OPEN SITE DRAIN
- FD — FLOOR DRAIN
- ADR — AREA DRAIN
- CO — CLEANOUT
- CO — WALL CLEAN OUT

PLUMBING SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	SOIL OR WASTE PIPE (BELOW GROUND)		VACUUM BREAKER
	SOIL OR WASTE PIPE (ABOVE GROUND)	RD	ROOF DRAIN
	VENT PIPE (V)		PRESSURE GAGE
	COLD WATER PIPE (CW)		TEMPERATURE GAGE
	HOT WATER PIPE (HW)	M	WATER METER
	HOT WATER RETURN (HWR)		PRESSURE REDUCING VALVE
T	TEMPERED HOT WATER LINE (THW)		GAS COCK
G	NATURAL GAS PIPE	VTR	VENT THROUGH ROOF
SD	STORM DRAIN PIPE	LAV	LAVATORY
FD	FLOOR DRAIN	WC	WATER CLOSET
CO	CLEAN–OUT(FLOOR)	URN	URINAL
CO	CLEAN–OUT(WALL)	DF	DRINKING FOUNTAIN
WH	HOT WATER HEATER	SH	SHOWER
	GATE VALVE	A.D.	ACCESS DOOR
	CHECK VALVE	SS	SAFETY SHOWER
	TEMP./PRESS. RELIEF VALVE		
	FIXTURE ISOLATION VALVE		



CIRCUIT SOLVER – AUTOMATIC CIRCUIT SETTER DETAIL

NOT TO SCALE

PLUMBING - LEGEND

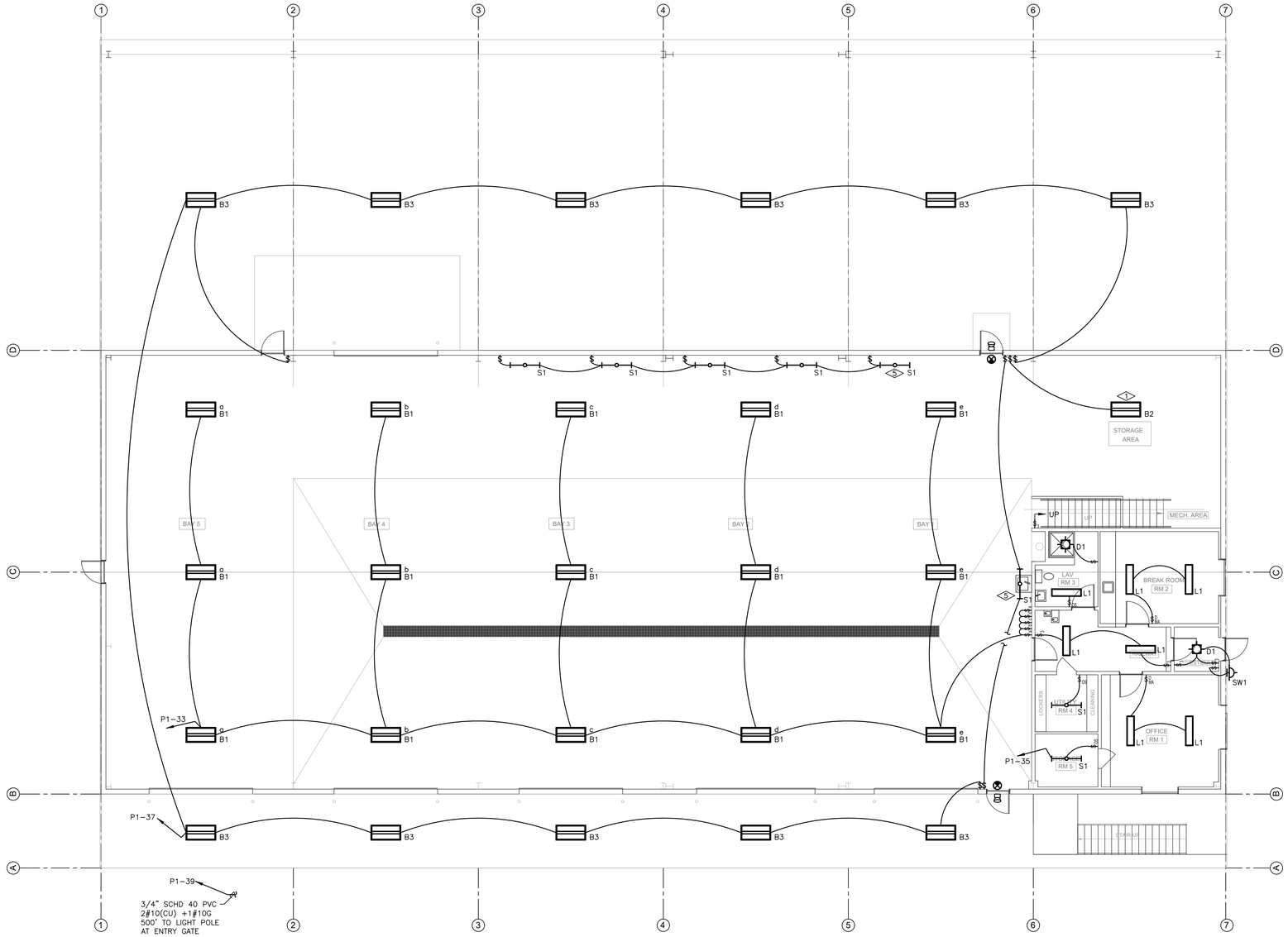
Bighorn Consulting Engineers, Inc.
Mechanical & Electrical Engineers
386 Indian Road
Grand Junction, CO 81501
Phone: 970-241-8709

TOWN OF HOTCHKISS
PUBLIC WORKS FACILITY
TBD BARROW MESA RD
HOTCHKISS, COLORADO

DATE:	ISSUED FOR:
03/21/19	REVISED 50% DD

DATE:	03/21/19
JOB NO:	18-159
DRAWN BY:	BCE
CHECKED BY:	BCE
SCALE:	AS SHOWN
SHEET NUMBER:	P2-2

March 25, 2019 – 3:18:18pm



FLAG NOTES:

1. FIXTURE LOCATED ON THE UNDERSIDE OF THE MEZZANINE LEVEL.
2. SW1 FIXTURE LOCATED 7' ABOVE SECOND FLOOR LANDING. CIRCUITED WITH THE OFFICE AREA LIGHTING P1-35.
3. CONTINUED FROM BAY LIGHTING CIRCUIT P1-33
4. CONTINUE TO FRONT DOOR LIGHT TO BE CIRCUITED WITH OFFICE AREA LIGHTING P1-35
5. PROVIDE SUPPORT BRACKETS TO SUSPEND TYPE S1 FIXTURES 8 FT A.F.F. LOCATED OVER WORKBENCHES, COORDINATE WITH OWNER FOR EXACT LOCATIONS; CIRCUIT WITH OFFICE AREA LIGHTING: P1-35.

LIGHTING - SHOP FLOOR PLAN

SCALE: 1/8"=1'-0"

NORTH

LIGHTING - MEZZANINE FLOOR PLAN

SCALE: 1/8"=1'-0"

NORTH

Bighorn Consulting Engineers, Inc.
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Grand Junction, CO 81501
Phone: 970-241-8709

TOWN OF HOTCHKISS
PUBLIC WORKS FACILITY

TBD BARROW MESA RD
HOTCHKISS, COLORADO

DATE:	ISSUED FOR:
03/21/19	REVISED 50% DD

DATE:	03/21/19
JOB NO:	18-159
DRAWN BY:	BCE
CHECKED BY:	BCE
SCALE:	AS SHOWN
SHEET NUMBER:	E1-1

March 25, 2019 - 4:28:37pm

LIGHTING LEGEND

NOTES:
SYMBOLS SHOWN ARE STANDARD. VARIATION AND/OR COMBINATIONS MAY BE USED ON THE PLANS. THIS LIST SHOWS STANDARD SYMBOLS AND ALL MAY NOT APPEAR ON THE PROJECT DRAWINGS; HOWEVER, WHEREVER THE SYMBOL ON THE PROJECT DRAWINGS OCCUR; THE ITEM SHALL BE PROVIDED AND INSTALLED.

A LOWER CASE LETTER NEXT TO LIGHT FIXTURE OR SWITCH INDICATES A SWITCH DESIGNATION.

AN UPPER CASE LETTER NEXT TO A SWITCH INDICATES THE TYPE OF SWITCH. SEE THE LIST BELOW

AN UPPER CASE LETTER NEXT TO A LIGHT FIXTURE INDICATES THE TYPE OF FIXTURE. REFER TO THE LUMINAIRE SCHEDULE FOR FIXTURE SPECIFICATIONS.

ELECTRICAL EQUIPMENT

- BRANCH CIRCUIT PANELBOARD
- LA–7 CIRCUITRY HOMERUN: PANEL LA – CIR. #7
- CONDUIT OR WIRE CONCEALED IN WALL/CLG.
- CONDUIT OR WIRE UNDERFLOOR/UNDERGND.
- J CEILING JUNCTION BOX – SURFACE/FLUSH
- JH WALL JUNCTION BOX – SURFACE/FLUSH

SWITCHES

- $ SINGLE POLE SWITCH
- $2 TWO POLE SWITCH
- $3 THREE–WAY SWITCH
- $4 FOUR–WAY SWITCH
- $D DIMMER SWITCH
- $3D 3 WAY DIMMER SWITCH – (4D INDICATES A 4WAY DIMMER)
- $OS WALL MOUNTED DUAL TECHNOLOGY VACUITY SENSOR SWITCH
- $LV LOW VOLTAGE LIGHT SWITCH
- $MA MANUAL ON / AUTO OFF LIGHT SWITCH
- $DMA MANUAL ON / AUTO OFF DIMMING LIGHT SWITCH
- (OS) CEILING MOUNTED MOTION SENSOR

LIGHT FIXTURES

ALL FIXTURES:
A–UPPER CASE LETTER INDICATES FIXTURE TYPE REFERENCE LUMINAIRE SCHEDULE FOR SPECIFICATIONS
a–LOWER CASE LETTER INDICATES SWITCHING CIRCUIT.

ACTUAL FIXTURE ON PLANS MAY VARY SLIGHTLY FROM THE SYMBOL SHOWN HERE

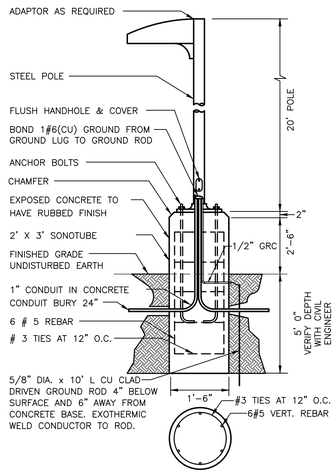
- A 2'x4' LED HIGH BAY TYPE FIXTURE, SUSPENDED MOUNTED
- A 1'x4' LED TROFFER OR DIRECT/INDIRECT TYPE FIXTURE GRID, FLANGE OR SURFACE MOUNTED
- A 2'x4' LED TROFFER OR DIRECT/INDIRECT TYPE FIXTURE GRID, FLANGE OR SURFACE MOUNTED
- A 2'x2' LED TROFFER OR DIRECT/INDIRECT TYPE FIXTURE GRID, FLANGE OR SURFACE MOUNTED
- A WALL BRACKET LIGHT FIXTURE
- A RECESSED DOWNLIGHT CAN FIXTURE
- A SURFACE CEILING OR PENDANT MOUNTED FIXTURE
- EX1 SINGLE FACE EXIT SIGN, WALL AND CEILING MOUNTED
- EX2 DOUBLE FACE EXIT SIGN, WALL AND CEILING MOUNTED
- EM WALL MOUNTED EMERGENCY LIGHT
- EMR EMERGENCY EXTERIOR EGRESS FIXTURE

ABBREVIATIONS

- E1 DRAWING KEYED NOTE
- ROOM NAME / 100 ROOM DESIGNATION, NAME AND NUMBER
- NL NIGHT/SECURITY LIGHT – DO NOT SWITCH
- WP WEATHERPROOF
- A.F.F. ABOVE FINISHED FLOOR
- A.F.G. ABOVE FINISHED GRADE
- GFCI OR GF GROUND FAULT CIRCUIT INTERRUPTER
- EM EMERGENCY FUNCTION NON–SWITCHED FIXTURE FOR
- 44" MOUNTING HEIGHT – A.F.F. OR A.F.G. TO CENTERLINE
- A.C. ITEM TO BE MOUNTED ABOVE COUNTER HEIGHT

