

WYOMING STATE HOSPITAL PRE-ENGINEERED METAL BUILDING
SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.
- B. Wyoming Public Works Standard Specifications (2023).
- C. Wyoming Standard Specifications for Road and Bridge Construction (WYDOT 2021).

1.2 DEFINITIONS

- A. Demolish: Completely remove and legally dispose of off-site. Demolition of concrete and asphalt shall include demolition of the existing base, subbase and subgrade, as needed, for new construction.
- B. Existing to Remain: Leave existing items that are not to be demolished or removed and that are not otherwise indicated to be salvaged or reinstalled.
- C. Owners' Representative shall have the same meaning as "Engineer".

1.3 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes the property of the Contractor and shall be properly disposed of off-site, unless specifically called out elsewhere in the contract documents.

1.4 FIELD CONDITIONS

- A. Before demolition, the Owner will remove the following items from the site:
 - 1. NONE.
- B. Notify the Owners' Representative of discrepancies between existing conditions and drawings before proceeding with demolition.
- C. Owner and staff will occupy portions of the property immediately adjacent to demolition areas. Conduct selective demolition so that Owner and staff operations will not be disrupted.
- D. Litter: The Contractor shall be responsible for removing any demolition debris or mud from any adjacent property, street, alley, or right-of-way resulting from the execution of the demolition work as a continuous and ongoing process each day.

1.5 COORDINATION

- A. Arrange demolition schedule so as not to interfere with the operations of Owner and staff or adjacent property and streets.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Continuous monitoring and maintenance of traffic control.
- C. Continuous monitoring and maintenance of dust control.
- D. Continuous monitoring and maintenance of erosion control measures (BMPs).

2.2 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and roadways to remain.
- B. Asphalt, Sidewalks, Curb, and Gutters: The Contractor shall be responsible for any damage to asphalt, sidewalks, curbs, and gutters abutting or adjacent to the demolition properties resulting from the execution of the demolition work. The cost of repair or replacement shall be considered incidental to the work, and the Contractor shall obtain all permits and pay any fees.
- C. All construction equipment used in conjunction with this project shall be in good repair and adequately muffled and free from motor and hydraulic oil leaks.
- D. Dust Control: The Contractor shall comply with applicable air pollution control requirements of the Jurisdiction and project specifications. The Contractor shall take appropriate actions to minimize atmospheric pollution at all times. To minimize atmospheric pollution, the Owners' Representative

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shall have the authority to require that reasonable precautions be taken to prevent particulate matter from becoming airborne.

2.3 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only as indicated. Use methods required to complete the Work within the project limitations of governing regulations.
- B. Saw cutting shall be considered incidental to other work.
- C. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- D. Existing Items to Remain: Protect construction indicated to remain against damage.
 - 1. Where asphalt and concrete to remain is damaged during operations, additional full-depth saw cutting in straight and clean lines shall be completed as directed by the Owners' Representative at no additional cost to the Owner.
- E. Demolition of all concrete and pavement base course, subbase, subgrade, and geotextile (if present) to the lines and grade for the new Concrete and Pavement Sections shall be considered incidental to other work.

2.4 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Asphalt Pavement: This item consists of bulk removal of asphalt. Isolation of the asphalt shall be by full-depth saw cutting using a power-driven saw in straight, clean lines, followed by removal of the asphalt. Demolition shall include the demolition of concrete/asphalt pavement, base course, subbase, subgrade, and geotextile (if present) to the lines and grade for the new Concrete and Pavement Sections.

2.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from the Project site.
 - 1. Do not allow demolished materials to accumulate on-site. Site soils not scheduled for reuse shall be removed from the site immediately to limit dust.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. The contractor shall keep the public roadway clean and free from construction material at all times and shall clean the area(s) immediately upon the Owner's Representative's request.

END OF SECTION

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SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.
- B. Geotechnical Report prepared by JFC Engineers and Surveyors, December 2025.
- C. Wyoming Public Works Standard Specifications (2023).
- D. Wyoming Standard Specifications for Road and Bridge Construction (WYDOT 2021).

1.2 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Unclassified Excavation shall consist of the demolition or excavation and off-site disposal of all materials encountered in the work, including excavation obtained from borrow sources, not classified under other items of the contract.
- C. Base Course: Aggregate layer placed between the subbase and concrete or plant mix asphalt paving or concrete curb, gutters, and sidewalks.
- D. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- E. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - 1. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Owner's Representative. Unauthorized excavation, as well as remedial work directed by the Owner's Representative, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Subbase Course: Aggregate layer placed between the subgrade or reconditioned native soils and base course for plant mix asphalt paving or concrete curb, gutters, and sidewalks
- I. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase course, or topsoil materials.
- J. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.
- K. Owner's Representative shall have the same meaning as "Engineer".

1.3 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: The General Contractor shall schedule and conduct a site conference at the project site, with the Owner's Representative present, before any excavation activities. Detailed minutes shall be recorded by the General Contractor and provided to the Owner's Representative in typewritten form no later than 3 business days after the meeting.
 - 1. Personnel and equipment needed to make progress and avoid delays.
 - 2. Coordination of Work with Utility Locator Service.
 - 3. Extent of trenching in and outside asphalt areas.
 - 4. Field quality control.
 - 5. Traffic Control measures

1.4 SUBMITTALS

- A. Material Test Reports: For each borrow soil, base course, and subbase course material proposed for fill and backfill as follows:

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1. Contractor shall submit for Owner's Representative approval the following test data.
 - a. Particle Sieve Analysis (Gradation) ASTM C-136/C-117
 - b. Classification according to ASTM D 2487
 - c. Laboratory compaction curve according to ASTM D-1557
 - d. Those properties called out in WYDOT Table 803.4.4-2
2. All borrow/imported materials are to be approved prior to being delivered to the site. The Contractor shall submit to the Owner's Representative, for approval, standards material test data, not more than 45 days old, from an existing stockpile(s) and/or a location that the Owner's Representative can visit. Material placed without current test data or prior approval by the Owner's Representative shall be immediately removed from the project site at the Contractor's expense and not reused on the project.

1.5 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Owner and authorities having jurisdiction.
- B. Utility Locator Service: Notify Wyoming One Call for the area where the Project is located before beginning earth-moving operations. Private utilities are to be potholes for location by the Contractor.
- C. Do not commence earth-moving operations until temporary erosion and sedimentation control measures are in place.
- D. The following practices are prohibited within asphalt areas on the property:
 1. Fuel storage
 2. Refueling equipment.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Per Geotechnical Report
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
 1. Unsatisfactory soils also include:
 - a. Satisfactory soils not maintained within 2 percent of optimum moisture content at the time of compaction.
 - b. Clay and Clay Stone
 - c. Shale Stone
- D. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand meeting WYDOT Grading Band W.
- E. Subbase Course: WYDOT Grading Band W material or imported naturally or artificially graded mixture of natural or crushed gravel, stone with natural or crushed sand.
 1. "Native" pit run material may be used for imported Subbase with prior approval of the Owner's Representative. Material shall be an imported, natural pit run type or artificially well-graded mixture of gravel, stone, and natural or crushed rock free of rock larger than 8 inches in any dimension, free of excess clays, debris, waste, frozen materials, vegetation, and other deleterious or Unsatisfactory Soils as approved by the Owner's Representative.
- F. BEDDING COURSE: NATURALLY OR ARTIFICIALLY GRADED MIXTURE:
 1. Type 1 Bedding material around the pipe from 6 inches under the pipe to 12 inches over the pipe shall consist of select coarse-grained soils, with less than 5 percent passing a #200 sieve, such as

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gravel, sand, or silty sand meeting unified soil classification requirements as per ASTM designation D-2487 for type GW, GP, GM, GC, S W, S P, S M & S C, or as specifically approved by Owner's Representative. Bedding material shall not consist of silt, clay & organic soils meeting requirements for soil types ML, CH, & PT. Bedding material shall be free from clods, frozen material, or stones larger than 3/4 inch in their maximum dimension. Where wet or otherwise unstable conditions exist, the material in this zone shall be free draining, nonplastic material. Where suitable material is available in the material excavated from the trench, Contractor may procure the select material by screening, sifting or manually sorting the material removed from the trench in a manner approved by Owner's Representative.

2. Type 2 - Bedding is required for foundation in over-excavated trenches and shall consist of the bedding material from six (6) inches under the pipe and below. The bedding material shall consist of sand, sandy gravel, compacted rock or gravel having a maximum size of 3 inches, uniformly graded and having a maximum plasticity of six (6) as determined by AASHTO Methods T-89 and T-90.

G. TRENCH BACKFILL:

1. Type A (Pavement Areas) - Base Course material carefully deposited in depth layers suitable to the equipment used for compaction, but not less than two separate, level lifts, wetted to three (3) percent below to two (2) percent above optimum moisture content, and compacted to at least ninety-six (96) percent of maximum density as determined by AASHTO T-99 (Standard Proctor)
2. Type B (Landscape Areas) – Satisfactory Soils deposited in depth layers suitable to the equipment used for compaction, but not less than two separate, level lifts, wetted to three (3) percent below to two (2) percent above optimum moisture content, and compacted to at least eighty-eight (88) percent of maximum density as determined by AASHTO T-99 (Standard Proctor).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade bottom elevations for installation of new concrete or asphalt sections, regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

3.4 EXCAVATION FOR CURBS, GUTTERS, SIDEWALKS, AND PAVEMENTS

- A. Excavate surfaces under curbs, gutters, and sidewalks to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

- A. Natural Gas – Contractors' work shall include all trench excavation and backfill in preparation and coordination for Dominion Energy to install the natural gas service pipe, tie-in to the service regulator. General Contractor shall enter into a Work Order Agreement for this installation.
 1. Contact Joshua Sargent: cell: 307-708-0860 or joshua.sargent@dominionenergy.com.