GENERAL LIGHTING NOTES

1. LUMINAIRES:
   - 1.1. LIGHTING FIXTURES SHALL BE SUPPORTED FROM THE STRUCTURE ABOVE AND SHALL NOT BE SUPPORTED FROM THE T–BAR CEILING GRID.
   - 1.2. THE ELECTRICAL CONTRACTOR IS TO CONFIRM THE LIGHT FIXTURES ORDERED WILL BE COMPATIBLE WITH THE CEILING TYPES AS SHOWN ON THE ARCHITECTURAL REFLECTED CEILING PLANS. NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO ORDERING THE FIXTURES.
   - 1.3. COORDINATE THE LOCATION OF LIGHTING EQUIPMENT INCLUDING BUT NOT LIMITED TO THE LUMINAIRES, SWITCHES AND CONTROL COMPONENTS WITH THE ARCHITECTURAL, STRUCTURAL AND MECHANICAL DRAWINGS AND ALL OTHER TRADES AS REQUIRED.
   - 1.4. VERIFY LUMINAIRE MOUNTING REQUIREMENTS AND OVERALL HEIGHT OF ALL PENDANT MOUNTED FIXTURES PRIOR TO ORDERING.
   - 1.5. ALL LIGHT FIXTURES NEED TO BE COMPATIBLE WITH THE SWITCHES AND CONTROLS BEING PROVIDED.
   - 1.6. THE LIGHTING PACKAGE SHALL BE APPROVED BY BOTH ARCHITECTS AND ENGINEERS AS APPROVED EQUAL BEFORE BID. NO LIGHT FIXTURE SHALL BE ORDERED UNTIL THE LIGHT FIXTURE SUBMITTAL PACKAGE HAS BEEN APPROVED IN WRITING BY THE ARCHITECT, GENERAL CONTRACTOR AND ELECTRICAL ENGINEER.
   - 1.7. COORDINATE LUMINAIRE MOUNTING REQUIREMENTS PRIOR TO PLACING ORDER.
2. EMERGENCY AND EXIT LIGHTS:
   - 2.1. PROVIDE EMERGENCY AND EXIT SIGNS AS PER ALL LOCAL CODES.
   - 2.1. EXIT SIGNS CONNECTED TO A REMOTE EMERGENCY HEAD REQUIRES EXTRA BATTERY CAPACITY TO OPERATE THE REMOTELY LOCATED EMERGENCY HEAD FOR EGRESS AWAY FROM THE BUILDING.
   - 2.2. REFER TO THE PLANS FOR THE NUMBER OF FACES REQUIRED AT EACH EXIT. FIELD ADJUST THE LOCATION OF THE EXIT SIGNS FOR THE BEST VISIBILITY POSSIBLE.
   - 2.3. ALL LIGHTING FIXTURES DENOTED WITH "EM" SHALL BE PROVIDED WITH AN ENGINEER APPROVED EMERGENCY LED DRIVER OR BALLAST TO OPERATION THE FIXTURE IN AN EMERGENCY MODE TO MEET ALL CURRENT LOCAL CODES AND WILL BE CIRCUITED TO THE UNSWITCHED SIDE OF THE LIGHTING CIRCUIT.
   - 2.4. ALL LIGHT FIXTURES DESIGNATED WITH "EM" OR SPECIFIED WITH AN EM FUNCTION SHALL BE PROVIDE WITH ONE OF THE FOLLOWING;
     - 2.4.1. INTEGRAL TEST SWITCH;
     - 2.4.2. REMOTE INFRARED HAND HELD DEVICE;
     - 2.4.3. INTEGRAL ELECTRONIC DEVICE THAT AUTOMATICALLY PERFORMS CODE REQUIRED TESTS.
   - 2.5. ALL STAIRWELLS AND PATHS OF EGRESS TO THE EXTERIOR DOORS, AND THE EXTERIOR PATH OF EGRESS AWAY FROM THE BUILDING SHALL RECEIVE EMERGENCY LIGHTING PER CODE.
3. LIGHTING CONTROLS:
   - 3.1. ALL LIGHTS IN: RESTROOMS, STORAGE CLOSETS, JANITORS CLOSETS AND STAIRWELLS ARE TO BE SWITCHED WITH A MOTION SENSOR ON/OFF SWITCH WITH A TIME DELAY. SET THE TIME DELAY LENGTH AS DIRECTED BY THE OWNER
     - 3.1.1. EXCEPTION: IN AREAS WHERE THE SWITCH IS LOCATED OUTSIDE THE AREA THE LIGHT IS LOCATED IN.
4. OFFICES WITH MORE THAT ONE FIXTURE WILL BE SWITCHED WITH A MANUAL ON/AUTO OFF DIMMING SWITCH.
5. SWITCHING FOR LIGHTS IN LARGE COMMON AREA ARE AS SHOWN ON PLAN.
6. GENERAL NOTES:
   - 6.1. FIELD COORDINATION DURING CONSTRUCTION IS IMPERATIVE. CONTRACTORS BIDDING THIS WORK MUST MAKE REASONABLE ALLOWANCES FOR UNFORESEEN CONTINGENCIES.
7. WIRING:
   - ALL WIRING IS SHOWN DIAGRAMMATICALLY ON DRAWING, FIELD VERIFY ALL CONDITIONS PRIOR TO ROUGH–IN.
   - 7.1. ALL WIRE IS TO BE #12 UNLESS NOTED OTHERWISE.
   - 7.2. ALL BRANCH CIRCUITS WITH HOME RUNS OVER 50 FEET, WILL BE SIZED ONE SIZE LARGER.
   - 7.3. ALL ELECTRICAL WORK TO COMPLY WITH LATEST EDITON OF NEC AND ALL APPLICABLE LOCAL CODES.



ENTRY GATE LIGHT - POLE DETAIL

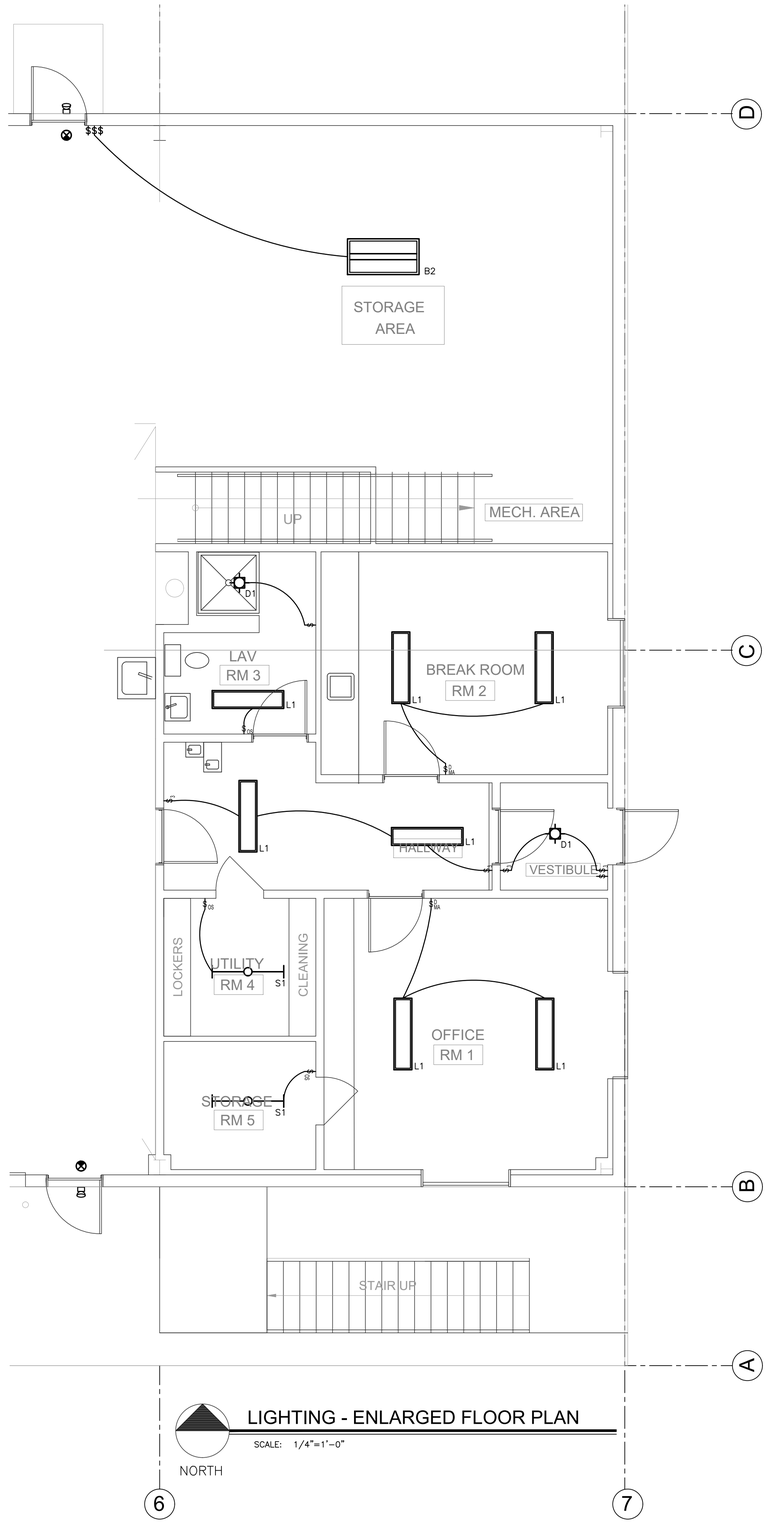
NOT TO SCALE

NOTES:
1. DIMENSION FOR ANCHOR BOLT SPACING BY POLE MANUFACTURER.
2. CONTRACTOR SHALL INSTALL A FUSE AND WEATHERPROOF FUSEHOLDER AT EACH POLE BASE.
3. BASE HOLE SHALL BE DRILLED INTO NATURAL, UNDISTURBED SOIL OR PROPERLY COMPACTED FILL.

INTERIOR LUMINAIRE SCHEDULE

TYPE	MANUFACTURER CATALOG NO.	MANUFACTURER CATALOG NO.	VOLTAGE MOUNTING # OF LAMPS	BALLAST LAMP TYPE LAMP CAT. #	DESCRIPTION
B1	LITHONIA LIGHTING IBG 15000LM SEF ACL GND MVOLT GZ10 40K 80CRI	APPROVED EQUIVALENT	120–277V SUSPENDED CEILING 1	LED DRIVER 97W, 80CRI 14059LM, 4000K	24"Lx16"Wx5"H SUSPENDED HIGH BAY LED LIGHTING, LM–80 80,000 HOUR LIFESPAN, DAMP LISTED 5 YEAR WARRANTY, –40°C STARTING TEMPERATURE
B2	LITHONIA LIGHTING IBG 8000LM SEF ACL WD MVOLT GZ10 40K 80CRI	APPROVED EQUIVALENT	120–277V SUSPENDED CEILING 1	LED DRIVER 55W, 80CRI 7384LM, 4000K	24"Lx16"Wx5"H SUSPENDED HIGH BAY LED LUMINAIRE LM–80 80,000 HOUR LIFESPAN, DAMP LISTED 5 YEAR WARRANTY
B3	LITHONIA LIGHTING IBG 15000LM SEF ACL GND MVOLT GZ10 40K 80CRI LAOZU	APPROVED EQUIVALENT	120–277V SUSPENDED CEILING 1	LED DRIVER 97W, 80CRI 14059LM, 4000K	24"Lx16"Wx5"H SUSPENDED HIGH BAY LED LIGHTING, LM–80 80,000 HOUR LIFE, DAMP LISTED, 5 YEAR WARRANTY INTEGRAL OCCUPANCY SENSOR, –40°C STARTING TEMPERATURE
D1	LITHONIA LIGHTING LDN4 40/10 L04 ARLSS MVOLT GZ10	APPROVED EQUIVALENT	120–277V RECESSED CEILING 1	LED DRIVER 13W, 80CRI 1000LM, 4000K	4"DIAx5"H DOWNLIGHT LUMINAIRE WET LISTED, 5 YEAR WARRANTY
L1	LITHONIA LIGHTING BLTX 48L ADP EZ1 LP840	APPROVED EQUIVALENT	120–277V SURFACE CEILING 1	LED DIMMING DRIVER 45W, 80CRI 5261LM, 4000K	12"Lx48"Wx5"H SURFACE ARCHITECTURAL LINEAR LIGHT LONG LIFE LED, DAMP LISTED 5 YEAR WARRANTY
S1	LITHONIA LIGHTING ZL1D L48 5000LM FST MVOLT 40K 80CRI	APPROVED EQUIVALENT	120–277V STRIP LIGHT 1	LED DIMMING DRIVER 41W, 80CRI 5541LM, 4000K	48"Lx24"Wx2"H RECESSED GRID LUMINAIRE LONG LIFE LED, PENDANT MOUNT KIT INTEGRATED LIGHTCLOUD CONTROLLER
	LITHONIA LIGHTING EU2C	APPROVED EQUIVALENT	120/277 SURFACE WALL/CEILING 2	NONE REQUIRED LED WITH UNIT	11"Wx3.5"Dx7.5"H IMPACT RESISTANT THERMO–PLASTIC, BATTERY
	LITHONIA LIGHTING ECG LED HO M6	APPROVED EQUIVALENT	120/277 WALL/CEILING N/A	NONE REQUIRED LED WITH UNIT	14"Wx8"H COMBO EXIT EGRESS LIGHT NICAD BATTERY, UNIVERSAL MOUNTING, 5 YEAR WARRANTY FIELD CONFIGURABLE INDICATION, REMOTE HEAD CAPABLE
	LITHONIA LIGHTING ELA LED WP M12	APPROVED EQUIVALENT	120/277 WALL/CEILING N/A	NONE REQUIRED LED WITH UNIT	6.5"Wx10.5"Hx4"D EXTERIOR EGRESS LIGHTING WET LOCATION RATED,
SW1	LITHONIA LIGHTING OLWX1 20W 40K PE	APPROVED EQUIVALENT	120–277V WALL MOUNT 1	LED DRIVER 20W, 80CRI 2697LM, 4000K	48"Lx24"Wx2"H EXTERIOR WALL PACK LONG LIFE LED, –20°C STARTING TEMPERATURE IP 65 RATED, FULL CUTOFF, 5 YEAR WARRANTY
SW2	LITHONIA LIGHTING TWH LED ALO 40K T3M MVOLT PE	APPROVED EQUIVALENT	120–277V WALL MOUNT 1	LED DRIVER 78W, 70CRI 9214LM, 4000K	16"Hx16"Wx8"D EXTERIOR WALL PACK LONG LIFE LED, –20°C STARTING TEMPERATURE IP 65 RATED, 5 YEAR WARRANTY
SP1	LITHONIA LIGHTING DSX0 LED P2 40K T3S MVOLT	APPROVED EQUIVALENT	120–277V POLE MOUNT 1	LED DRIVER 78W, 70CRI 9214LM, 4000K	26"Lx13"Wx3"H POLE MOUNTED FIXTURE LONG LIFE LED, –20°C STARTING TEMPERATURE IP 66 RATED, 5 YEAR WARRANTY

NOTES:
1. OCCUPANCY SENSORS ARE DIAGRAMMATICALLY DISPLAYED ON THE PLANS, FIELD ADJUST UNITS TO MEET THE MANUFACTURER'S RECOMMENDED SPACING REQUIREMENTS.
2. THE EXIT LIGHT SYMBOL USED IN THIS SCHEDULE IS A GENERIC SYMBOL TO INDICATE AN EXIT LIGHT FIXTURE. REFER TO THE PLANS FOR THE NUMBER OF FACES REQUIRED AT EACH EXIT. INSTALL THE NUMBER OF FACES REQUIRED AT EACH EXIT. FIELD ADJUST THE LOCATION OF THE EXIT SIGNS FOR THE BEST VISIBILITY POSSIBLE. ALL EXIT LIGHTS SHALL COMPLY WITH ALL LOCAL BUILDING CODES.
3. EXIT AND EMERGENCY EGRESS LIGHTING TO BE CIRCUITED TO THE UNSWITCHED SIDE OF THE LIGHTING CIRCUIT OF THE SPACE IN WHICH IT IS LOCATED.
4. EXTERIOR FIXTURES UNDER THE AWNING ARE TO BE CONTROLLED WITH A PHOTOCELL, PROVIDE A SNAP SWITCH IN SERIES TO CONTROL NORTH AWNING AND SOUTH AWNING INDEPENDENTLY OF EACH OTHER.
5. PROVIDE A MEANS FOR AUTOMATIC OFF CONTROL FOR THE FIXTURES IN THE SHOP AREA; SET TIME DELAY PER OWNER.



LIGHTING - ENLARGED FLOOR PLAN

SCALE: 1/4"=1'–0"

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386 Indian Road
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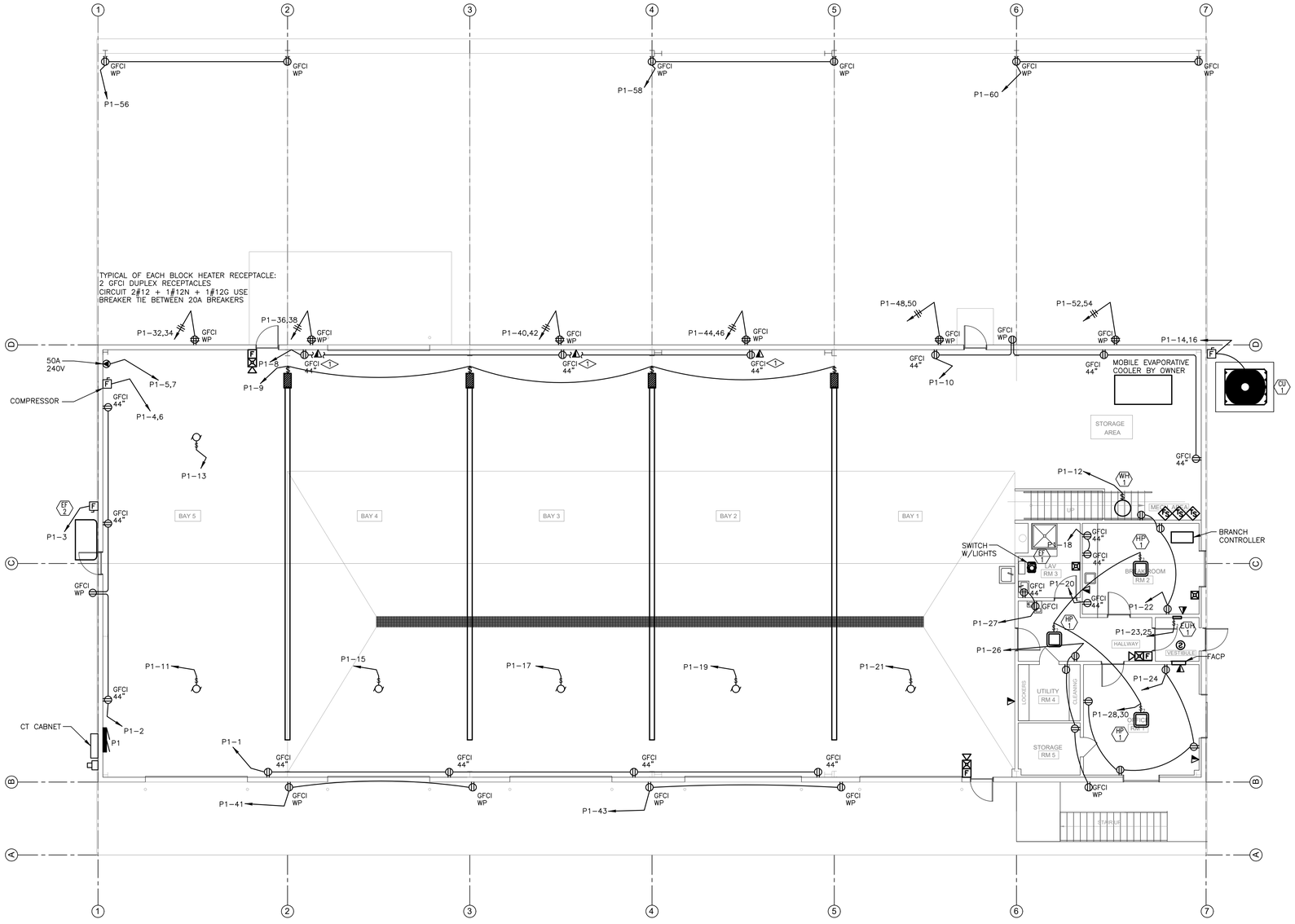
Phone: 970-241-8709

TOWN OF HOTCHKISS
PUBLIC WORKS FACILITY
TBD BARROW MESA RD
HOTCHKISS, COLORADO

DATE:	ISSUED FOR:
03/21/19	REVISED 50% DD

DATE:	03/21/19
JOB NO:	18-159
DRAWN BY:	BCE
CHECKED BY:	BCE
SCALE:	AS SHOWN
SHEET NUMBER:	E1-2

March 25, 2019 – 4:28:37pm



FLAG NOTES:

1. COORDINATE MOUNTING OF ELECTRICAL AND DATA OUTLETS WITH WORK BENCHES.

ELECTRICAL - SHOP FLOOR PLAN

SCALE: 1/8"=1'-0"

NORTH

ELECTRICAL - MEZZANINE FLOOR PLAN

SCALE: 1/8"=1'-0"

NORTH

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TOWN OF HOTCHKISS
PUBLIC WORKS FACILITY

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HOTCHKISS, COLORADO

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SCALE:	AS SHOWN
SHEET NUMBER:	E2-1

March 25, 2019 - 4:28:38pm

ELECTRICAL - OFFICE FLOOR PLAN

SCALE: 1/4"=1'–0"

NORTH

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Mechanical & Electrical Engineers
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Grand Junction, CO 81501
Phone: 970-241-8709

TOWN OF HOTCHKISS
PUBLIC WORKS FACILITY

TBD BARROW MESA RD
HOTCHKISS, COLORADO

DATE:	ISSUED FOR:
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SCALE:	AS SHOWN
SHEET NUMBER:	E2-2

March 25, 2019 – 4:28:38pm

MECHANICAL EQUIPMENT SCHEDULE

COMB: COMBINATION MOTOR STARTER
MAG: MAGNETIC MOTOR STARTER
NR: NONE REQUIRED
P/I: PLUG-IN UNIT
CONT: CONTRACTOR
MAN: MANUAL MOTOR STARTER
W/U: SUPPLIED WITH UNIT:

UNIT NO	FUNCTION (NOTES)	LOAD	VOLTS	ø	FULL LOAD AMPS	BRANCH CIRCUIT CONDUIT SIZE	BRANCH CIRCUIT NO. COND.	BRANCH CIRCUIT WIRE SIZE	GRND WIRE SIZE	BRKR SIZE	START	DISC FUSE
CU 1	CONDENSING UNIT		240	1	42 A	3/4"	2	8	10	50A	NR	60 50
EF 1	EXHAUST FAN		120	1	1.0A	1/2"	2	12	12	20A	NR	½
EF 2	EXHAUST FAN	3/4HP	120	1	13.8A	1/2"	2	12	12	20A	NR	½
HP 1	INDOOR AC EQUIPMENT		240	1	0.3A	1/2"	2	12	12	20A	NR	½
IR 1	RADIANT HEATER		120	1	1.0A	1/2"	2	12	12	20A	NR	½
LR 1	MOTORIZED LOUVER		120	1	1.0A	1/2"	2	12	12	20A	NR	½

PANEL SCHEDULE – P1
TYPE: PANELBOARD
VOLTAGE: 120/240
ENCLOSURE: NEMA1
BUS SIZE: 600
MAIN BRKR: 600
MOUNTING: SURFACE
PHASES: 1
WIRES: 3
SC RATING: 22000
NEUTRAL BUS: YES
GROUND BUS: YES

LOAD TYPE	LOAD DESCRIPTION	AMPS POLES	CKT# LOAD	ø	CKT# LOAD	AMPS POLES	LOAD TYPE	LOAD DESCRIPTION
RECEPTACLE	SHOP OUTLETS	20A 1P	1 720	A	2 720	20A 1P	RECEPTACLE	SHOP OUTLETS
MECH YEAR ROUND	UNIT EF-2	20A 1P	3 1656	B	4 4000	50A 2P	MOTOR	AIR COMPRESSOR
PROCESS	SHOP OUTLET	50A 2P	5 4800	A	6 4000	--- ---	MOTOR	--- ---
PROCESS	--- ---	--- ---	7 4800	B	8 720	20A 1P	RECEPTACLE	SHOP OUTLETS
MECH HEATING	SHOP HEATERS	20A 1P	9 400	A	10 720	20A 1P	RECEPTACLE	SHOP OUTLETS
PROCESS	DOOR OPENER	20A 1P	11 1500	B	12 200	20A 1P	MECH YEAR ROUND	WATER HEATER & CIRC PUMP
PROCESS	DOOR OPENER	20A 1P	13 1500	A	14 5040	45A 2P	MECH YEAR ROUND	UNIT CU-1
PROCESS	DOOR OPENER	20A 1P	15 1500	B	16 5040	--- ---	MECH YEAR ROUND	--- ---
PROCESS	DOOR OPENER	20A 1P	17 1500	A	18 360	20A 1P	RECEPTACLE	BREAK ROOM COUNTER OUTLET
PROCESS	DOOR OPENER	20A 1P	19 1500	B	20 180	20A 1P	RECEPTACLE	BREAK ROOM COUNTER OUTLET
PROCESS	DOOR OPENER	20A 1P	21 1500	A	22 360	20A 1P	RECEPTACLE	BREAK ROOM OUTLETS
MECH HEATING	UNIT EUH-1	20A 2P	23 1000	B	24 720	20A 1P	RECEPTACLE	OFFICE OUTLETS
MECH HEATING	--- ---	--- ---	25 1000	A	26 720	20A 1P	RECEPTACLE	CONVIENCE OUTLETS
RECEPTACLE	BATHROOM OUTLET	20A 1P	27 360	B	28 250	20A 2P	MECH YEAR ROUND	HP UNITS
RECEPTACLE	MEZZANINE OUTLETS	20A 1P	29 540	A	30 250	--- ---	MECH YEAR ROUND	--- ---
RECEPTACLE	MEZZANINE OUTLETS	20A 1P	31 540	B	32 1000	20A 1P	RECEPTACLE	BLOCK HEATER 1 PROVIDE BREAKER TIE WITH P1-34
LIGHTING	SHOP LIGHTING	20A 1P	33 1400	A	34 1000	20A 1P	RECEPTACLE	BLOCK HEATER 1 PROVIDE BREAKER TIE WITH P1-32
LIGHTING	OFFICE LIGHTING	20A 1P	35 1000	B	36 1000	20A 1P	RECEPTACLE	BLOCK HEATER 2 PROVIDE BREAKER TIE WITH P1-38
LIGHTING	EXTERIOR LIGHTING	20A 1P	37 1200	A	38 1000	20A 1P	RECEPTACLE	BLOCK HEATER 2 PROVIDE BREAKER TIE WITH P1-36
LIGHTING	GATE LIGHTING	20A 1P	39 600	B	40 1000	20A 1P	RECEPTACLE	BLOCK HEATER 3 PROVIDE BREAKER TIE WITH P1-42
RECEPTACLE	EXTERIOR OUTLETS	20A 1P	41 360	A	42 1000	20A 1P	RECEPTACLE	BLOCK HEATER 3 PROVIDE BREAKER TIE WITH P1-40
RECEPTACLE	EXTERIOR OUTLETS	20A 1P	43 360	B	44 1000	20A 1P	RECEPTACLE	BLOCK HEATER 4 PROVIDE BREAKER TIE WITH P1-46
SPARE	UNALLOCATED FUTURE	20A 1P	45 200	A	46 1000	20A 1P	RECEPTACLE	BLOCK HEATER 4 PROVIDE BREAKER TIE WITH P1-44
SPARE	UNALLOCATED FUTURE	20A 1P	47 200	B	48 1000	20A 1P	RECEPTACLE	BLOCK HEATER 5 PROVIDE BREAKER TIE WITH P1-50
SPARE	UNALLOCATED FUTURE	20A 1P	49 200	A	50 1000	20A 1P	RECEPTACLE	BLOCK HEATER 5 PROVIDE BREAKER TIE WITH P1-48
SPARE	UNALLOCATED FUTURE	20A 1P	51 200	B	52 1000	20A 1P	RECEPTACLE	BLOCK HEATER 6 PROVIDE BREAKER TIE WITH P1-54
SPARE	UNALLOCATED FUTURE	20A 1P	53 200	A	54 1000	20A 1P	RECEPTACLE	BLOCK HEATER 6 PROVIDE BREAKER TIE WITH P1-52
SPARE	UNALLOCATED FUTURE	20A 1P	55 200	B	56 360	20A 1P	RECEPTACLES	AWNING POLE OUTLET
SPACE	--- ---	--- ---	57 0	A	58 360	20A 1P	RECEPTACLES	AWNING POLE OUTLET
SPACE	--- ---	--- ---	59 0	B	60 360	20A 1P	RECEPTACLES	AWNING POLE OUTLET
SPACE	--- ---	--- ---	61 0	A	62 200	20A 1P	SPARE	UNALLOCATED FUTURE
SPACE	--- ---	--- ---	63 0	B	64 200	20A 1P	SPARE	UNALLOCATED FUTURE
SPACE	--- ---	--- ---	65 0	A	66 0	--- ---	SPACE	--- ---
SPACE	--- ---	--- ---	67 0	B	68 0	--- ---	SPACE	--- ---
SPACE	--- ---	--- ---	69 0	A	70 0	--- ---	SPACE	--- ---