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- B. Excavate trenches to indicated gradients, lines, depths, and elevations.
 - C. Excavate trenches to uniform widths.
 - 1. Clearance: As indicated in the plan Sections and Details.
 - D. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - 1. Shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
 - 2. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
 - E. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
 - 1. Excavate trenches 24" inches deeper than elevation required in unstable foundation area, as determined by the Owner's Representative to allow for Type 2 Pipe Bedding course.
- 3.6 SUBGRADE INSPECTION
- A. Notify Owner's Representative when excavations have reached the required subgrade.
 - B. If Owner's Representative determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
 - C. Proof-roll subgrade, in the presence of the Owner's Representative, below curb, gutters, and pavements with a pneumatic-tired 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph (5 km/h).
 - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Owner's Representative, and replace with compacted backfill or fill as directed.
 - D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit price for "Additional Subgrade Excavation".
 - E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Owner's Representative, without additional compensation.
- 3.7 UTILITY TRENCH BACKFILL
- A. Initial Backfill:
 - 1. Backfill material shall be placed in the trench for its full width on each side simultaneously.
 - 2. Bedding material under and around the pipe to 12 inches above the top of the pipe shall be distributed by hand in maximum layers of 6 inches and thoroughly compacted by tamping. Special care shall be taken to assure complete compaction under the haunches of the pipe.
 - 3. Soil Backfill: Place and compact initial backfill of base course material over the pipe or conduit
 - B. Final Backfill:
 - 1. Soil Backfill: Place and compact final backfill of satisfactory soil to the final subgrade elevation in loose lifts not exceeding 12 inches.
 - 2. Detectable Warning Tape: Acid and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 24 inches deep; colored as follows:
- 3.8 RECONDITIONED NATIVE SOIL (SUBGRADE)
- A. Uniformly rip and moisten condition subgrade layer to -4% to +2% of the optimum moisture before compaction.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

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2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to the specified dry unit weight.

3.9 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Compaction:

1. Compaction by flooding will not be permitted.
2. Compaction by vibratory plate only shall be considered to be inadequate.
3. Compaction should be done with equipment that is large enough to densify the entire thickness of the lift. With the presence of geosynthetics, it is important to not damage any geosynthetic present during the pulverization and blending process
4. If the backfilled trench has not been tested at required intervals during backfilling, the Contractor shall provide excavation equipment to dig compaction test holes through each layer of backfill.
5. Under curbs, gutters, and pavements, scarify and recompact the top 6 inches of existing subbase.
 - a. Base Course and Subgrade materials should be moisture conditioned to -4% to +2% of the optimum moisture and compacted to 95% of the standard proctor.
6. Utility trenches under curbs, gutters, and pavements, compact each layer of initial and final backfill should be moisture conditioned to -4% to +2% of the optimum moisture and compacted to 95% of the standard proctor.
 - a. Base Course and Subgrade materials should be moisture conditioned to -4% to +2% of the optimum moisture and compacted to 95% of the standard proctor.
7. Utility trenches under grass turf or unpaved areas:
 - a. Compact each layer of backfill or fill soil material at 85 percent.

3.10 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

3.11 BASE COURSES AND SUBBASE COURSES UNDER CONCRETE AND ASPHALT

A. Subgrade:

1. Complete unclassified excavation to the required elevations.
2. Scarify and recompact the top 8 inches of existing subgrade.
3. Proof-roll in the presence of the Owner Representative.

B. Subbase Course

1. Install separation geotextile on prepared subgrade according to the manufacturer's written instructions, overlapping sides and ends with edges turned up excavation walls.
2. Install Geo-grid on properly installed separation geotextile according to the manufacturer's written instructions, overlapping sides and ends with edges turned up excavation walls
3. Place subbase course to the required elevations.
4. Proof-roll in the presence of the Owner Representative.

C. Base Course

1. Place and shape base course to required elevations and cross-slope grades.
2. Verify compacted densities.

3.12 RECLIMATION and SEEDING

A. Upon completion of construction, grade and smooth all disturbed areas.

1. Grade areas as needed to route surface water away from foundations and concrete/asphalt edges, toward drainage swales.

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2. Construct V-ditches as needed for additional drainage control.
 3. Removed all rocks larger than 2" in diameter.
- B. Hydraulic Seeding: Hydro-Seed all disturbed areas with an approved rangeland grass seed mix.
1. Submittal: Rangeland Seed Mix.
 2. Substrate and seedbed preparation
 - a. Examine substrates and conditions where the seed will be applied. Do not proceed with installation until satisfactory conditions are established.
 - b. Apply soil amendments as necessary to prepare the seedbed.
 3. Installation
 - a. Strictly comply with the equipment manufacturer's installation instructions and recommendations. Rough surfaces (rocky terrain, cat tracks, and ripped soils) may require higher application rates to achieve coverage.
 - b. Seed at a rate of 50 lbs. per 100 gallons (23 kg / 380 liters) of water over properly prepared surfaces. Confirm loading rates with the equipment manufacturer.
 - c. Application Rate: 2,000 lbs./Ac. Mulch Binding 750 lbs./Ac.
 - d. Do not apply to saturated soils or substrates.
 - e. Do not apply to drainage swales of pond.
 - f. Do not apply if precipitation is anticipated within 24-48 hours.
- C. Seeded Erosion Control Blankets: Install on all drainage swales and pond.
1. Submittal: Erosion Control Blanket with installation instructions
 2. Blanket performance:
 - a. C Factor: 0.22
 - b. Shear Stress: 2.5 lb/sf (120 Pa)
 - c. Velocity: 10.0 ft/sec (3.1 m/sec)
 - d. Functional Longevity: ≤ 36 months
 3. Staples shall be a minimum of 4" long (biodegradable).
 4. Installation:
 - a. Strictly comply with the blanket manufacturer's installation instructions and recommendations.
 - b. Ensure sufficient staples are installed to resist uplift from hydraulics, extreme wind speeds, and foot traffic.
 - c. Before placing blankets, the contractor shall verify that the subgrade has been properly compacted and graded smooth.
 - d. Contractor shall fine-grade the subgrade by hand dressing where necessary.
 - e. Apply soil amendments as necessary to prepare for blanket seed.
 - f. No equipment or vehicle traffic shall be allowed on installed blankets.
 - g. Ensure blankets maintain intimate contact with the soil surface of the entirety of the installation.
 - h. Blankets shall be installed parallel to the water flow.
 - 1) The first roll shall be centered longitudinally in the mid-channel and anchored with staples at the bottom edge of the swale.
 - 2) The successive length of blankets shall be overlapped sufficiently for a common row of staples with the upstream end on top. Staple the overlap across the end of each of the overlapping lengths so that staples anchor through the netting of both blankets

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- 3) Horizontal joints shall be sufficiently overlapped with the uphill end on top for a common row of staples so that the staples anchor through the netting of both blankets.
- 4) Extend blankets 24" beyond the top EDGE of swale and staples as recommended by the manufacturers (12" minimum)
- 5) Extend blankets 3 feet beyond the end of swales and secure with a single row of staples on 12" centers (minimum)

5. Erosion Control Blankets shall be subsidiary to Drainage Swales.

3.13 FIELD QUALITY CONTROL

- A. All material testing sufficient for the Contractor to properly execute the work under this contract will be completed by the Contractor.
- B. The Contractor shall perform its own Quality Control to ensure all work is in accordance with the contract requirements prior to Owner Acceptance Testing.
- C. The Contractor shall establish and maintain an inspection and testing system that assures compliance with the contract requirements.
- D. Any indication of system deficiencies, whether discovered as a result of the Owner's observations or the Contractor's inspections and tests, shall result in modifications to the Contractor's construction methods to correct all deficiencies.
- E. The Contractor shall maintain up-to-date Quality Control testing and inspection records on-site and make them available to the Owner, Engineer, and Observer(s) immediately upon request.
- F. The Contractor shall perform Quality Control measures, whether or not Owner Quality Acceptance testing is performed. Owner Quality Acceptance tests and inspections are for its benefit and do not take the place of the Contractor's Quality Control and testing obligations.

3.14 FIELD QUALITY ACCEPTANCE

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Allow testing agency to inspect and test the base course and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:
 1. Paved Areas: At top of Base Course layer, at least one test for every 50 sq. yd. or less of paved area, but in no case fewer than three tests.
 - a. When testing agency reports that base course, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.
 2. Type A Trench Backfill: Compaction tests shall be required on each lift in excess of 12" (loose) at linear intervals not to exceed fifty (50) feet, but a minimum of one (2) tests per trench segment under asphalt or concrete areas, whether tests are performed during backfilling or via test holes.
 - a. Should tests fail, the Contractor shall remove all trench backfill above the failed lift and rework the area of deficiency to passing compaction. The Owner's Representative shall determine the area of deficiency. In no case shall it extend into areas of known acceptable compaction.
- D. All work required to bring the failed test area(s) into spec shall be at the CONTRACTORS expense, including Material Retesting.
- E. Passing backfill tests only assures the Owner that the minimum acceptable level of testing was achieved. The passing tests do not relieve the Contractor of his responsibility to compact the entire trench, and does not relieve his guarantee of the trench or material placed over the trench

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3.15 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Owner's Representative; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.16 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Unless otherwise indicated, remove surplus soil and waste materials, including trash and debris, and properly dispose of them off-site.

END OF SECTION



GEOTECHNICAL REPORT

for the

**80'x100' Medal Building Project
Wyoming State Hospital
Evanston, Wyoming**

Prepared for:
Wyoming State Construction Department
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December 2025
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1. EXECUTIVE SUMMARY

The Wyoming State Construction Department enlisted the services of JFC Engineers & Surveyors (JFC) to perform a subsurface soils investigation for the proposed 80'x100' metal building at the Wyoming State Hospital, Evanston, Wyoming. The purpose of the investigation was to identify surface and subsurface soil conditions found at the site and to offer recommendations regarding the construction of foundations for the proposed building. To accomplish this investigation, two (2) boreholes were drilled. At the time of drilling, samples were taken at regular predetermined intervals and reserved for laboratory testing. The field investigation was conducted on November 12, 2025.