LOADS BY TYPE:

LOAD TYPE	CONNECTED LOAD (VA)	DEMAND FACTOR	DEMAND LOAD (VA)
LIGHTING	4200.00	1.25	5250.00
KITCHEN	0.00	0.00	0.00
PROCESS	18600.00	1.00	18600.00
RECEPTACLES	10000.00	1.00	10000.00
RECEPTACLES	9380.00	0.50	4690.00
MECH HEATING	2400.00	1.00	2400.00
MECH COOLING	0.00	1.00	0.00
MECH YEAR ROUND	12436.00	1.00	12436.00
APPLIANCE	0.00	1.00	0.00
MISCELLANEOUS	0.00	1.00	0.00
MOTOR	8000.00	1.00	12000.00
SPARE	1600.00	1.00	1600.00
LARGEST MOTOR [1]	ABOVE	0.25	2520.00
TOTAL	67696.00		65496.00

LOADS BY PHASE:

PHASE	CONNECTED LOAD (VA)	CONNECTED LOAD (AMPS)	BALANCE (PERCENT)
A	34250.00	285.42	A-B: 97.7
B	33446.00	278.72	B-A: 97.7
C	---	---	---
TOTAL/AVERAGE	67696.00	282.07	97.7

NOTES:

1. THE LARGEST CONNECTED MOTOR LOAD IS INCLUDED IN MECHANICAL, PROCESS, OR MOTOR LOADS.

ABBREVIATIONS AND NOTATIONS

A.C.	ABOVE COUNTER – VERIFY HEIGHT
A.F.C.	ABOVE FINISHED CEILING
A.F.F.	ABOVE FINISHED FLOOR
A.F.G.	ABOVE FINISHED GRADE
AIC	AMPS INTERRUPTING CAPACITY
AL	ALUMINUM
ATS	AUTOMATIC TRANSFER SWITCH
AV	AUDIO/VIDEO
AWG	AMERICAN WIRE GAGE
CB	CIRCUIT BREAKER
CCT	CIRCUIT
CT	CURRENT TRANSFORMER
CU	COPPER
EC	ELECTRICAL CONTRACTOR
EF	EXHAUST FAN
EM	EMERGENCY
FLA	FULL LOAD AMPS
G	GROUND
GEC	GROUNDING ELECTRODE CONDUCTOR
GFI	GROUND FAULT INTERRUPTER
HP	HORSEPOWER
IG	ISOLATED GROUND
MCA	MINIMUM CIRCUIT AMPACITY
MCB	MAIN CIRCUIT BREAKER
MLO	MAIN LUGS ONLY
N	NEUTRAL
NL	NIGHT LIGHT
OCP	OVERCURRENT PROTECTION
OL	OVERLOAD
SC	SHORT CIRCUIT
TR	TAMPER RESISTANT
TTB	TELECOMMUNICATIONS TERMINAL BACKBOARD
VFD	VARIABLE FREQUENCY DRIVE
WP	WEATHERPROOF
WPIU	WEATHERPROOF IN-USE
XFMR	TRANSFORMER

(X/X) MECHANICAL EQUIPMENT SCHEDULE NOTATION
(X) FLAG NOTE
(X) DELTA REVISION NOTE
(X) ELECTRICAL FEEDER SIZE

SCHEMATIC WIRING SYMBOLS

TRANSFORMER
ELECTRICAL POWER PANEL
– MAIN LUG ONLY/MAIN CIRCUIT BREAKER
GROUND
CURRENT TRANSFORMER
CIRCUIT BREAKER, MOLDED-CASE
FUSED DISCONNECT SWITCH
(M) METER

ELECTRICAL SYMBOLS

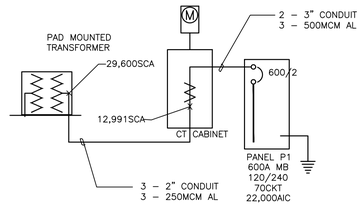
DUPLEX RECEPTACLE
FOUR PLEX RECEPTACLE
SINGLE RECEPTACLE
SPLIT-WIRED RECEPTACLE
SPECIAL PURPOSE RECEPTACLE
FLOOR RECEPTACLE
JUNCTION BOX
WALL MOUNTED J-BOX
DISCONNECT SWITCH
(F) FUSED DISCONNECT SWITCH
BRANCH CIRCUIT PANELBOARD
PP1-3 CIRCUITRY HOMERUN: POWER PANEL 1 – CIRCUIT #3
CONDUIT OR WIRE CONCEALED IN WALL/CLG
CONDUIT OR WIRE UNDERFLOOR/UNDERGROUND

FIRE ALARM

FACP FIRE ALARM CONTROL PANEL
F MANUAL PULL STATION
WALL MOUNTED HORN
WALL MOUNTED SPEAKER
(H) ELECTROMAGNETIC DOOR HOLD OPEN
(FS) SPRINKLER FLOW SWITCH
(TS) SPRINKLER TAMPER SWITCH
(S) SMOKE DETECTOR
(SCO) SMOKE/CARBON MONOXIDE DETECTOR
(SPB) SMOKE DETECTOR WITH PIEZO BUZZER

SYSTEMS LEGEND

TTB, MDF OR IDF
TELECOMMUNICATION OUTLET
TELEPHONE OUTLET
DATA OUTLET
TELEVISION OUTLET



ONE-LINE DIAGRAM

NOT TO SCALE

PROVIDE GROUNDING AND LABELING PER NEC REQUIREMENTS
PROVIDE A #6 COPPER CONDUCTOR TO A 10' BY 5/8" DRIVEN ROD.

kAIC CALCULATIONS:

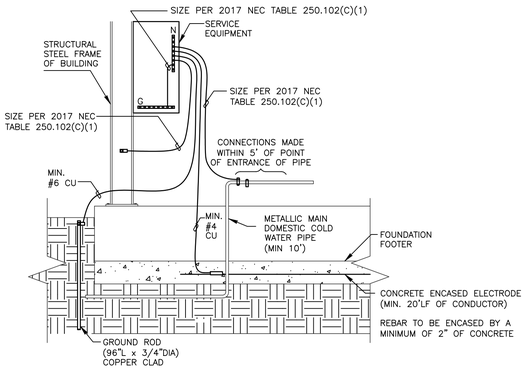
100KVA 120/240V 1Ø TRANSFORMER INFORMATION
29,600 kAIC

UTILIZING POINT TO POINT METHODS:

f FACTOR
f = 2 x L x I =
N x C x E(L-L)
L = WIRE LENGTH = 200' ESTIMATED
I = FAULT CURRENT = 29,600 AMPS
N = NUMBER OF CONDUCTORS PER PHASE = 3
C = CONSTANT INVERSE IMPEDANCE PER FOOT
250kcmil : 12862
E(L-L) = VOLTAGE (LINE TO LINE) = 240 VOLTS
f = 400 x 29600 / 3x12862x240V = 3.835

MULTIPLIER
M = 1 / (1 + f) = 1 / (1 + 1.219) = .439

FAULT CURRENT
I(F) = I(SC) x M = 29600A x .439 = 12991



GROUNDING ELECTRODE SYSTEM DETAIL

SCALE: NOT TO SCALE

NOTES:
1. SEE ONE LINE DIAGRAM FOR GROUNDING CONDUCTOR SIZES REQUIRED.
2. PROVIDE A MINIMUM OF TWO SEPARATE GROUND SOURCES, U.O.N. ON ONE LINE DIAGRAM.
3. CADWELD ALL ENCASED GROUND CONNECTIONS

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SECTION 16000
GENERAL PROVISIONS

SECTION 16010
GENERAL PROVISIONS

A. THE ARCHITECTURAL GENERAL AND SPECIAL CONDITIONS FOR THE CONSTRUCTION OF THIS PROJECT SHALL BE A PART OF THE ELECTRICAL SPECIFICATIONS. THE ELECTRICAL CONTRACTOR SHALL EXAMINE THE GENERAL AND SPECIAL CONDITIONS BEFORE SUBMITTING HIS OR HER PROPOSAL.
B. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK INCLUDED IN THIS SECTION AND THE DELEGATION OF WORK TO THE ELECTRICAL CONTRACTOR, SHALL NOT RELIEVE HIM OF THIS RESPONSIBILITY. THE ELECTRICAL CONTRACTOR AND HIS SUBCONTRACTORS WHO PERFORM WORK UNDER THIS SECTION SHALL BE RESPONSIBLE TO THE GENERAL CONTRACTOR.
C. WHERE ITEMS OF THE GENERAL CONDITIONS OR OF THE SPECIAL CONDITIONS ARE REPEATED IN THIS SECTION OF THE SPECIFICATIONS, IT IS INTENDED TO RE-ENFORCE OR QUALIFY THEM; IT IS NOT INTENDED THAT ANY OTHER PARTS OF THE GENERAL CONDITIONS OR SPECIAL CONDITIONS SHALL BE ASSUMED TO BE OMITTED IF NOT REPEATED HEREIN.
D. THE NAMING OF A CERTAIN BRAND OR MAKE OR MANUFACTURER IN THE SPECIFICATIONS IS TO ESTABLISH A QUALITY STANDARD FOR THE ARTICLE DESIRED. THE CONTRACTOR IS NOT RESTRICTED TO THE USE OF THE SPECIFIC BRAND OF THE MANUFACTURER NAMED UNLESS SO INDICATED IN THE SPECIFICATIONS.
E. THE ELECTRICAL CONTRACTOR SHALL FURNISH AND PRESENT FIVE (5) COPIES OF SHOP DRAWINGS OR BROCHURES FOR ALL FIXTURES, EQUIPMENT, AND ACCESSORIES TO THE ENGINEER FOR THE ENGINEER'S APPROVAL. CHECKING IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR: DIMENSIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE; FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION; COORDINATION OF HIS WORK WITH THAT OF ALL OTHER TRADES AND THE SATISFACTORY PERFORMANCE OF HIS WORK.
F. THE ELECTRICAL CONTRACTOR SHALL EXAMINE DRAWINGS RELATING TO WORK OF ALL TRADES AND BECOME FULLY INFORMED AS TO EXTENT AND CHARACTER OF WORK REQUIRED AND ITS RELATION TO ALL OTHER WORK IN THE PROJECT.
G. BEFORE SUBMITTING A BID, THE CONTRACTOR SHALL VISIT THE SITE AND EXAMINE ALL ADJOINING EXISTING BUILDINGS, EQUIPMENT AND SPACE CONDITIONS ON WHICH HIS WORK IS IN ANY WAY DEPENDENT FOR THE BEST WORKMANSHIP AND OPERATION ACCORDING TO THE INTENT OF SPECIFICATIONS AND DRAWINGS. HE SHALL REPORT TO THE ARCHITECT ANY CONDITION WHICH MIGHT PREVENT HIM FROM INSTALLING HIS EQUIPMENT IN THE MANNER INTENDED.
H. NO CONSIDERATION OR ALLOWANCE WILL BE GRANTED FOR FAILURE TO VISIT SITE, OR FOR ANY ALLEGED MISUNDERSTANDING OF MATERIALS TO BE FURNISHED OR WORK TO BE DONE.
I. EXISTING CONDUITS, PIPES, EQUIPMENT, ETC.: REFER TO DIVISION I FOR ADDITIONAL REQUIREMENTS. EXISTING CONDUITS, PIPES, UTILITY LINES, TANKS, EQUIPMENT, OR OTHER OBSTRUCTIONS, WHETHER UNDERGROUND, CONCEALED, OR EXPOSED, ARE NOT IN GENERAL INDICATED ON DRAWINGS. PRIOR TO START OF WORK, HAVE EXISTING UTILITY OBSTRUCTIONS CLEARLY MARKED BY UTILITIES LOCATOR SERVICE. PLAN WORK SO AS TO ROUTE AND LOCATE ALL NEW WORK TO AVOID THESE OBSTRUCTIONS. REPAIR OR REPLACE, AT NO COST TO OWNER, EXISTING INSTALLATIONS WHERE DAMAGED, THAT OCCURRED DURING THE COURSE OF CONSTRUCTION.

END OF SECTION 16010

SECTION 16015
ELECTRICAL DRAWINGS AND REFERENCE SYMBOLS

A. THE DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERALLY THE LOCATIONS OF MATERIAL AND EQUIPMENT. THESE DRAWINGS SHALL BE FOLLOWED AS CLOSELY AS POSSIBLE. THE ELECTRICAL CONTRACTOR SHALL COORDINATE THE WORK UNDER THIS SECTION WITH THE ARCHITECTURAL, STRUCTURAL, PLUMBING, HEATING AND AIR CONDITIONING, AND THE DRAWINGS OF OTHER TRADES FOR EXACT DIMENSIONS, CLEARANCES AND ROUGHING-IN LOCATIONS: THIS CONTRACTOR SHALL COOPERATE WITH ALL OTHER TRADES IN ORDER TO MAKE MINOR FIELD ADJUSTMENTS TO ACCOMMODATE THE WORK OF OTHERS. DO NOT RELY ON THE SCALE OF THE DRAWINGS FOR ROUGH-IN MEASUREMENTS, NOR USE THEM AS SHOP DRAWINGS.
B. THE DRAWINGS AND SPECIFICATIONS ARE COMPLEMENTARY, EACH TO THE OTHER, AND THE WORK REQUIRED BY EITHER SHALL BE INCLUDED IN THE CONTRACT AS IF CALLED FOR BY BOTH.
C. IF DIRECTED BY THE ARCHITECT, THE CONTRACTOR SHALL, WITHOUT EXTRA CHARGE, MAKE REASONABLE MODIFICATIONS IN THE LAYOUT AS NEEDED TO PREVENT CONFLICT WITH WORK OF OTHER TRADES OR FOR PROPER EXECUTION OF THE WORK.
D. ELECTRICAL SYMBOLS USED ON THIS PROJECT ARE SHOWN IN A SYMBOL LIST ON THE ACCOMPANYING WORKING DRAWINGS. THIS LIST SHOWS STANDARD SYMBOLS AND ALL MAY NOT APPEAR ON THE PROJECT DRAWINGS; HOWEVER, WHEREVER THE SYMBOL ON PROJECT DRAWINGS OCCURS, THE ITEM SHALL BE PROVIDED AND INSTALLED.

END OF SECTION 16015

SECTION 16020
WORK INCLUDED

A. THE SCOPE OF THE WORK CONSISTS OF ELECTRICAL INSTALLATION AND MODIFICATION AT THE HOTCHKISS SHOP. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO; INSTALLATION OF ELECTRICAL DISTRIBUTION; AND OTHER ITEMS AS CALLED OUT ON THE DRAWINGS FOR THE AREAS OF WORK.THIS WORK WILL ALSO INCLUDE: ELECTRICAL DISTRIBUTION INSTALLATION; POWERING OF MECHANICAL EQUIPMENT; AND OTHER ITEMS AS CALLED OUT ON THE DRAWINGS FOR THE CONSTRUCTION. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL SUPERVISION, LABOR, MATERIALS, EQUIPMENT, MACHINERY, AND ANY AND ALL OTHER ITEMS NECESSARY TO COMPLETE THE SYSTEMS. THE ELECTRICAL CONTRACTOR SHALL NOTE THAT ALL ITEMS OF EQUIPMENT ARE SPECIFIED IN THE SINGULAR; HOWEVER, THE CONTRACTOR SHALL PROVIDE AND INSTALL THE NUMBER OF ITEMS OF EQUIPMENT AS INDICATED ON THE DRAWINGS AND AS REQUIRED FOR COMPLETE SYSTEMS.
B. IT IS THE INTENTION OF THE SPECIFICATIONS AND DRAWINGS TO CALL FOR FINISHED WORK, TESTED AND READY FOR OPERATION.
C. ANY APPARATUS, APPLIANCE, MATERIAL OR WORK NOT SHOWN ON DRAWINGS BUT MENTIONED IN THE SPECIFICATIONS, OR VICE VERSA, OR ANY INCIDENTAL ACCESSORIES NECESSARY TO MAKE THE WORK COMPLETE AND PERFECT IN ALL RESPECTS AND READY FOR OPERATION, EVEN IF NOT PARTICULARLY SPECIFIED, SHALL BE FURNISHED, DELIVERED AND INSTALLED BY THE CONTRACTOR WITHOUT ADDITIONAL EXPENSE TO THE OWNER. WITH SUBMISSION OF BID, THE ELECTRICAL CONTRACTOR SHALL GIVE WRITTEN NOTICE TO THE ARCHITECT: ANY MATERIALS OR APPARATUS BELIEVED INADEQUATE OR UNSUITABLE, IN VIOLATION OF LAWS, ORDINANCES OR RULES; ANY NECESSARY ITEMS OR WORK OMITTED. IN THE ABSENCE OF SUCH WRITTEN NOTICE, IT IS MUTUALLY AGREED THE CONTRACTOR HAS INCLUDED THE COST OF ALL REQUIRED ITEMS IN HIS PROPOSAL, AND THAT HE WILL BE RESPONSIBLE FOR THE APPROVED SATISFACTORY FUNCTIONING OF THE ENTIRE SYSTEM WITHOUT EXTRA COMPENSATION.

END OF SECTION 16020

SECTION 16030
CODES AND FEES

A. ALL MATERIALS AND WORKMANSHIP SHALL COMPLY WITH ALL APPLICABLE CODES, SPECIFICATIONS, LOCAL ORDINANCES, INDUSTRY STANDARDS. UTILITY COMPANY AND FIRE INSURANCE CARRIER'S REQUIREMENTS. CONTACT PROPER AUTHORITIES, OBTAIN AND PAY FOR REQUIRED PERMITS, INSPECTIONS AND UTILITY SERVICE CONNECTIONS. DO NOT INCLUDE ANY UTILITY COMPANY CHARGES THAT CAN BE BILLED DIRECTLY TO THE OWNER.
B. IN CASE OF DIFFERENCE BETWEEN THE BUILDING CODES, SPECIFICATIONS, STATE LAWS, LOCAL ORDINANCES, INDUSTRY STANDARDS, UTILITY COMPANY REGULATIONS, FIRE INSURANCE CARRIER'S REQUIREMENTS, AND THE CONTRACT DOCUMENTS, THE MOST STRINGENT SHALL GOVERN. THE CONTRACTOR SHALL PROMPTLY NOTIFY THE ARCHITECT IN WRITING OF ANY SUCH DIFFERENCE.
C. NONCOMPLIANCE: SHOULD THE CONTRACTOR PERFORM ANY WORK THAT DOES NOT COMPLY WITH THE REQUIREMENTS OF THE APPLICABLE BUILDING CODES, STATE LAWS, LOCAL ORDINANCES, INDUSTRY STANDARDS, FIRE INSURANCE CARRIER'S REQUIREMENTS, AND UTILITY COMPANY REGULATIONS, HE SHALL BEAR THE COST ARISING IN CORRECTING ANY SUCH DEFICIENCY.

END OF SECTION 16030

SECTION 16100
BASIC METHODS AND MATERIALS

SECTION 16101
GENERAL

A. PROTECTION: ALL WORK, MATERIALS AND EQUIPMENT SHALL BE COMPLETELY AND ADEQUATELY PROTECTED AT ALL TIMES. PAY FOR ALL DAMAGE, INJURY OR LOSS, EXCEPT SUCH AS MAY BE DIRECTLY DUE TO ERRORS IN THE CONTRACT DOCUMENTS OR BE CAUSED BY AGENTS OR EMPLOYEES OF THE OWNER. POST EFFECTIVE DANGER SIGNS WARNING AGAINST HAZARDS CREATED BY THE WORK.
B. TRENCHING AND BACKFILLING: PERFORM ALL TRENCHING AND BACKFILL REQUIRED BY WORK UNDER THIS DIVISION OF THE SPECIFICATIONS. TRENCHING AND BACKFILLING SHALL BE DONE IN ACCORDANCE WITH THE "SITE WORK" DIVISION OF THE SPECIFICATIONS AND AS HEREIN SPECIFIED. THIS PORTION OF THE WORK SHALL BE EXECUTED UNDER THE DIRECT SUPERVISION OF THE GENERAL CONTRACTOR. TRENCHES SHALL BE EXCAVATED TO THE DEPTH REQUIRED FOR THE UTILITIES INVOLVED. THE TRENCH BOTTOM SHALL BE GRADED TRUE AND FREE FROM DEBRIS, STONES AND SOFT SPOTS. WHERE DIRECT BURIAL CABLES ARE USED FOUR INCHES OF FINE SAND SHALL BE PLACED IN THE BOTTOM OF THE TRENCH PRIOR TO CABLE PLACEMENT.
C. EQUIPMENT, MATERIALS, INSTALLATION;
   1. ALL EQUIPMENT, ACCESSORIES AND SPECIALTIES CONNECTED TO EQUIPMENT AND ALL ITEMS OF MATERIAL SHALL BE INSTALLED AS RECOMMENDED BY THEIR MANUFACTURERS UNLESS SPECIFICALLY STATED OTHERWISE.
   2. PROVIDE PROPER SUPPORTS, MOUNTS, ETC., AS REQUIRED.
   3. COORDINATE WITH THE GENERAL CONTRACTOR.
   4. OBTAIN INSTRUCTIONS FROM THE ARCHITECT FOR INSTALLATION OF ITEMS NOT COMPLETELY COVERED BY CONTRACT DOCUMENTS OR PUBLISHED MANUFACTURER'S RECOMMENDATIONS.
D. EQUIPMENT FINISH: ALL ELECTRICAL EQUIPMENT SHALL BE FURNISHED FACTORY PAINTED OR FINISHED WITH TWO COATS OF HIGH GRADE ENAMEL AND IN THE MANUFACTURER'S STANDARD COLORS UNLESS OTHERWISE SPECIFIED.
   1. UNPAINTED EQUIPMENT AND MATERIALS, EXCEPT CONDUIT IN CONCEALED SPACES, SHALL BE CLEANED AND PRIMED TO BE PAINTED BY THE PAINTING CONTRACTOR IN ACCORDANCE WITH THE PAINTING SECTION OF THESE SPECIFICATIONS.
   2. THE COLORS OF ALL EXPOSED ELECTRICAL MATERIAL AND APPARATUS SHALL BE AS SELECTED BY THE OWNER.
E. CHASES, SLEEVES, CUTTING, PATCHING
   1. PROVIDE FOR NECESSARY CHASES, HOLES, SLEEVES, BOXES, INSERTS AND HANGERS BY ARRANGEMENT WITH CONTRACTORS OF THE OTHER APPROPRIATE TRADES. PROVIDE "FLAMESEAL" OR OF THE APPROVED FIRESTOPPING MATERIAL AT ALL PENETRATIONS THROUGH RATED WALLS, FLOORS AND CEILINGS.
   2. PROVIDE FOR ALL CUTTING AND PATCHING OF HOLES, OPENINGS, AND NOTCHES. OBTAIN WRITTEN APPROVAL OF THE ARCHITECT BEFORE NOTCHING, BORING, CHIPPING, BURNING, DRILLING, WELDING TO STRUCTURAL MEMBERS.
F. INSPECTION
   1. ALL WORK AND MATERIALS COVERED BY DRAWINGS AND SPECIFICATIONS SHALL BE SUBJECT TO INSPECTION AT ANY AND ALL TIMES BY REPRESENTATIVES OF THE ARCHITECT AND OWNER. IF ANY MATERIAL OR INSTALLATION DOES NOT CONFORM TO THE DRAWINGS AND SPECIFICATIONS, WITHIN THREE DAYS AFTER BEING NOTIFIED BY THE ARCHITECT, REMOVE THE MATERIALS FROM THE PREMISES AND CORRECT THE INSTALLATION TO THE SATISFACTION OF THE ARCHITECT. ASSUME THE ENTIRE COST OF REMOVING AND REPLACING THE MATERIAL AND CORRECTING THE INSTALLATION, INCLUDING CUTTING AND PATCHING THAT MAY BE NECESSARY.
   2. WORK SHALL NOT BE CLOSED IN NOR COVERED BEFORE INSPECTION AND APPROVAL BY THE ARCHITECT. PROVIDE FOR UNCOVERING AND MAKING REPAIRS, AT NO EXTRA COST, WHEN UNINSPECTED WORK HAS BEEN CLOSED IN. NOTIFY THE ARCHITECT WHEN WORK IS READY FOR INSPECTION.
   3. NOTIFY PROPER AUTHORITIES WHEN WORK IS READY FOR ANY INSPECTIONS REQUIRED BY APPLICABLE CODES, RULES AND REGULATIONS, ALLOWING SUFFICIENT TIME FOR INSPECTIONS TO BE MADE WITHOUT HINDERING PROGRESS OF THE WORK, AND FURNISH THE OWNER, WITHOUT ADDITIONAL COSTS, PROPER CERTIFICATES OF ACCEPTANCE FROM SUCH AUTHORITIES.
   4. UPON COMPLETION OF ALL WORK AND ADJUSTMENT OF ALL EQUIPMENT, FINAL INSPECTION SHALL BE MADE UNDER DIRECTION OF THE ARCHITECT. TEST AND OPERATE ALL DEVICES, EQUIPMENT AND SYSTEMS TO DEMONSTRATE THAT THE ELECTRICAL SYSTEM IS COMPLETE AND FUNCTIONAL IN THE MANNER REQUIRED.
G. CLEAN UP
   1. DURING THE COURSE OF THE WORK REMOVE ANY MATERIALS NOT INSTALLED IN THE WORK WHICH CONFLICT WITH THE WORK OF OTHERS IF SO DIRECTED BY THE ARCHITECT.
   2. AT COMPLETION OF WORK CLEAN UP AND REMOVE FROM THE PREMISES ALL DEBRIS AND MATERIALS NOT INSTALLED IN THE WORK SO THE PREMISES WILL BE LEFT CLEAN. WASH AND WIPE CLEAN ALL LIGHTING FIXTURES AND LAMPS WHICH MAY HAVE BECOME SOILED DURING INSTALLATION.
H. RECORD DRAWINGS: AT COMPLETION OF THE WORK FURNISH TO THE ARCHITECT TWO COMPLETE SETS OF ELECTRICAL PRINTS MARKED TO SHOW THE WORK "AS-BUILT".
I. MAINTENANCE AND OPERATING PROCEDURES: UPON COMPLETION OF ALL WORK AND ADJUSTMENT OF ALL EQUIPMENT, INSTRUCT THE OWNER ON THE CORRECT OPERATION AND MAINTENANCE PROCEDURE FOR THE ELECTRICAL SYSTEM IN TOTAL. FURNISH 3 SETS OF TYPED MAINTENANCE MANUALS CONTAINING CUT SHEETS ON ALL EQUIPMENT, TABLES OF FUSES AND FOR WHAT EQUIPMENT, TABLE OF LAMPS AND BALLASTS AND FOR WHAT FIXTURES. INCLUDE A LIST OF CONTACTS WITH PHONE NUMBERS FOR ALL SYSTEMS FOR OWNERS' USE, IN THE EVENT THE ELECTRICAL SYSTEM REQUIRES SERVICE WORK WITHIN THE WARRANTY PERIOD.
J. GUARANTEE: GUARANTEE THAT ALL WORK GOVERNED BY THIS DIVISION SHALL BE NEW AND FREE OF DEFECTIVE WORK, MATERIALS, AND COMPONENTS FOR A PERIOD OF ONE YEAR AFTER WRITTEN ACCEPTANCE. REPAIR, REVISE AND REPLACE DEFECTS AS DIRECTED, WITH NO ADDITIONAL COST TO THE OWNER. (INCANDESCENT LAMPS, FUSES AND ANY EXISTING EQUIPMENT ARE EXEMPT).