The subsurface conditions were investigated using a standard drilling rig, as outlined in **Section 3.1 Field Investigation** of this Report. The boreholes were advanced to bedrock/refusal or a maximum depth of 25'. While bedrock was not encountered, refusal was encountered in both boreholes and a significant gravel layer containing small to medium sized gravels was encountered between 7.5' and 10' in depth in Borehole #2. Samples were collected at 2.5' intervals to a depth of 10', and at 5' intervals after 10' in depth until completion. The soil collected consisted primarily of sandy lean clays (CL), as well as sands, clays, gravels, or a mixture of these materials. Standard Penetration Tests (SPTs), conducted at the time of the investigation, revealed that the subsoil consisted of mostly soft to stiff soils. Groundwater was not encountered in any borehole during the field investigation.

Based on the soils found at the site, subsequent laboratory testing, and location and occupancy category, the site is categorized as a Seismic Site Class D, as defined by the International Building Code (IBC).

Based on the analyses of the data collected during the investigation, it is our opinion that it is possible to develop the site as planned and the proposed site features can be supported by the preparations described in **Section 5. Analysis and Recommendations** of this Report.

It is not anticipated that conditions at the site should adversely affect grading, filling, or excavation operations. It is critical that proper compaction be achieved due to the presence of the softer near surface soils in the Project area. Stability of trenches and open cuts are the responsibility of the contractor and OSHA guidelines are to be followed.

Specific recommendations for various aspects of the Project can be found in this Report. This Executive Summary only gives a brief overview of the findings of the investigation and should not be used for design or construction without first studying and understanding the Report in its entirety. This Report is also subject to the limitations found in **Section 6.2. Limitations** of this Report.

2. INTRODUCTION

2.1 Purpose and Scope of Services

This Report presents the findings and results of the geotechnical investigation conducted by JFC for the construction of a proposed 80'x100' pre-engineered metal building located at the Wyoming State Hospital. The area investigated is shown on the map in **Appendix A – Vicinity**

Map (A-1). Two (2) boreholes were drilled, and the borehole locations are shown in **Appendix A – Borehole Location Map (A-2).**

The general purpose of the investigation was to determine and evaluate the general geologic condition and engineering properties of the subsurface soils, the depth to bedrock, if encountered at the site, and to provide recommendations for the design, development, and construction of the proposed 80'x100' metal building within the site. The investigation included soil sampling, field testing, lab testing, data analysis, and preparation of this Report.

The work done for this investigation was authorized by Mr. Nate Miller of the Wyoming State Construction Department and was conducted in accordance with applicable standards and accepted engineering practices.

2.2 Project Description

It is our understanding that the Project will consist of the construction of a single-story 80'x100' pre-engineered metal building on a concrete foundation with interior concrete slabs, and concrete pads at each overhead door location. The building will be used to store heavy machinery and equipment.

3. INVESTIGATIVE TECHNIQUES

3.1 Field Investigation

The subsurface program consisted of drilling two (2) boreholes at locations spaced across the proposed site, as determined by the access for drilling equipment and avoidance of known utilities. During the drilling of Borehole #1, the site representative of the Wyoming State Construction Department indicated that the building location was moved and requested that Borehole #2 be relocated to accommodate the new building location. Borehole #1 was completed in the original location. The approximate locations of the two (2) drilled boreholes are given in **Appendix A – Borehole Location Map (A-2).**

All elevations given here refer to depth below the existing ground surface. The boreholes were advanced to bedrock/refusal, or a maximum depth of 25' with sampling. The overburden soil primarily consists of poorly graded soft to medium sands, clays, gravels, and some silts. Borehole logs documenting the conditions encountered at the time of drilling can be found in **Appendix B – Borehole Logs** of this Report.

Drilling was conducted with a Simco 2800 H/S truck-mounted drilling rig using a 4" solid stem auger. SPTs and soil samples were taken using a Standard Split Spoon Sampler with a 2" (nominal) outside diameter, which was driven by a standard 140-pound weight, falling 30". Sampling was conducted starting at 2.5', followed by intervals of 2.5' up to 10'. After reaching 10', sampling continued at 5' intervals to 25' or refusal depth. The sampling method is in general accordance with ASTM D1586.

The SPTs were used to produce Blow Counts (N-values) at selected intervals. The raw N-values were then adjusted for energy losses to produce Corrected Blow Counts (N₆₀-values). These N₆₀ values, along with USCS soil types and information gathered from visual inspection, were used to produce anticipated properties of the materials encountered.

After conducting visual identification and field tests of the various soil samples, the samples were transported to JFC's Materials Testing Laboratory for further analysis/testing.

The borehole logs, located in **Appendix B – Borehole Logs**, contain soil descriptions and types, sample intervals, total borehole depths, depth to bedrock, and raw N and N₆₀ values found at the time of exploration.

3.2 Laboratory Testing

Laboratory testing was performed on six (6) of the samples collected during the field investigation. Testing included Gradations and Atterberg Limits for selected samples, a single FHA test performed on soil identified in the field as possibly containing a high or an entirely clay content, and a standard proctor on topsoil collected from auger cuttings. Classification of the samples indicated that the most common soil found at the site was CL. No expansive clays were determined to be present at the site. Laboratory test results can be found in **Appendix C – Laboratory Test Data**.

The following tests were performed on the selected samples:

- Four (4) – Gradation and Atterberg Limits Tests
- One (1) – FHA Soil Expansion Test
- One (1) – Standard Proctor

4. SITE CONDITIONS

4.1 Site Location and Description

The Project site is located southeast of the maintenance buildings associated with the Wyoming State Hospital. The site consists of an open, relatively flat lot on what appears to be degraded agricultural property. Vegetation on the site consists primarily of dry grass between 0.5' and 1.5' in height with very little other plant diversity. The site location can be seen in **Appendix A – Vicinity Map (A-1)**.

4.2 Subsurface Conditions

The subsurface investigation indicated that conditions encountered across the two (2) boreholes are consistent with an alluvial area. The topsoil layer was observed to be no greater than 2.5' in depth atop varying layers of soils classified as poorly graded sand with clays, silts, and gravels; and occasional silty or sandy clay were consistently present in these boreholes from surface to bedrock/refusal.

Based on the soils found at the site, subsequent laboratory testing, and location and occupancy category, the site is categorized as a Seismic Site Class D, as defined by the IBC as shown in **Appendix D – ASCE Hazards Report**.

4.2.1 Soils

Two (2) boreholes were drilled within the marked area as seen in **Appendix A - Borehole Location Map (A-2)**. During the drilling of Borehole #1, the site representative of the

Wyoming State Construction Department indicated that the building location was moved and requested that Borehole #2 be relocated to accommodate the new building location. Borehole #1 was completed in the original location. The investigation indicates the area is underlain by predominantly CL, with small amounts of sands, gravels, and other clays. The topsoil layer was observed to be no greater than 2.5'. A significant gravel layer containing mostly small to medium gravels was encountered between 7.5' and 10' in depth in Borehole #2. Bedrock/Refusal, indicated by less than 6" of penetration within 50 blows, was encountered in both boreholes at varying depths. The stratigraphy of the boreholes is explained below and can be reviewed in **Appendix B – Borehole Logs**.

4.2.2 Groundwater

Groundwater was not encountered during the field investigation in any of the boreholes. It should be noted that depths to groundwater will fluctuate seasonally from year to year due to variations in precipitation and runoff. The possibility of groundwater level fluctuations should be considered when developing the design of the Project.

4.3 Geologic Conditions

The surficial geology of the site consists of mostly alluvial materials, as the site sits squarely inside of a Holocene/Pleistocene Alluvium and Colluvium Deposit (Qa), comprised mostly of clay, silt, sand and gravel in flood plains, fans, terraces, and slopes.

4.4 Seismic Considerations

In accordance with the IBC, 2024 edition, based on the soils encountered during investigation and the proposed structures Risk 1 categorization, results in a Seismic Design Category D designation for determination of design spectral response acceleration parameters in accordance with IBC. This corresponds to buildings and structures in areas expected to experience severe and destructive ground shaking but not located next to any known major fault.

5. ANALYSIS AND RECOMMENDATIONS

5.1 General Conclusions

Based on the conditions found at the site and the lab testing conducted, it is possible that the site can be developed as proposed. Recommendations for soils improvement, preparation, and foundation design are given in the following sections.

5.2 Earthwork

5.2.1 General Site Preparation, Grading, Filling, and Compaction

Before operations begin, construction areas should be stripped of vegetation, topsoil, loose fill, debris, uncontrolled fill, and other deleterious materials. Stripping depths may vary and should be verified in the field by a qualified geotechnical engineer or representative. Stripped material that contains organics, or deleterious material, should be removed from the site. Stripped material not containing organics or deleterious material may be used as general fill where needed.

After clearing and grubbing have been completed, the subgrade below any areas to be filled should be proof rolled using a steel, smooth-drum roller or a loaded tandem axle dump truck to determine if any soils will not be suitable to fill over. If soft areas or anomalies are encountered during proof-rolling, the material should be removed and replaced with properly compacted fill as classified below.

General Fill: Soils suitable for use as general fill may consist of any soil type including stripped or deleterious material void of organics from the site. General fill is used for raising grade, landscaped areas, or surface work and should be placed in an uncompacted lift thickness of 8" or less and compacted to a minimum of 92% of the Standard Proctor and within 2% of the optimum moisture, as determined by ASTM D698.

Site Fill: Soils suitable for use as site fill consist of coarse grain soils, GW, GP, SP, SW, SM and SC, in accordance with the Unified Soil Classification System. Site fill, placed beneath roadways and flat work on grade, should be placed in an uncompacted lift thickness of 8" or less and compacted to 95% of the Standard Proctor and within 2% of the optimum moisture, as determined by ASTM D698.

Structural Fill: Soils suitable for use as structural fill consist of clean gravels, GW and GP, or clean sands, SW and SP, in accordance with the Unified Soil Classification System. Production materials, such as roadbase, may also be used for this purpose. Structural fill, placed beneath foundations, should be placed in an uncompacted lift thickness of 8" or less and compacted to a minimum of 98% of the Standard Proctor and within 2% of the optimum moisture, as determined by ASTM D698.

Where native soils meet the above criteria, the native soils compacted to 92% (general fill) 95% (site fill) or 98% (structural fill) of the Standard Proctor and within 2% of the optimum moisture, as determined by ASTM D698, are also acceptable. Proof-rolling and compaction should be observed by a geotechnical engineer or qualified representative so that soft areas are identified and corrected.

Where native soils are determined to be soft or have a high clay content, the material should be removed and replaced with appropriate backfill and compacted in accordance with ASTM D698. The maximum backfill material size should not exceed 3". No brush, frozen material, sod, or any other deleterious or unsuitable material should be used for backfilling. Backfill should not be placed on frozen or muddy ground.

5.2.2 Excavatability

Soils/rock encountered during the exploration do not appear to offer increased difficulty to excavate. Typical construction equipment such as excavators, scrapers, and loaders should be adequate for excavation and earth-moving operations. Stability of trenches and excavations is the responsibility of the contractor. Trenches and excavations should be properly benched, and trench boxes should be used where necessary. All applicable OSHA and other governing agencies' regulations should be followed.

5.3 Ground Improvements

Based on the results of the SPTs and soil conditions found during the excavation, it is our opinion that a shallow foundation system can be used to support the proposed structure. The bearing capacity of the subgrade soils described vary depending on depth. The top 5' of soils was found to have a safe bearing pressure of 2,500 PSF, while the gravel layer encountered from 7.5' to 15.0' in depth has a safe bearing pressure of 8,000 PSF.

Foundations can consist of continuous or isolated footings or a combination of continuous and isolated footings. Foundations should extend below the local frost depth to a minimum of 54". If soft soils are encountered during excavation, they should be removed and replaced in accordance with the recommendations found in section **5.2.1 General Site Preparation, Grading, Filling, and Compaction** of this Report.

5.3.1 Shallow Foundations

As a result of soft to medium dense soil layers present on the site, it is our opinion that a foundation preparation be used below the footings. The foundation should be excavated to a minimum of 54" below finished grade. The bottom of the excavation should be tamped and proof rolled until no loose soil remains. If loose soils are encountered during the proof rolling, they should be removed and replaced. The structural fill should be placed and compacted to 98% of the Standard Proctor, as determined by ASTM D698, within 2% of the optimum moisture and should also conform to the recommendations found in **Section 5.2.1 General Site Preparation, Grading, Filling, and Compaction** of this Report. The material should be placed in lifts not exceeding 8" in uncompacted thickness. Footings may then be constructed over this preparation and should be designed to bear no more than 2,500 PSF on the preparation. Proof-rolling and compaction should be observed by a qualified geotechnical engineer, or similarly qualified representative, so that any soft areas are identified and corrected.

5.4 Concrete

Concrete should be made with Type II, IIA, or V cement to resist the effects of alkali found in the local soils and can be batched using standard mix designs. This concrete should have a minimum total air content of 5-7% for exterior concrete. Exposed concrete should have a minimum 28-day compressive strength of 4,000 psi for sidewalks, and 4,500 psi for pavement for durability during freeze-thaw cycles in accordance with ASTM C642-21.

5.5 Slabs on Grade

Due to the intended use of the structure to house heavy machinery and equipment, floors and slabs should be made of reinforced concrete and should be a minimum of 10" thick. The subgrade below slabs should be proof rolled to mitigate any soft spots. Over the subgrade, 12" of road base should be placed and compacted in the manner described in **Section 5.2.1 General Site Preparation, Grading, Filling, and Compaction**.

5.6 Exterior Flatwork and Pavement

The subgrade below exterior flatwork should be proof rolled to mitigate any soft spots. Over the subgrade, 6" of road base should be placed and compacted in the manner described in **Section 5.2.1 General Site Preparation, Grading, Filling, and Compaction**. Flatwork may then be

constructed over this preparation. Any deleterious material should be removed and replaced with competent fill. The concrete used for flatwork/pavement should have a minimum air content of 5% for durability during freeze-thaw cycles and should have a minimum 28-day break strength of 4,500 psi. Concrete should conform to the recommendations given in **Section 5.4 Concrete** of this Report. It is imperative that positive drainage should be provided to discharge all exterior flatwork. It is our opinion that a minimum slope of 1% over flatwork should be used in grading design to ensure proper drainage and minimize the chance of ponding.

5.5 Drainage

After construction of the foundation, it is imperative that proper drainage be constructed away from the foundation. A minimum slope of 5% (6" in 10) should be made for at least the first 10' away from the foundation in unpaved areas. A slope of 2% may be used for pavement and a slope of 1% may be used for concrete sections.

6. CLOSURE

6.1 Conclusions

Recommendations for the construction of the proposed 80'x100' metal building to be constructed on the southeast of the maintenance buildings associated with the Wyoming State Hospital have been explained in this Report. It is our opinion that soils found at this site should offer adequate bearing, if the recommendations of this report are followed. Inspections of any preparations should be done by a qualified geotechnical engineer prior to the placement of structures, reinforcements, or fill. The inspection should verify that all loose, organic, frozen, and/or unsuitable material has been removed from improvement/structural areas and that there are no soft spots.

6.2 Limitations

This Report is for use by our client, Wyoming State Construction Department, for the construction of the proposed 80'x100' steel building located southeast of the maintenance buildings associated with the Wyoming State Hospital. The recommendations provided in this Report are based on our field explorations and our understanding of the proposed construction, which at this time only concerns the construction of the proposed metal building. The subsurface data, used in the preparation of this Report, was obtained from the boreholes drilled for this site. It is possible that variations in the soil and groundwater conditions could exist between and beyond the points explored. The nature and extent of these variations may not be evident until construction occurs. If any conditions are encountered at the site that are different from those described herein, JFC should be notified immediately, and additional or different recommendations may be necessary. In addition, if the scope or location of the proposed construction changes from that described in this Report or as explained to JFC at the start of the Project, our firm should also be notified as these recommendations may no longer be valid.

Our evaluation of subsurface conditions at the site has considered the subgrade soil and groundwater conditions present at the time of our limited field exploration. The influence(s) of post-construction changes to these conditions, such as the introduction of water into the subsurface, will likely influence the future performance of the Project. Whereas our Scope of Services addresses present soil and groundwater conditions, future flooding, changed

groundwater conditions, etc. may adversely influence the Project and should be addressed and mitigated during design and construction.

This Report was prepared in accordance with applicable ASTM standards and ACI guidelines and accepted standards of practice at the time this Report was written.

This Report may be used only by the Client, for the purposes stated, within a reasonable time frame of issuance. Land use, site conditions (both on and off site), or other pertinent factors may change over time, and it may be necessary to complete additional work. Based on the intended use of this Report, JFC may require that additional work be conducted, and an updated report issued. Non-compliance with any of the recommendations given by the Client or anyone else, unless specifically agreed to in advance by JFC in writing, will release JFC from any liability resulting from the use of this Report by any unauthorized party.

It is our client's responsibility to see that all parties to the Project, including designers, contractors, subcontractors, etc., are made aware of this Report in its entirety. The use of information contained in this Report for bidding purposes should be done at the contractor's sole risk.

6.3 *Additional Services*

The recommendations given in this Report assume that an adequate program of testing and observation will be made during construction to verify compliance with these recommendations. These tests and observations should include, at a minimum, the following:

1. Observations and testing during site preparation, earthwork, and fill placement.
2. Consultation as required during construction.

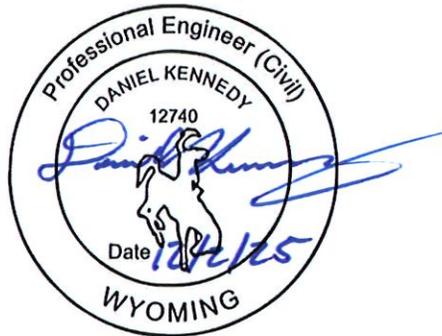
JFC also recommends that a geotechnical engineer be engaged to inspect ground improvements below paving, flatwork, and foundations. Additional information concerning the Scope and cost of these services can be obtained from our office.