END OF SECTION 16101

SECTION 16111
CONDUITS

A. PVC CONDUIT SHALL BE USED FOR ALL UNDERGROUND FEEDERS AND BRANCH CIRCUITS UNLESS OTHERWISE DIRECTED ON PLANS OR AS APPROVED BY NEC. ALL CONDUIT SHALL BE UL APPROVED.
B. CONDUIT SIZES SHALL BE AS INDICATED ON THE DRAWINGS, OR MINIMUM IN ACCORDANCE WITH THE NEC, INCLUDING PROVISION FOR GREEN EQUIPMENT GROUNDING CONDUCTOR USING 3/4 INCH MINIMUM CONDUIT. THE USE OF 1/2 INCH CONDUIT ELSEWHERE MAY BE APPROVED IF CONDITIONS WARRANT.
C. SPECIAL CONDUIT FITTINGS SHALL BE APPROPRIATE FOR EACH APPLICATION AND SHALL BE MANUFACTURED BY T & B OR APPROVED EQUAL.
D. CONDUIT SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE NEC AND SHALL BE INSTALLED IN A NEAT, WORKMANLIKE MANNER.
E. THE ENTIRE CONDUIT SYSTEM SHALL BE INSTALLED TO PROVIDE A CONTINUOUS BOND THROUGHOUT THE SYSTEM.
F. ELECTRICAL METALLIC TUBING (EMT) MAY BE USED FOR BRANCH CIRCUITS AND RACEWAYS OTHER THAN FOR SERVICE ENTRANCE AND MAIN FEEDERS UNLESS PROHIBITED BY THE NEC OR LOCAL ORDINANCES. EMT SHALL BE UL APPROVED, GALVANIZED INSIDE AND OUTSIDE, COMPLYING WITH ANSI C-80.3 FOR ZINC COATED EMT WITH FITTINGS OF THE SAME TYPE MATERIAL AND FINISH, OF THE PRESSURE CONNECTED TYPE FOR EXTERIOR INSTALLATION AND OF THE SET SCREW TYPE FOR INTERIOR INSTALLATION.
G. ALL CONDUIT JOINTS SHALL BE CUT SQUARE, REAMED SMOOTH, AND DRAWN UP TIGHT. BENDS OR OFFSETS SHALL BE MADE WITH AN APPROVED BENDER OR HICKEY, OR HUB-TYPE CONDUIT FITTINGS. NUMBER OF BENDS PER RUN SHALL CONFORM TO THE NEC LIMITATIONS.
H. CONCEALED CONDUITS SHALL BE RUN IN A DIRECT LINE WITH LONG SWEEP BENDS AND OFFSETS. EXPOSED CONDUITS SHALL BE PARALLEL TO AND AT RIGHT ANGLES TO BUILDING LINES, USING CONDUIT FITTINGS FOR ALL TURNS AND OFFSETS.
I. TRANSITIONS BETWEEN NONMETALLIC CONDUITS AND CONDUITS OF OTHER MATERIALS SHALL BE MADE WITH THE MANUFACTURER'S STANDARD ADAPTERS DESIGNED FOR SUCH PURPOSE.
J. EXPOSED CONDUITS SHALL BE SECURELY FASTENED IN PLACE ON MAXIMUM 10 FOOT INTERVALS; AND HANGERS, SUPPORTS OR FASTENERS SHALL BE PROVIDED AT EACH ELBOW AND AT THE END OF EACH STRAIGHT RUN TERMINATING AT A BOX OR CABINET.

END OF SECTION 16111

SECTION 16120
WIRES AND CABLES

A. WIRE AND CABLE SHALL MEET ALL STANDARDS AND SPECIFICATIONS APPLICABLE, AND SHALL BE IN CONFORMANCE WITH THE LATEST EDITION OF THE NEC. INSULATED WIRE AND CABLE SHALL HAVE SIZE, TYPE OF INSULATION, VOLTAGE AND MANUFACTURER'S NAME PERMANENTLY MARKED ON OUTER COVERING AT REGULAR INTERVALS NOT EXCEEDING FOUR FEET. WIRE AND CABLE SHALL BE DELIVERED IN COMPLETE COILS OR REELS WITH IDENTIFYING TAGS, STATING SIZE, TYPE OF INSULATION, ETC.
B. WIRE AND CABLE SHALL BE SUITABLY PROTECTED FROM WEATHER AND OTHER DAMAGE DURING STORAGE AND HANDLING, AND SHALL BE IN FIRST CLASS CONDITION AFTER INSTALLATION.
C. WIRE AND CABLE SHALL BE FACTORY COLOR CODED WITH A SEPARATE COLOR FOR EACH PHASE AND NEUTRAL USED CONSISTENTLY THROUGHOUT THE SYSTEM. COLOR CODING SHALL BE AS REQUIRED BY THE NEC.
D. ALL CONDUCTORS SHALL BE RATED 600 VOLTS, UNLESS OTHERWISE SPECIFIED OR SHOWN ON THE DRAWINGS, OR FOR ELECTRONIC OR COMMUNICATION USE.
E. WIRE AND CABLE FOR VARIOUS APPLICATIONS SHALL BE AS FOLLOWS UNLESS OTHERWISE DESIGNATED:
   1. WIRE #10 AND SMALLER SHALL BE SOLID; WIRE #8 AND LARGER SHALL BE STRANDED.
   2. #12 THRU #6 DRY LOCATIONS: TYPE THHN, 90 DEGREES C.
   3. #12 THRU #6 IN SLABS, UNDERGROUND, OR WET LOCATIONS: TYPE THWN OR TYPE XHHW, 75 DEGREES C.
   4. #4 AND LARGER: TYPE XHHW OR TYPE THWN 75 DEGREES C.
F. WIRE AND CABLE SHALL BE AS MANUFACTURED BY GENERAL ELECTRIC, ANACONDA WIRE & CABLE, ROME CABLE, TRIANGLE CONDUIT & CABLE, OR APPROVED EQUAL. SUBSTITUTION OF WIRE AND CABLE MANUFACTURER SHALL BE ONLY WITH THE APPROVAL OF THE ARCHITECT/ENGINEER.
G. FOR ANY SPECIFIC USE NOT COVERED HERE ABOVE, COMPLY WITH THE NEC IN CONDUCTOR USE.
H. ALL CIRCUITS SHALL BE 2#12 CU + G CU UNLESS OTHERWISE NOTED ON DRAWINGS OR IN SCHEDULES.
I. ALL 15 AND 20 AMP CIRCUITS WITH LENGTHS OVER 150 FT. SHALL HAVE THEIR CONDUCTOR SIZE INCREASED TO #10 FOR VOLTAGE DROP.
J. COMMUNICATION CABLING, OUTLETS AND GEAR TO MEET CAT 6A REQUIREMENTS.

END OF SECTION 16120

SECTION 16121
WIRE CONNECTIONS

A. JOINTS ON BRANCH CIRCUITS SHALL OCCUR ONLY WHERE SUCH CIRCUIT DIVIDE AS INDICATED ON PLANS AND SHALL CONSIST OF ONE THROUGH CIRCUIT TO WHICH SHALL BE SPLICED THE BRANCH FROM THE CIRCUIT. IN NO CASE SHALL JOINTS IN BRANCH CIRCUITS BE LEFT FOR THE FIXTURE HANGER TO MAKE. NO SPLICES SHALL BE MADE IN CONDUCTOR EXCEPT AT OUTLET BOXES, JUNCTION BOXES, OR SPLICE BOXES.
B. ALL JOINTS OR SPLICES FOR #10 AWG OR SMALLER SHALL BE MADE WITH UL APPROVED WIRE NUTS OR COMPRESSION TYPE CONNECTORS.
C. ALL JOINTS OR SPLICES FOR #8 AWG OR LARGER SHALL BE MADE WITH A MECHANICAL COMPRESSION CONNECTOR. AFTER THE CONDUCTORS HAVE BEEN MADE MECHANICALLY AND ELECTRICALLY SECURE, THE ENTIRE JOINT OR SPLICE SHALL BE COVERED WITH SCOTCH #33 TAPE OR APPROVED EQUAL TO MAKE THE INSULATION OF THE JOINT OR SPLICE EQUAL TO THE INSULATION OF THE CONDUCTORS. THE CONNECTOR SHALL BE UL APPROVED.

END OF SECTION 16121

SECTION 16125
PULLING CABLES

A. INSTALL CONDUCTORS IN ALL RACEWAYS AS REQUIRED, UNLESS OTHERWISE NOTED, IN A NEAT AND WORKMANLIKE MANNER. ALL EMPTY CONDUITS SHALL HAVE A #14 GALVANIZED PULL WIRE OR NYLON PULLCORD LEFT IN PLACE FOR FUTURE USE.
B. CONDUCTORS SHALL BE COLOR CODED IN ACCORDANCE WITH THE NEC. MAINS, FEEDERS, SUBFEEDERS SHALL BE TAGGED IN ALL PULL, JUNCTION, AND OUTLET BOXES AND IN THE GUTTER OF PANELS WITH APPROVED CODE TYPE WIRE MARKERS.
C. NO LUBRICANT OTHER THAN POWDERED SOAPSTONE OR APPROVED PULLING COMPOUND MAY BE USED TO PULL CONDUCTORS.
D. AT LEAST EIGHT (8) INCHES OF SLACK WIRE SHALL BE LEFT IN EVERY OUTLET BOX WHETHER IT BE IN USE OR LEFT FOR FUTURE USE.
E. ALL CONDUCTORS AND CONNECTIONS SHALL TEST FREE OF GROUNDS, SHORTS AND OPENS BEFORE TURNING THE JOB OVER TO THE OWNER.
F. PULL BOXES SHALL BE REQUIRED IN RUNS OVER 100 FEET OR WHEN MORE THAN THREE 90-DEGREE BENDS ARE USED, OR AS INDICATED ON THE DRAWINGS.
G. FEEDERS ARE TO BE RUN ABOVE GROUND TO ALL POWER PANELS AND LIGHTING PANELS, UNLESS INDICATED OTHERWISE ON DRAWINGS.
H. WHERE MOTORS HAVE CONDUIT TERMINAL BOXES, FEEDERS SHALL BE CONNECTED TO SAME BY FLEXIBLE MEANS.
I. ALL MOTORS WITH SLIDING BASE MOUNTINGS SHALL HAVE NOT LESS THAN 18 INCHES NOR MORE THAN 6 FEET OF CONDUIT CONNECTING RIGID CONDUIT FEED TO MOTOR TERMINAL BOX.
J. CONDUCTOR SPLICES SHALL BE MADE ONLY IN JUNCTION BOXES, TERMINAL BOXES, OR PULL BOXES.

END OF SECTION 16125

SECTION 16133
OUTLET BOXES

ALL OUTLET BOXES FOR CONCEALED WIRING SHALL BE SHEET METAL,
A. GALVANIZED OR CADMIUM PLATED, AT LEAST 1 INCHES DEEP, SINGLE OR GANGED, OF SIZE TO ACCOMMODATE DEVICES AND NUMBER OF CONDUCTORS NOTED. BOXES SHALL BE EQUIPPED WITH PLASTER RING OR COVER AS NECESSARY. ALL OUTLET BOXES SHALL BE MANUFACTURED BY STEEL CITY OR APPROVED EQUAL.
B. BOXES FOR EXPOSED WIRING SHALL BE MALLEABLE IRON, CADMIUM FINISH, OR CAST ALUMINUM ALLOY, AS MANUFACTURED BY STEEL CITY, AND SHALL NOT BE LESS THAN 4 INCHES SQUARE BY 1 INCHES DEEP UNLESS OTHERWISE NOTED.
C. FIXTURE OUTLET BOXES SHALL BE MINIMUM 4 INCH OCTAGONAL AND, WHERE REQUIRED AS OUTLET AND JUNCTION BOXES, THEY SHALL BE 4 11/16 INCHES BY 2 1/8 INCHES DEEP.

END OF SECTION 16133

SECTION 16190
SUPPORTING DEVICES

A. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL METALLIC SUPPORTS AS REQUIRED FOR THE PROPER INSTALLATION OF RACEWAY SYSTEMS AND ALL OTHER EQUIPMENT INSTALLED UNDER THIS DIVISION OF THE CONTRACT CONFORMING TO THE LATEST EDITION OF THE NEC.
B. CONDUIT SHALL BE SUPPORTED ON APPROVED TYPES OF WALL BRACKETS, CEILING TRAPEZES, STRAP HANGERS OR PIPE SUPPORTS, SECURED BY MEANS OF TOGGLE BOLTS IN HOLLOW MASONRY WALLS OR UNITS. EXPANSION BOLTS WILL BE USED IN CONCRETE OR BLOCK, MACHINE SCREWS ON METAL SURFACES, AND WOOD SCREWS ON WOOD CONSTRUCTION.
C. CONDUIT SHALL BE SECURELY FASTENED TO ALL SHEET METAL OUTLETS, JUNCTION AND PULL BOXES WITH TWO GALVANIZED LOCKNUTS AND BUSHING, CARE BEING TAKEN TO SEE THAT THE FULL NUMBER OF THREADS PROJECT THROUGH TO PERMIT THE BUSHING TO BE DRAWN TIGHT AGAINST THE END OF THE CONDUIT, AFTER WHICH THE LOCKNUTS SHALL BE MADE TIGHT SUFFICIENTLY TO DRAW THEM INTO FIRM ELECTRICAL CONTACT WITH THE OUTLET BOX. INSTALL A PLASTIC BUSHING ON END OF PIPE THREADS PROTRUDING INTO JUNCTION BOXES AND OTHER ENCLOSURES TO PROTECT CABLING.
D. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SUPPORTS REQUIRED FOR THE ELECTRICAL EQUIPMENT AND CONDUIT.