Report prepared by:



Ryan D. Poyer, GIT

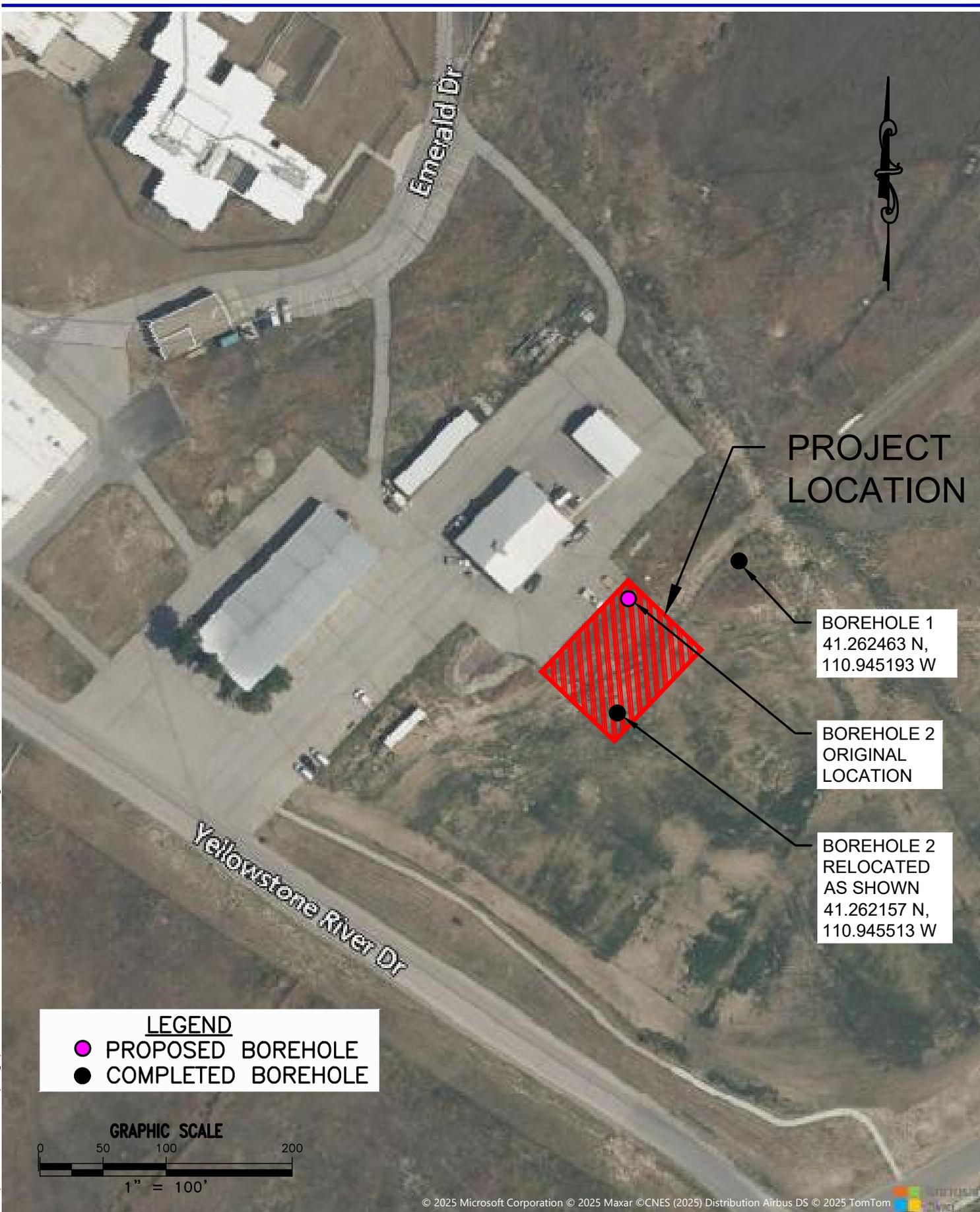
Report reviewed by:



Daniel Kennedy, PE
Vice President

APPENDIX A

Vicinity and Borehole Location Maps



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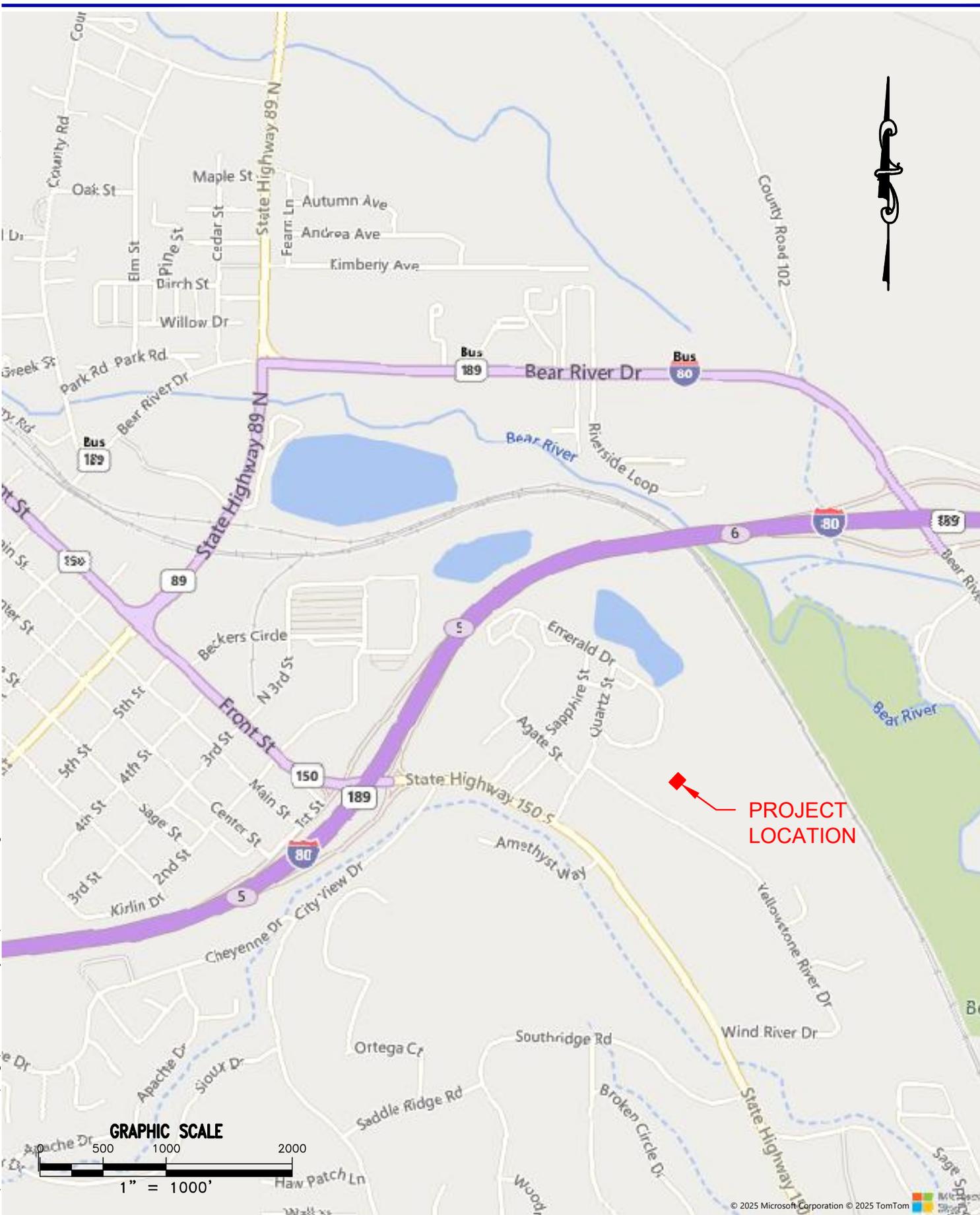
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<http://www.jfc-wyo.com>

WYOMING STATE HOSPITAL
 BOREHOLE LOCATION MAP
 EVANSTON, WYOMING

DWN BY: RDP
 DATE: 11/25/25

SCALE:
 1"=100'

A-2



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WYOMING STATE HOSPITAL
 STEEL STRUCTURE VICINITY MAP
 EVANSTON, WYOMING

DWN BY: RDP	SCALE: 1"=1000'	A-1
DATE: 11/25/25		

APPENDIX B

Borehole Logs

BOREHOLE LOG

Borehole # 1

Page # 1 of 1

Job Number: 11648		Date/Time Started: 12NOV25 / 0903								
Project: Metal Building		Date/Time Completed: 12NOV25 / 1049								
Drilling Method: 4" Solid Stem Auger		Drilling Contractor: LK Drilling								
Sampling Method: Split Spoon		Drill Rig #: Simco 2800			Driller: Steve Brady					
Completion Depth: 25'		Logged By: RDP			Helper: Travis Brady					
Site Description: Flat, open field with brown/tan medium to fine grain sand and scattered small to large gravels with some boulders present. Vegetation consists of dense 0.5' to 1.5' tall, dried grasses.		Top of Sample	Length of Sample	Sample Number	Recovery (ft / in)	Sample Type	Additional Testing	Blow Count 2 nd 6"	Blow Count 3 rd 6"	N ₆₀ Value
Depth (ft)	Sample Description	Top of Sample	Length of Sample	Sample Number	Recovery (ft / in)	Sample Type	Additional Testing	Blow Count 2 nd 6"	Blow Count 3 rd 6"	N ₆₀ Value
0	Hand Sample – (SP) Brown/tan, dry, m-f grain sand with organics and small to large gravels									
2.5	2.5' – (SP) Top 2" is the same as above (SM) Last 12" is tan, dry, dense f-grain sand with trace alkalis, fines/silts and organics	2.5'	1.5'	1	14"	SS		3	4	5
5	5.0' – (SM) White/tan, dry f-grain sand with trace organics, fines/silts and clays	5.0'	1.5'	2	13"	SS	G/A	8	8	12
7.5	7.5' – (SM) Top 11" is the same as above with some moisture (SC) Last 5" is tan, m-f grain clayey sand with trace organics and alkali	7.5'	1.5'	3	16"	SS		12	14	19
10	10.0' – (SC) Same as above last 5" 11' to 12' – Boulder encountered on possible bearing surface, fractured quartzite observed coming up auger blades	10.0'	1.5'	4	13"	SS	G/A	13	48	51
15	15.0' – (CL) Top 4" is reddish brown, moist, m-f grain sandy clay with some small gravels (CL) Last 12" is mottled gray/red/yellow clay with trace fines/silts	15.0'	1.5'	5	16"	SS		14	22	30
20	20.0' – (CL) Mottled gray/red/yellow sandy clay with trace fines/silts	20.0'	11"	6	14"	SS		50/ 5"		N/A
25	25.0' – (CL) Gray/brown, dry, m-f grain sandy clay with small to medium sized claystone gravels	25.0'	6"	7	11"	SS		50/ 6"		N/A
30										

BOREHOLE LOG

Borehole # 2

Page # 1 of 1

Job Number: 11648		Date/Time Started: 12NOV25 / 1102								
Project: Metal Building		Date/Time Completed: 12NOV25 / 1336								
Drilling Method: 4" Solid Stem Auger		Drilling Contractor: LK Drilling								
Sampling Method: Split Spoon		Drill Rig #: Simco 2800			Driller: Steve Brady					
Completion Depth: 25'		Logged By: RDP			Helper: Travis Brady					
Site Description: Flat, open field with brown/tan medium to fine grain sand and scattered small to large gravels with some boulders present. Vegetation consists of dense 0.5' to 1.5' tall, dried grasses.		Top of Sample	Length of Sample	Sample Number	Recovery (ft / in)	Sample Type	Additional Testing	Blow Count 2 nd 6"	Blow Count 3 rd 6"	N ₆₀ Value
Depth (ft)	Sample Description	Top of Sample	Length of Sample	Sample Number	Recovery (ft / in)	Sample Type	Additional Testing	Blow Count 2 nd 6"	Blow Count 3 rd 6"	N ₆₀ Value
0	Hand Sample – (SP) Brown/tan, dry, m-f grain sand with organics and small to large gravels present									
2.5	2.5' – (SC) Reddish brown, dry, f-grain clayey sand with trace organics and some small gravels	2.5'	1.5'	1	14"	SS	G/A	11	11	16
5	5.0' – (SC) Same as above	5.0'	1.5'	2	14"	SS	G/A	11	12	17
7.5	7.0' – Small quartzite boulder encountered 7.5' – (SC) White/gray, dry, f-grain clayey sand with small to very small, fractured clay/gravels (stuck in SS shoe)	7.5'	0'	3	0"	SS		50/ 0"		N/A
10	10.0' – (SP) White/tan, dry, f-grain gravelly sand with small to medium gravels observed coming up auger blades	10.0'	4"	4	4"	SS		50/ 4"		N/A
15	14.0' – End of gravel layer seen above 15.0' – (SP) Top 4" is brown/tan, dry, m-f grain clayey/gravelly sand with small to medium gravels (possible fall in) (CL) Last 12" is dry mottled gray/red/yellow clay	15.0'	1.5'	5	16"	SS	FHA	7	17	20
20	20.0' – Top 4" is likely fall in (CL/SC) Last 3" is tan, dry, m-f grain clayey sand with some small gravels	20.0'	3"	6	7"	SS		50/ 3"		N/A
25	25.0' – Top 7" is likely fall in (CL/SC) Last 3" is tan/brown, dry, f-grain clayey sand with some small gravels	25.0'	5"	7	12"	SS		50/ 5"		N/A
30										

APPENDIX C

Laboratory Test Data



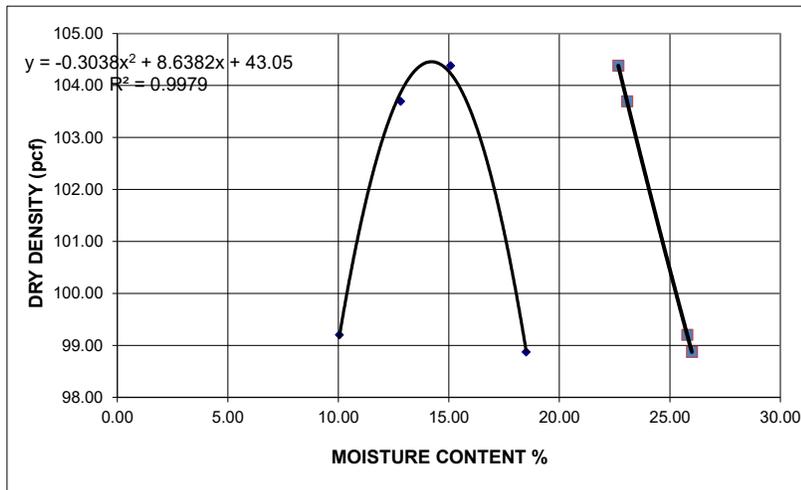
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 ROCK SPRINGS, WY 82902
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 FAX (307) 362-7569

PROCTORS FOR COMPACTION TEST

Client: Wyoming State Construction Department	Project: Wyoming State Hospital	Sample #: 11648-01 BH-01			
Location: BH-01	Date Sampled: 11/12/25	Date Tested: 11/17/25			
Soil Description: CL - Sandy Lean Clay					
Sampled By: RDP	Method: ASTM D698 Method A				
Tested By: CDW					
	A	B	C	D	E
Wt. of Mold	9.63	9.63	9.63	9.63	
Wt. of Soil & Mold	13.28	13.54	13.64	13.54	
Wt. of Soil	3.65	3.91	4.01	3.91	
Weight of Moisture Tin	0.55	0.55	0.57	0.57	
Weight of Tin & Soil	4.21	4.41	4.60	4.49	
Weight of Tin & Dry Soil	3.87	3.98	4.07	3.88	
Weight of Water	0.33	0.44	0.53	0.61	
Weight of Dry Soil	3.33	3.43	3.50	3.32	
Wet Density	109.16	116.98	120.12	117.16	
Percent Moisture	10.04	12.81	15.08	18.49	
Dry Density	99.20	103.69	104.38	98.87	
Saturation Points	25.78	23.06	22.67	25.99	

Optimum Moisture %: 14.2% Maximum Dry Density (pcf): 104.4

Hammer Weight:	5 lb.
Drop:	12 in.
Number of Layers:	3
Blows/Layer:	25
Mold Diameter:	4
Mold Height:	4.5
Mold Volume:	0.0334



Comments: No Problems Reported, Adhered to ASTM D698

Signature _____

Printed Name & Title _____



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 FAX (307) 362-7569

CLIENT:	Wyoming State Construction Department
PROJECT:	Wyoming State Hospital
JOB NO:	11648-25E
TEST DATE:	11/17/25
TESTED BY:	AMJ
TEST METHOD:	ASTM D4318-17
SAMPLE NO:	11648-01 BH-1 #2 5' Atterberg
SAMPLED BY:	RDP
SOURCE:	BH-1 #2 5'
SAMPLE DESCRIPTION:	CL - Lean Clay with Sand

LIQUID LIMIT						
TRIAL NUMBER	BLOWS	BLOWS N	PAN TARE (g)	WET MASS + PAN (g)	DRY MASS + PAN (g)	PERCENT MOISTURE
1	25<N<35	33	20.85	40.88	36.05	31.78
2	20<N<30	27	20.59	40.99	35.99	32.47
3	15<N<25	15	20.61	41.52	36.16	34.47

LL	33
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PLASTIC LIMIT						
TRIAL NUMBER			PAN TARE (g)	WET MASS + PAN (g)	DRY MASS + PAN	PERCENT MOISTURE
1			20.48	28.00	26.92	16.77
2			20.55	26.66	25.80	16.38

PL	17
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PI	16
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C _c	-
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Signature

Printed Name & Title



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JFC ENGINEERS & SURVEYORS
 PARTICLE SIZE ANALYSIS

CLIENT:	Wyoming State Construction Department
PROJECT:	Wyoming State Hospital
JOB NO:	11648-25E
TEST DATE:	11/18/25
TESTED BY:	AMJ
TEST METHOD:	ASTM C-136/C-117, ROUND SHAKER, STANDARD STACK UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487)
SAMPLE NO:	11648-01 BH-1 #2 5' Gradation
SAMPLED BY:	RDP
SOURCE:	BH-1 #2 5'
SAMPLE DESCRIPTION:	CL - Lean Clay with Sand
GRADATION DESCRIPTION:	NO PROBLEMS ENCOUNTERED ADHERED TO ASTM STD.
Pan Tare:	0.00
Fineness Modulus	2.19

	Sieve No	Sieve Size (mm)	Wt. Retained+ Pan (grams)	Wt. Retained (grams)	Percent Retained	Percent Finer	Gradation Envelope Limits	
							Lower Spec.	Upper Spec.
Gravel	6	152.40						
	3.0	76.20						
	2.5	63.50						
	2.0	50.80						
	1.5	38.10						
	1.0	25.40						
	0.75	19.05						
	0.50	12.70						
	0.375	9.53	0.00	0.00	0.00%	100.00		
Sand	0.250	6.3						
	4	4.75	0.00	0.00	0.00%	100.00		
	8	2.36	0.65	0.65	0.22%	99.78		
	10	2.00						
	16	1.18	1.58	1.58	0.53%	99.26		
	30	0.60	3.26	3.26	1.09%	98.17		
	40	0.43						
	50	0.30	9.58	9.58	3.19%	94.98		
	60	0.25						
	100	0.15	18.01	18.01	6.00%	88.97		
Silt/Fines	140	0.106						
	200	0.08	44.36	44.36	14.79%	74.18		
	Pan	0	222.50	222.50	74.18%	0.00		
			Total	299.94				

Percent Moisture, Mass Lost, Gradation and Uniformity Coefficient					
Pan Tare:	0.45	M _{water} :	0.11	D ₁₀ :	-
M _w +Pan:	1.26	%Mt.	16.14%	D ₃₀ :	-
M _w :	0.81	Initial Mass:	300.00	D ₆₀ :	-
M _D +Pan:	1.15	Final Mass:	299.94	C _c :	-
M _D :	0.70	Mass Lost(%):	0.02%	C _u :	-