END OF SECTION 16190

SECTION 16195
ELECTRICAL IDENTIFICATION

A. THE ELECTRICAL CONTRACTOR SHALL MAINTAIN ACCURATE RECORDS OF ALL DEVIATIONS IN WORK AS ACTUALLY INSTALLED FROM WORK INDICATED ON THE DRAWINGS. UPON COMPLETION OF THE PROJECT, TWO (2) COMPLETE SETS OF MARKED-UP PRINTS SHALL BE DELIVERED TO THE ARCHITECT.
B. IDENTIFICATION OF EQUIPMENT
   1. PROVIDE AND INSTALL LAMINATED BLACK AND WHITE LAMACOID NAMEPLATES FOR ALL SERVICE SWITCHES, DISTRIBUTION SWITCHES, DISTRIBUTION SWITCHBOARDS, BRANCH CIRCUIT PANELBOARDS, SAFETY SWITCHES, CABINETS, STARTERS, AND OTHER EQUIPMENT WITH THEIR CORRECT DESIGNATION. LABEL EQUIPMENT IN AREAS ACCESSIBLE TO THE PUBLIC ON INSIDE OF ENCLOSURE ONLY. NAMEPLATES SHALL BE FIRMLY SECURED TO FRONT COVER OR DOOR WITH TWO PROPERLY SIZED POP RIVETS.
   2. MOUNT A TYPEWRITTEN DIRECTORY BEHIND PLASTIC ON THE INSIDE OF EACH BRANCH CIRCUIT PANEL DOOR, GIVING THE NUMBER, DESCRIPTION AND LOCATION OF THE CIRCUIT CONTROLLED BY EACH CIRCUIT BREAKER. REVISE EXISTING DIRECTORIES TO REFLECT CIRCUIT MODIFICATIONS UNDER THIS CONTRACT.
   3. ALL FUSED SAFETY SWITCHES AND FUSED SWITCH UNITS IN SWITCHBOARDS SHALL INDIVIDUALLY BEAR A FUSE LABEL SHOWING PROPER SIZE AND TYPE OF FUSE TO BE USED.
   4. INSTALL WIRING DIAGRAMS ON THE INSIDE COVER OF ALL STARTERS, SWITCHES AND OTHER SUCH EQUIPMENT. SUCH DIAGRAMS SHALL NOT BE HANDWRITTEN.
   5. ALL JUNCTION BOXES WITH BLANK COVERS SHALL HAVE CIRCUITS CONTAINED THEREIN IDENTIFIED BY MEANS OF PERMANENT BLACK "MAGIC MARKER" ON THE COVER.

END OF SECTION 16195

SECTION 16199
ELECTRONIC EQUIPMENT

A. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION AND CONNECTION OF A PROPER POWER SUPPLY TO ALL ELECTRONIC EQUIPMENT FURNISHED BY OTHERS. HE SHALL VERIFY ALL VOLTAGE, FREQUENCY, ETC., REQUIREMENTS PRIOR TO ENERGIZING THE CIRCUIT. THOSE INSTALLING THE EQUIPMENT WILL BE RESPONSIBLE FOR THE PROPER OPERATION OF THE EQUIPMENT PROVIDED THE PROPER POWER SUPPLY CIRCUIT IS INSTALLED BY THE ELECTRICAL CONTRACTOR.
B. PROVIDE TELEPHONE LINES TO EQUIPMENT CONTROL PANELS WITH MODEM ACCESS. COORDINATE WITH MECHANICAL CONTRACTOR.

END OF SECTION 16199

SECTION 16400
SERVICE AND DISTRIBUTION

SECTION 16401
GENERAL

A. THE ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL RELATED DISTRIBUTION EQUIPMENT AS INDICATED ON THE FLOOR PLAN, DIAGRAMS, SCHEDULES, AND NOTES. ALL EQUIPMENT SHALL BE NEW AND UL LISTED.
B. RELATED DOCUMENTS: DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATIONS SECTION, APPLY TO WORK OF THIS SECTION.

END OF SECTION 16401

SECTION 16440
DISCONNECT SWITCHES

A. THE ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL SAFETY SWITCHES AS INDICATED ON THE DRAWINGS OR AS REQUIRED. ALL SAFETY SWITCHES SHALL BE UL LISTED.
   1. THE SWITCHES SHALL BE FUSED SAFETY SWITCHES (FSS) OR NON-FUSED SAFETY SWITCHES (NFSS) AS SHOWN ON THE DRAWINGS OR REQUIRED AND SHALL BE MANUFACTURED BY SIEMENS, SQUARE D, OR APPROVED EQUAL.
   2. SWITCHES SHALL HAVE A QUICK-MAKE AND QUICK-BREAK OPERATING HANDLE AND MECHANISM WHICH SHALL BE AN INTEGRAL PART OF THE BOX. PADLOCKING PROVISIONS SHALL BE PROVIDED FOR PADLOCKING IN THE OFF POSITION WITH AT LEAST THREE PADLOCKS. SWITCHES SHALL BE HORSEPOWER RATED FOR 250 VOLTS AC OR DC OR 600 VOLTS AC AS REQUIRED. LUGS SHALL BE UL LISTED FOR COPPER AND ALUMINUM CABLE.
   3. SWITCHES SHALL BE FURNISHED IN NEMA I GENERAL PURPOSE ENCLOSURES WITH KNOCKOUTS UNLESS OTHERWISE NOTED OR REQUIRED. SWITCHES LOCATED ON THE EXTERIOR OF THE BUILDING OR IN "WET" LOCATIONS SHALL HAVE NEMA 3R ENCLOSURES (WP).
   4. THE SAFETY SWITCHES SHALL BE SECURELY MOUNTED IN ACCORDANCE WITH THE NEC. THE CONTRACTOR SHALL PROVIDE ALL MOUNTING MATERIALS AND INSTALL FUSES IN THE FSS. THE FUSES SHALL BE DUAL ELEMENT ON MOTOR CIRCUITS.

END OF SECTION 16440

SECTION 16450
GROUNDING

A. THE CONDUIT SYSTEMS AND NEUTRAL CONDUCTOR FOR THE WIRING SYSTEM, AND THE TELEPHONE SYSTEM SHALL BE SECURELY GROUNDED. THE GROUNDS SHALL BE NEC GROUNDS IN EACH CASE.
B. A GROUND SHALL BE ESTABLISHED AND TESTS CARRIED OUT TO INDICATE THAT SATISFACTORY GROUND HAS BEEN ESTABLISHED IN ACCORDANCE WITH THE NEC.
C. WRITTEN RESULTS OF THIS TEST SHALL BE FORWARDED TO THE ENGINEER BEFORE CONNECTION TO THE SERVICE.

END OF SECTION 16450

SECTION 16470
PANELBOARDS

A. FURNISH AND INSTALL DISTRIBUTION AND POWER PANELBOARDS AS INDICATED IN THE PANELBOARD SCHEDULE AND WHERE SHOWN ON THE DRAWINGS. PANELBOARDS SHALL BE DEAD-FRONT SAFETY TYPE, EQUIPPED WITH QUICK-MAKE, QUICK-BREAK FUSIBLE BRANCH SWITCHES AND APPROVED FOR SERVICE ENTRANCE. THE ACCEPTABLE MANUFACTURERS OF THE PANELBOARD ARE SIEMENS, SQUARE D, AND GE, PROVIDED THEY ARE FULLY EQUAL TO THE TYPE LISTED ON THE DRAWINGS. THE PANELBOARD SHALL BE UL LISTED AND BEAR THE UL LABEL.
B. ALL FUSIBLE BRANCH SWITCHES SHALL BE QUICK-MAKE, QUICK BREAK, WITH VISIBLE BLADES AND DUAL HORSEPOWER RATINGS SWITCH HANDLES SHALL PHYSICALLY INDICATE ON AND OFF POSITIONS. SUCH HANDLES SHALL ALSO BE ABLE TO ACCEPT THREE PADLOCKS HAVING HEAVY-DUTY INDUSTRIAL TYPE SHACKLES. COVERS SHALL BE INTERLOCKED WITH THE SWITCH HANDLES TO PREVENT OPENING IN THE ON POSITION. A MEANS SHALL BE PROVIDED TO ALLOW AUTHORIZED PERSONNEL TO RELEASE THE INTERLOCK FOR INSPECTION PURPOSES WHEN A SWITCH IS ON. A CARDHOLDER, PROVIDING CIRCUIT IDENTIFICATION, SHALL BE MOUNTED ON EACH BRANCH SWITCH. SWITCHES SHALL BE PROVIDED WITH FUSES OR AS NOTED ON THE DRAWINGS.
C. PANELBOARD BUS STRUCTURE AND MAIN LUGS OR MAIN SWITCH SHALL HAVE CURRENT RATINGS AS SHOWN ON THE PANELBOARD SCHEDULE. THE BUS STRUCTURE SHALL ACCOMMODATE PLUG-ON OR BOLTED BRANCH SWITCHES AND MOTOR STARTERS AS INDICATED IN THE PANELBOARD SCHEDULE WITHOUT MODIFICATION TO THE BUS ASSEMBLY. PROVIDE SOLID NEUTRAL ASSEMBLY (S/N).
D. SWITCHES AND PANELBOARD BUS STRUCTURE SHALL SAFELY AND WITHOUT FAILURE WITHSTAND SHORT CIRCUITS ON THE SYSTEMS CAPABLE OF DELIVERING UP TO 100,000 AMPERES RMS SYMMETRICAL, UNLESS OTHERWISE NOTED.
E. PANELBOARD ASSEMBLY SHALL BE ENCLOSED IN A STEEL CABINET. THE RIGIDITY AND GAUGE OF STEEL TO BE AS SPECIFIED IN UL STANDARD FOR CABINETS. THE SIZE OF WIRING GUTTERS SHALL BE IN ACCORDANCE WITH UL STANDARD. CABINETS SHALL BE EQUIPPED WITH A FRONT DOOR AND HAVE FULLY CONCEALED, SELF-ALIGNING TRIM CLAMPS. FRONTS SHALL BE FULL-FINISHED STEEL WITH RUST INHIBITING PRIMER AND BAKED ENAMEL FINISH.
F. TERMINALS FOR FEEDER CONDUCTORS TO THE PANELBOARD MAINS AND NEUTRAL SHALL BE SUITABLE FOR THE TYPE OF CONDUCTOR SPECIFIED. TERMINALS FOR BRANCH CIRCUIT WIRING, BOTH BREAKER AND NEUTRAL, SHALL BE SUITABLE FOR THE TYPE OF CONDUCTOR SPECIFIED.
G. BEFORE INSTALLING PANELBOARDS CHECK ALL OF THE ARCHITECTURAL DRAWINGS FOR POSSIBLE CONFLICT OF SPACE AND ADJUST THE LOCATION OF THE PANELBOARD TO PREVENT SUCH CONFLICT WITH OTHER ITEMS.
H. THE PANELBOARDS SHALL BE MOUNTED IN ACCORDANCE WITH THE NEC. THE ELECTRICAL CONTRACTOR SHALL FURNISH ALL MATERIAL FOR MOUNTING THE PANELBOARDS.

END OF SECTION 16470

SECTION 16471
BRANCH CIRCUIT PANELBOARD

A. POWER AND LIGHTING PANELS SHALL BE OF THE DEAD-FRONT, SAFETY TYPE, WITH THERMAL MAGNETIC, QUICK-MAKE, QUICK-BREAK, TRIP FREE, BOLTED-TYPE MOLDED CASE CIRCUIT BREAKERS. VOLTAGE RATINGS, NUMBER OF POLES, FRAME SIZE, TRIP RATINGS, MAIN BREAKER OR LUGS, NEUTRAL BUS, AND GROUND BUS ARE ALL AS SHOWN ON THE DRAWINGS. BUS BARS SHALL BE RECTANGULAR, SOLID COPPER, SECURELY MOUNTED AND BRACED. ALL CONNECTIONS TO BUS BARS SHALL BE SECURELY BOLTED. CABINET BOXES SHALL BE CONSTRUCTED OF CODE GRADE GALVANIZED STEEL, SIZED TO PROVIDE MINIMUM 4-INCH WIDE WIRING GUTTERS ON SIDES, TOP AND BOTTOM. FRONTS SHALL BE CONSTRUCTED OF CODE GRADE STEEL, ADJUSTABLE INDICATING TRIM CLAMPS AND WITH DOOR PROVIDED WITH CONCEALED HINGES AND CYLINDER TYPE LOCK AND CATCH. TWO KEYS PER PANEL SHALL BE FURNISHED, AND ALL LOCKS KEYED ALIKE. FRONT SHALL BE FINISH PAINTED BLUE-GRAY.
B. POWER PANELS SHALL BE SIEMENS, TYPE S1, S2, S3, SE, OR ENGINEER APPROVED EQUAL, WITH BRANCH BREAKERS, MAIN BREAKERS OR LUGS, NEUTRAL AND GROUND BUSES, ETC., ALL AS SHOWN ON THE DRAWINGS.
C. POWER AND LIGHTING PANEL CONSTRUCTION DETAILS SHALL BE IN ACCORDANCE WITH UL STANDARDS AND SHALL CONFORM TO NEMA STANDARDS. THEY SHALL BEAR THE UL LABEL. PANELS SHALL MEET FEDERAL SPECIFICATIONS W-P-115A, TYPE 1, CLASS I.
D. ALL PANEL DIRECTORIES SHALL BE TYPED AND TERMINOLOGY APPROVED BY THE OWNER.