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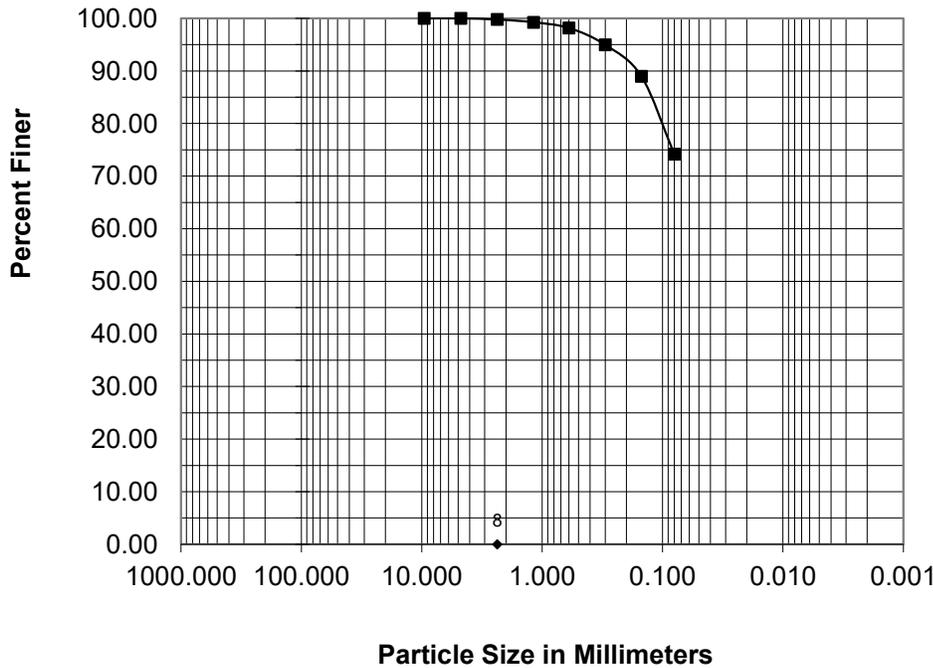
PARTICLE SIZE ANALYSIS

JFC ENGINEERS & SURVEYORS

CLIENT: Wyoming State Construction Department
PROJECT: Wyoming State Hospital
JOB NO: 11648-25E
TESTED DATE: 11/18/2025
TESTED BY: AMJ
TEST METHOD: ASTM C-136/C-117, ROUND SHAKER,
STANDARD STACK UNIFIED SOIL

SAMPLE NO: 11648-01 BH-1 #2 5' Gradator
SAMPLED BY: RDP
SOURCE: BH-1 #2 5'
SAMPLE DESCRIPTION: CL - Lean Clay with Sand
GRADATION DESCRIPTION: NO PROBLEMS
ENCOUNTERED ADHERED

Cumulative Particle-Size Plot



COMMENTS: NO HYDROMETER ANALYSIS CONDUCTED.

JFC ENGINEERS & SURVEYORS

Signature

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FAX: (307) 362-7569
E-MAIL: email@jfc-wyo.com

FHA Meter

CLIENT:	Wyoming State Construction Department
PROJECT:	Wyoming State Hospital
JOB NO:	11648-25E
TEST DATE:	11/19/25
TESTED BY:	CDW
TEST METHOD:	Soil Volume Change Meter (PVC)
SAMPLE NO:	11648-01 BH-2 #5 15' FHA
SAMPLED BY:	RDP
SOURCE:	BH-2 #5 15'
SAMPLE DESCRIPTION:	CL - Sandy Lean Clay

FHA Results	
<u>PVC Rating</u>	<u>Category</u>
Non-Critical	1.0
<u>Swell Pressure Exerted PSF</u>	
925 lb/sq.ft	



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CLIENT:	Wyoming State Construction Department
PROJECT:	Wyoming State Hospital
JOB NO:	11648-25E
TEST DATE:	11/17/25
TESTED BY:	AMJ
TEST METHOD:	ASTM D4318-17
SAMPLE NO:	11648-02 BH-1 #4 10' Atterberg
SAMPLED BY:	RDP
SOURCE:	BH-1 #4 10'
SAMPLE DESCRIPTION:	CL - Sandy Lean Clay

LIQUID LIMIT						
TRIAL NUMBER	BLOWS	BLOWS N	PAN TARE (g)	WET MASS + PAN (g)	DRY MASS + PAN (g)	PERCENT MOISTURE
1	25<N<35	34	20.74	40.95	36.44	28.73
2	20<N<30	26	20.77	40.59	36.05	29.71
3	15<N<25	18	20.72	40.55	35.83	31.24

LL	30
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PLASTIC LIMIT						
TRIAL NUMBER			PAN TARE (g)	WET MASS + PAN (g)	DRY MASS + PAN	PERCENT MOISTURE
1			20.75	28.16	27.14	15.96
2			20.56	26.61	25.79	15.68

PL	16
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PI	14
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C _c	-
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JFC ENGINEERS & SURVEYORS
 PARTICLE SIZE ANALYSIS

CLIENT:	Wyoming State Construction Department
PROJECT:	Wyoming State Hospital
JOB NO:	11648-25E
TEST DATE:	11/18/25
TESTED BY:	AMJ
TEST METHOD:	ASTM C-136/C-117, ROUND SHAKER, STANDARD STACK UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487)
SAMPLE NO:	11648-02 BH-1 #4 10' Gradation
SAMPLED BY:	RDP
SOURCE:	BH-1 #4 10'
SAMPLE DESCRIPTION:	CL - Sandy Lean Clay
GRADATION DESCRIPTION:	NO PROBLEMS ENCOUNTERED ADHERED TO ASTM STD.
Pan Tare:	0.00
Fineness Modulus	2.17

	Sieve No	Sieve Size (mm)	Wt. Retained+ Pan (grams)	Wt. Retained (grams)	Percent Retained	Percent Finer	Gradation Envelope Limits	
							Lower Spec.	Upper Spec.
Gravel	6	152.40						
	3.0	76.20						
	2.5	63.50						
	2.0	50.80						
	1.5	38.10						
	1.0	25.40						
	0.75	19.05						
	0.50	12.70						
	0.375	9.53	0.00	0.00	0.00%	100.00		
0.250	6.3							
Sand	4	4.75	0.00	0.00	0.00%	100.00		
	8	2.36	1.23	1.23	0.41%	99.59		
	10	2.00						
	16	1.18	1.04	1.04	0.35%	99.24		
	30	0.60	2.11	2.11	0.70%	98.54		
	40	0.43						
	50	0.30	4.52	4.52	1.51%	97.03		
	60	0.25						
	100	0.15	26.69	26.69	8.90%	88.13		
Silt/Fines	140	0.106						
	200	0.08	68.30	68.30	22.77%	65.36		
	Pan	0	196.04	196.04	65.36%	0.00		
			Total	299.93				

Percent Moisture, Mass Lost, Gradation and Uniformity Coefficient					
Pan Tare:	0.45	M _{water} :	0.17	D ₁₀ :	-
M _w +Pan:	1.89	%Mt.	13.78%	D ₃₀ :	-
M _w :	1.44	Initial Mass:	300.00	D ₆₀ :	-
M _D +Pan:	1.72	Final Mass:	299.93	C _c :	-
M _D :	1.26	Mass Lost(%):	0.02%	C _u :	-



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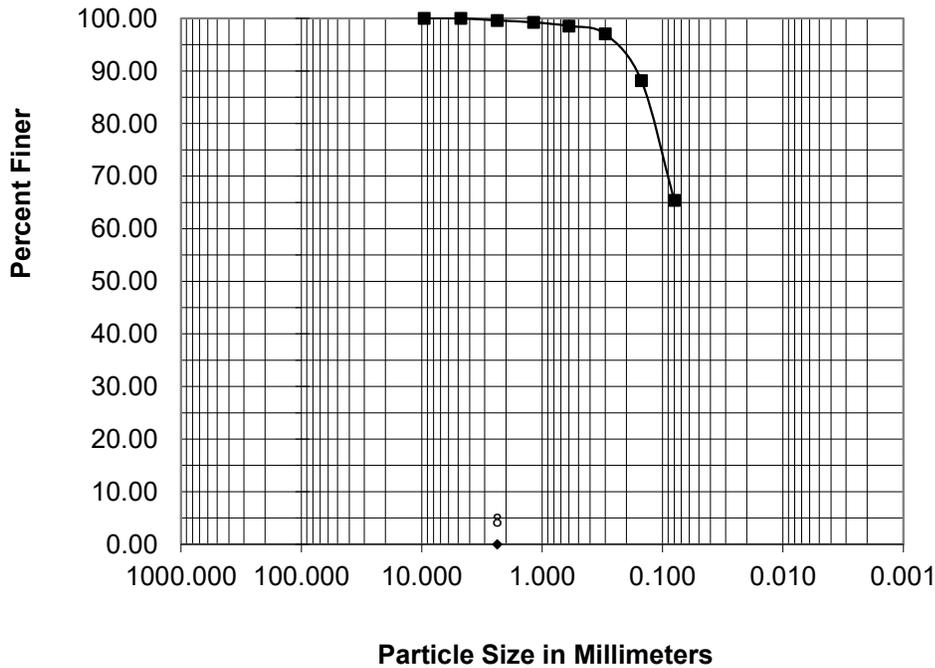
PARTICLE SIZE ANALYSIS

JFC ENGINEERS & SURVEYORS

CLIENT: Wyoming State Construction Department
PROJECT: Wyoming State Hospital
JOB NO: 11648-25E
TESTED DATE: 11/18/2025
TESTED BY: AMJ
TEST METHOD: ASTM C-136/C-117, ROUND SHAKER,
STANDARD STACK UNIFIED SOIL

SAMPLE NO: 11648-02 BH-1 #4 10' Gradatic
SAMPLED BY: RDP
SOURCE: BH-1 #4 10'
SAMPLE DESCRIPTION: CL - Sandy Lean Clay
GRADATION DESCRIPTION: NO PROBLEMS
ENCOUNTERED ADHERED

Cumulative Particle-Size Plot



COMMENTS: NO HYDROMETER ANALYSIS CONDUCTED.