END OF SECTION 16471

SECTION 16475
OVERCURRENT PROTECTIVE DEVICES

A. THE ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL WHERE INDICATED ON THE DRAWINGS OR AS REQUIRED BY THE NEC MOLDED CASE CIRCUIT BREAKERS IN A NEMA TYPE 1 ENCLOSURE. BREAKERS SHALL BE MANUALLY OPERATED, TRIP-FREE AND DESIGNED SO THAT ALL POLES OPEN SIMULTANEOUSLY. TRIPPING MECHANISM SHALL BE (THERMALLY, MAGNETICALLY) OPERATED, SHALL OPEN INSTANTANEOUSLY ON SHORT CIRCUITS AND HAVE TIME DELAY ON OVERLOADS, AND HAVE EFFECTIVE SCALING AGAINST TAMPERING. BREAKERS SHALL BE AS CALLED FOR ON THE DRAWINGS OR IN THE PANELBOARD SCHEDULE AND AS MANUFACTURED BY SIEMENS, SQUARE D, OR APPROVED EQUAL.
B. FUSES, UNLESS INDICATED OTHERWISE, SHALL BE DUAL ELEMENT, TIME LAG, CARTRIDGE TYPE AS MANUFACTURED BY BUSSMAN. FUSES FOR MOTOR CIRCUITS SHALL BE SIZED IN ACCORDANCE WITH THE NEC. LABELS INDICATING THE SIZE AND TYPE OF REPLACEMENT FUSES SHALL BE GLUED TO INSIDE OF DOOR ON ALL FUSIBLE SWITCHES AND PANELBOARDS.
C. ALL FUSES SHALL BE OF THE CURRENT AND VOLTAGE RATING AS REQUIRED OR INDICATED.
D. SPARES: SPARE FUSES AMOUNTING TO 10% (MINIMUM THREE) OF EACH TYPE AND RATING SHALL BE SUPPLIED BY THE ELECTRICAL CONTRACTOR. THESE SHALL BE TURNED OVER TO THE OWNER UPON PROJECT COMPLETION.

END OF SECTION 16475

SECTION 16900
CONTROLS AND INSTRUMENTATION

SECTION 16901
GENERAL

A. ALL EQUIPMENT AND MATERIALS USED IN RELATION TO CONTROL WORK FOR THE PROJECT SHALL BE NEW AND SHALL BEAR THE MANUFACTURER'S NAME AND TRADE NAME. THE EQUIPMENT AND MATERIAL SHALL BE ESSENTIALLY THE STANDARD PRODUCT OF A MANUFACTURER REGULARLY ENGAGED IN THE PRODUCTION OF THE REQUIRED TYPE OF EQUIPMENT AND SHALL BE THE MANUFACTURER'S LATEST APPROVED DESIGN.
B. THE ELECTRICAL CONTRACTOR SHALL RECEIVE AND PROPERLY STORE THE EQUIPMENT AND MATERIAL PERTAINING TO THE ELECTRICAL WORK. THE EQUIPMENT SHALL BE TIGHTLY COVERED AND PROTECTED AGAINST DIRT, WATER, CHEMICAL OR MECHANICAL INJURY AND THEFT. THE MANUFACTURER'S DIRECTIONS SHALL BE FOLLOWED COMPLETELY IN THE DELIVERY, STORAGE, PROTECTION AND INSTALLATION OF ALL EQUIPMENT AND MATERIALS.
C. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL ALL ITEMS NECESSARY FOR THE COMPLETE INSTALLATION OF THE EQUIPMENT AS RECOMMENDED OR AS REQUIRED BY THE MANUFACTURER OF THE EQUIPMENT OR REQUIRED BY CODE WITHOUT ADDITIONAL COST TO THE OWNER, REGARDLESS OF WHETHER THE ITEMS ARE SHOWN ON THE PLANS OR COVERED IN THE SPECIFICATIONS.
D. IT SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO CLEAN THE ELECTRICAL EQUIPMENT, MAKE NECESSARY ADJUSTMENTS AND PLACE THE EQUIPMENT INTO OPERATION BEFORE TURNING EQUIPMENT OVER TO OWNER. ANY PAINT THAT WAS SCRATCHED DURING CONSTRUCTION SHALL BE "TOUCHED-UP" WITH FACTORY COLOR PAINT TO THE SATISFACTION OF THE ARCHITECT. ANY ITEMS THAT WERE DAMAGED DURING CONSTRUCTION SHALL BE REPLACED.
E. GENERAL
   1. UNLESS OTHERWISE INDICATED ALL HEATING, VENTILATING, AIR CONDITIONING, PLUMBING, AND OTHER MECHANICAL EQUIPMENT, MOTORS, AND CONTROLS SHALL BE FURNISHED, SET IN PLACE AND WIRED AS FOLLOWS:

RESPONSIBLE DIVISION

ITEM	FURNISHED	SET	POWER-WIRED	CONTROL-WIRED
EQUIPMENT	15	15	16	--
COMBINATION MAGNETIC MOTOR STARTERS, MAGNETIC MOTOR STARTERS AND CONTACTORS .	15	16	16	15
FUSED AND UNFUSED DISCONNECT SWITCHES, THERMAL OVERLOAD SWITCHES AND HEATERS, MANUAL MOTOR STARTERS	16(1)	16(1)	16	--
MANUAL-OPERATING AND MULTI-SPEED SWITCHES . .	15	16	16	16
CONTROLS, RELAYS, TRANSFORMERS . . .	15	15	16	15
THERMOSTATS (LOW VOLTAGE) AND TIME SWITCHES . . .	15	15	16	15
THERMOSTATS (LINE VOLTAGE) .	15	15	16	16
TEMPERATURE CONTROL PANELS .	15	15	16	15
MOTOR AND SOLENOID VALVES, DAMPER MOTORS, PE & EP SWITCHES	15	15(2)	--	15(2)
PUSH-BUTTON STATIONS AND PILOT LIGHTS	15	15(2)	--	15(2)
HEATING, COOLING, VENTILATION AND AIR CONDITIONING CONTROLS	15	15	16	15
EXHAUST FAN SWITCHES . .	15	16	16	15(2)

SUBSCRIPT FOOTNOTES:
1) GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL SUBCONTRACTOR WORK.
2) UNDER DIVISION 15 IF FURNISHED FACTORY-WIRED AS PART OF EQUIPMENT OR IF FURNISHED WITH COMBINATION STARTERS.
3) IF ITEM IS FOR LINE VOLTAGE, SET IN PLACE AND CONNECT UNDER DIVISION 16. WHERE FACTORY MOUNTED ON EQUIPMENT OR ATTACHED TO PIPING OR DUCTS AND USING LINE VOLTAGE FURNISH AND SET UNDER DIVISION 15, CONNECT UNDER DIVISION 16.

   2. VERIFY LOCATION AND NAMEPLATE DATA OF ALL MECHANICAL EQUIPMENT WITH THE MECHANICAL CONTRACTOR PRIOR TO INSTALLING ELECTRICAL FACILITIES. BE RESPONSIBLE FOR COORDINATION OF REVISIONS AND MODIFICATIONS NECESSARY TO PROPERLY SUPPLY ELECTRICAL FACILITIES TO HEATING, VENTILATING, AIR CONDITIONING, PUMPS, MOTORS, CONTROLS, AND OTHER MECHANICAL EQUIPMENT INSTALLED IN PLACE OF EQUIPMENT SPECIFIED. REQUIRED ELECTRICAL FACILITIES CHANGES SHALL BE CONSIDERED TO BE A PART OF THE MECHANICAL CONTRACT.
   3. PROVIDE EACH MOTOR WITH A HORSEPOWER RATED DISCONNECT SWITCH AND MOTOR RUNNING OVERCURRENT PROTECTION PER N.E.C. 430-37. TO FACILITATE EASE AND SAFETY OF OPERATION AND MAINTENANCE OF MECHANICAL EQUIPMENT, LOCATE THE DISCONNECT SWITCH IMMEDIATELY ADJACENT TO THE MOTOR, UNLESS OTHERWISE INDICATED. SIZE THERMAL OVERLOAD HEATER UNITS FOR APPROXIMATELY 115% OF FULL LOAD MOTOR CURRENT. SIZE FUSES IN ACCORDANCE WITH THE ACTUAL MOTOR NAMEPLATE RATING AND AS RECOMMENDED BY THE BUSSMAN MFG. CO. CHECK AND COORDINATE ALL STARTERS, FUSES, AND OTHER MOTOR-RUNNING PROTECTIVE DEVICES WITH THE EQUIPMENT THEY CONTROL, AND PROVIDE AND INSTALL THE CORRECT SIZE PROTECTIVE ELEMENTS AS REQUIRED.
   4. DO NOT CONNECT MOTORS WHICH ARE OF A VOLTAGE RATING DIFFERENT THAN SUPPLY VOLTAGE. REPORT SAME TO THE ARCHITECT IN WRITING AND OBTAIN WRITTEN INSTRUCTIONS FOR RESOLUTION.
   5. USE FLEXIBLE CONDUIT FOR ALL CONNECTIONS TO DEVICES DIRECTLY ATTACHED TO DUCTS, PIPING AND MECHANICAL EQUIPMENT.

END OF SECTION 16901

SECTION 16950
TESTING

A. AS SOON AS ELECTRIC POWER IS AVAILABLE AND CONNECTED TO SERVE THE EQUIPMENT IN THE BUILDING, AND EVERYTHING IS READY FOR FINAL TESTING AND PLACING IN SERVICE, A COMPLETE OPERATIONAL TEST SHALL BE MADE. THE CONTRACTOR SHALL FURNISH ALL NECESSARY INSTRUMENTS AND EQUIPMENT AND MAKE ALL TESTS, ADJUSTMENTS, AND TRIAL OPERATIONS REQUIRED TO PLACE THE SYSTEM IN BALANCED AND SATISFACTORY OPERATING CONDITION; FURNISH ALL NECESSARY ASSISTANCE AND INSTRUCTIONS TO PROPERLY INSTRUCT THE OWNER'S AUTHORIZED PERSONNEL IN THE OPERATION AND CARE OF THE SYSTEM.
B. PRIOR TO TESTING THE SYSTEM, THE FEEDERS AND BRANCH CIRCUITS SHALL BE CONTINUOUS FROM MAIN FEEDERS TO MAIN PANELS, TO SUBPANELS, TO OUTLETS, WITH ALL BREAKERS AND FUSES IN PLACE. THE SYSTEM SHALL BE TESTED FREE FROM SHORTS AND GROUNDS. SUCH TESTS SHALL BE MADE IN THE PRESENCE OF THE ENGINEER'S REPRESENTATIVE.
C. NO CIRCUITS SHALL BE ENERGIZED WITHOUT THE OWNER'S APPROVAL.
D. THE RIGHT IS RESERVED TO INSPECT AND TEST ANY PORTION OF THE EQUIPMENT AND/OR MATERIALS DURING THE PROGRESS OF ITS ERECTION. THE CONTRACTOR SHALL FURTHER TEST ALL WIRING AND CONNECTIONS FOR CONTINUITY AND GROUNDS BEFORE CONNECTING ANY FIXTURES OR EQUIPMENT.
E. THE CONTRACTOR SHALL TEST THE ENTIRE SYSTEM IN THE PRESENCE OF THE ARCHITECT OR HIS ENGINEER WHEN THE SYSTEM IS FINALLY COMPLETED TO INSURE THAT ALL PORTIONS ARE FREE FROM SHORT CIRCUITS OR GROUND FAULTS.

END OF SECTION 16950

SECTION 16980
DEMONSTRATION OF ELECTRICAL EQUIPMENT

A. THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE ARCHITECT WITH CERTIFICATION OF THE INSPECTION AND APPROVAL OF AN ACTIVE MEMBER OF THE INTERNATIONAL ASSOCIATION OF ELECTRICAL INSPECTORS OF ALL WORK COMPLETED AND INCLUDED IN THE SECTION, IF REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE INSPECTOR WHEN WORK REACHES INSPECTION STAGE.
B. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE LOCAL AUTHORITY HAVING JURISDICTION IN ORDER THAT LOCAL INSPECTION MAY BE CARRIED OUT AT THE PROPER STAGE.
C. THE ELECTRICAL CONTRACTOR SHALL PAY FOR ALL PERMITS, INSPECTION FEES, AND INSTALLATION FEES AS REQUIRED TO COMPLETE THE WORK UNDER THIS SECTION OF THE CONTRACT.
D. THIS CONTRACTOR SHALL GUARANTEE THE MATERIALS AND WORKMANSHIP FOR A PERIOD OF TWELVE (12) MONTHS FROM THE TIME THE INSTALLATION IS ACCEPTED BY THE OWNER. IF, DURING THIS TIME, ANY DEFECTS SHOULD SHOW UP DUE TO ANY DEFECTIVE MATERIALS, WORKMANSHIP, NEGLIGENCE OR WANT OF PROPER CARE ON THE PART OF THIS CONTRACTOR, HE SHALL FURNISH ANY NEW MATERIALS AS NECESSARY, REPAIR SAID DEFECTS, AND PUT THE SYSTEM IN ORDER AT HIS OWN EXPENSE ON RECEIPT OF NOTICE OF SUCH DEFECTS FROM THE ARCHITECT. THIS SPECIFICATION IS NOT INTENDED TO IMPLY THAT THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR NEGLIGENCE OF THE OWNER.

END OF SECTION 16980
END OF DIVISION

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TOWN OF HOTCHKISS
PUBLIC WORKS FACILITY
TBD BARROW MESA RD
HOTCHKISS, COLORADO

DATE:	ISSUED FOR:
03/21/19	REVISED 50% DD

DATE:	03/21/19
JOB NO:	18-159
DRAWN BY:	BCE
CHECKED BY:	BCE
SCALE:	AS SHOWN
SHEET NUMBER:	E2-4

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