JFC ENGINEERS & SURVEYORS

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CLIENT:	Wyoming State Construction Department
PROJECT:	Wyoming State Hospital
JOB NO:	11648-25E
TEST DATE:	11/17/25
TESTED BY:	AMJ
TEST METHOD:	ASTM D4318-17
SAMPLE NO:	11648-03 BH-2 #2 5' Atterberg
SAMPLED BY:	RDP
SOURCE:	BH-2 #2 5'
SAMPLE DESCRIPTION:	CL - Sandy Lean Clay

LIQUID LIMIT						
TRIAL NUMBER	BLOWS	BLOWS N	PAN TARE (g)	WET MASS + PAN (g)	DRY MASS + PAN (g)	PERCENT MOISTURE
1	25<N<35	35	20.79	41.73	36.70	31.62
2	20<N<30	25	20.59	40.55	35.60	32.98
3	15<N<25	16	20.76	40.51	35.42	34.72

LL	33
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PLASTIC LIMIT						
TRIAL NUMBER			PAN TARE (g)	WET MASS + PAN (g)	DRY MASS + PAN	PERCENT MOISTURE
1			20.83	28.05	27.18	13.70
2			20.69	27.77	26.90	14.01

PL	14
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PI	19
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C _c	-
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JFC ENGINEERS & SURVEYORS
 PARTICLE SIZE ANALYSIS

CLIENT:	Wyoming State Construction Department
PROJECT:	Wyoming State Hospital
JOB NO:	11648-25E
TEST DATE:	11/18/25
TESTED BY:	AMJ
TEST METHOD:	ASTM C-136/C-117, ROUND SHAKER, STANDARD STACK UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487)
SAMPLE NO:	11648-03 BH-2 #2 5' Gradation
SAMPLED BY:	RDP
SOURCE:	BH-2 #2 5'
SAMPLE DESCRIPTION:	CL - Sandy Lean Clay
GRADATION DESCRIPTION:	NO PROBLEMS ENCOUNTERED ADHERED TO ASTM STD.
Pan Tare:	0.00
Fineness Modulus	2.22

	Sieve No	Sieve Size (mm)	Wt. Retained+ Pan (grams)	Wt. Retained (grams)	Percent Retained	Percent Finer	Gradation Envelope Limits	
							Lower Spec.	Upper Spec.
Gravel	6	152.40						
	3.0	76.20						
	2.5	63.50						
	2.0	50.80						
	1.5	38.10						
	1.0	25.40						
	0.75	19.05						
	0.50	12.70						
	0.375	9.53	0.00	0.00	0.00%	100.00		
Sand	0.250	6.3						
	4	4.75	0.75	0.75	0.25%	99.75		
	8	2.36	0.87	0.87	0.29%	99.46		
	10	2.00						
	16	1.18	2.32	2.32	0.77%	98.69		
	30	0.60	3.94	3.94	1.31%	97.37		
	40	0.43						
	50	0.30	7.15	7.15	2.38%	94.99		
	60	0.25						
	100	0.15	21.37	21.37	7.13%	87.86		
Silt/Fines	140	0.106						
	200	0.08	58.22	58.22	19.41%	68.45		
	Pan	0	205.30	205.30	68.45%	0.00		
			Total	299.92				

Percent Moisture, Mass Lost, Gradation and Uniformity Coefficient					
Pan Tare:	0.58	M _{water} :	0.20	D ₁₀ :	-
M _w +Pan:	2.02	%Mt.	15.93%	D ₃₀ :	-
M _w :	1.44	Initial Mass:	300.00	D ₆₀ :	-
M _D +Pan:	1.82	Final Mass:	299.92	C _c :	-
M _D :	1.24	Mass Lost(%):	0.03%	C _u :	-



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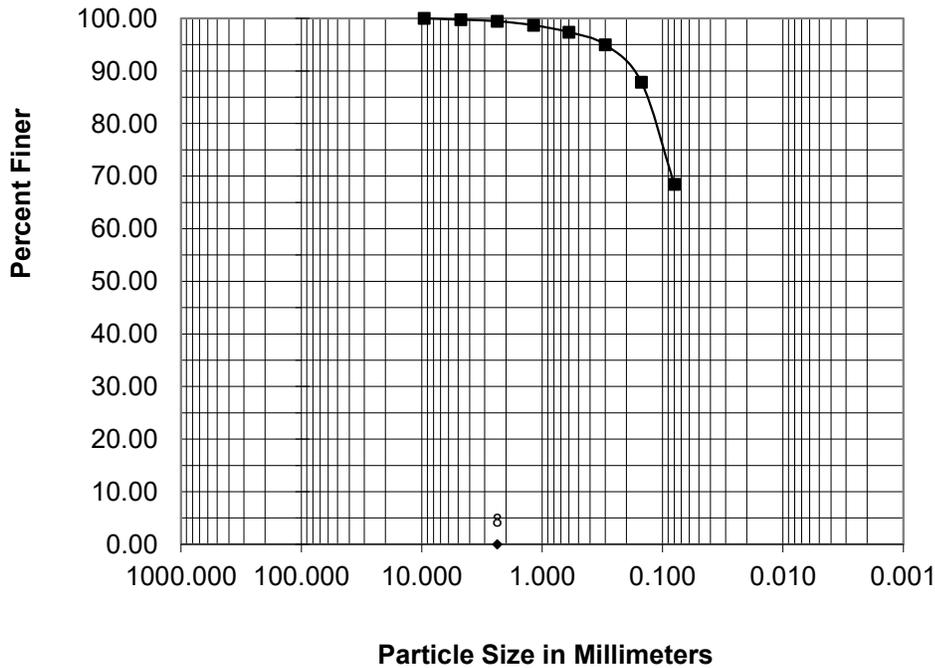
PARTICLE SIZE ANALYSIS

JFC ENGINEERS & SURVEYORS

CLIENT: Wyoming State Construction Department
PROJECT: Wyoming State Hospital
JOB NO: 11648-25E
TESTED DATE: 11/18/2025
TESTED BY: AMJ
TEST METHOD: ASTM C-136/C-117, ROUND SHAKER,
STANDARD STACK UNIFIED SOIL

SAMPLE NO: 11648-03 BH-2 #2 5' Gradator
SAMPLED BY: RDP
SOURCE: BH-2 #2 5'
SAMPLE DESCRIPTION: CL - Sandy Lean Clay
GRADATION DESCRIPTION: NO PROBLEMS
ENCOUNTERED ADHERED

Cumulative Particle-Size Plot



COMMENTS: NO HYDROMETER ANALYSIS CONDUCTED.

JFC ENGINEERS & SURVEYORS

Signature

Printed Name & Title



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CLIENT:	Wyoming State Construction Department
PROJECT:	Wyoming State Hospital
JOB NO:	11648-25E
TEST DATE:	11/17/25
TESTED BY:	AMJ
TEST METHOD:	ASTM D4318-17
SAMPLE NO:	11648-04 BH-2 #1 2.5' Atterberg
SAMPLED BY:	RDP
SOURCE:	BH-2 #1 2.5'
SAMPLE DESCRIPTION:	CL - Sandy Lean Clay

LIQUID LIMIT						
TRIAL NUMBER	BLOWS	BLOWS N	PAN TARE (g)	WET MASS + PAN (g)	DRY MASS + PAN (g)	PERCENT MOISTURE
1	25<N<35	35	20.84	44.14	38.75	30.09
2	20<N<30	24	20.59	44.10	38.50	31.27
3	15<N<25	16	20.82	44.47	38.62	32.87

LL	31
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PLASTIC LIMIT						
TRIAL NUMBER			PAN TARE (g)	WET MASS + PAN (g)	DRY MASS + PAN	PERCENT MOISTURE
1			20.69	27.74	26.79	15.57
2			20.69	27.70	26.81	14.54

PL	15
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PI	16
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C _c	-
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Printed Name & Title



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 FAX (307) 362-7569

JFC ENGINEERS & SURVEYORS
 PARTICLE SIZE ANALYSIS

CLIENT:	Wyoming State Construction Department
PROJECT:	Wyoming State Hospital
JOB NO:	11648-25E
TEST DATE:	11/18/25
TESTED BY:	AMJ
TEST METHOD:	ASTM C-136/C-117, ROUND SHAKER, STANDARD STACK UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487)
SAMPLE NO:	11648-04 BH-2 #1 2.5' Gradation
SAMPLED BY:	RDP
SOURCE:	BH-2 #1 2.5'
SAMPLE DESCRIPTION:	CL - Sandy Lean Clay
GRADATION DESCRIPTION:	NO PROBLEMS ENCOUNTERED ADHERED TO ASTM STD.
Pan Tare:	0.00
Fineness Modulus	2.25

	Sieve No	Sieve Size (mm)	Wt. Retained+ Pan (grams)	Wt. Retained (grams)	Percent Retained	Percent Finer	Gradation Envelope Limits	
							Lower Spec.	Upper Spec.
Gravel	6	152.40						
	3.0	76.20						
	2.5	63.50						
	2.0	50.80						
	1.5	38.10						
	1.0	25.40						
	0.75	19.05						
	0.50	12.70						
	0.375	9.53	0.00	0.00	0.00%	100.00		
0.250	6.3							
Sand	4	4.75	1.32	1.32	0.44%	99.56		
	8	2.36	1.28	1.28	0.43%	99.13		
	10	2.00						
	16	1.18	1.60	1.60	0.53%	98.60		
	30	0.60	4.18	4.18	1.39%	97.21		
	40	0.43						
	50	0.30	10.35	10.35	3.45%	93.76		
	60	0.25						
	100	0.15	21.63	21.63	7.21%	86.54		
Silt/Fines	140	0.106						
	200	0.08	55.93	55.93	18.65%	67.89		
	Pan	0	203.63	203.63	67.89%	0.00		
			Total	299.92				

Percent Moisture, Mass Lost, Gradation and Uniformity Coefficient					
Pan Tare:	0.58	M _{water} :	0.16	D ₁₀ :	-
M _w +Pan:	1.82	%Mt.	14.17%	D ₃₀ :	-
M _w :	1.25	Initial Mass:	300.00	D ₆₀ :	-
M _D +Pan:	1.67	Final Mass:	299.92	C _c :	-
M _D :	1.09	Mass Lost(%):	0.03%	C _u :	-



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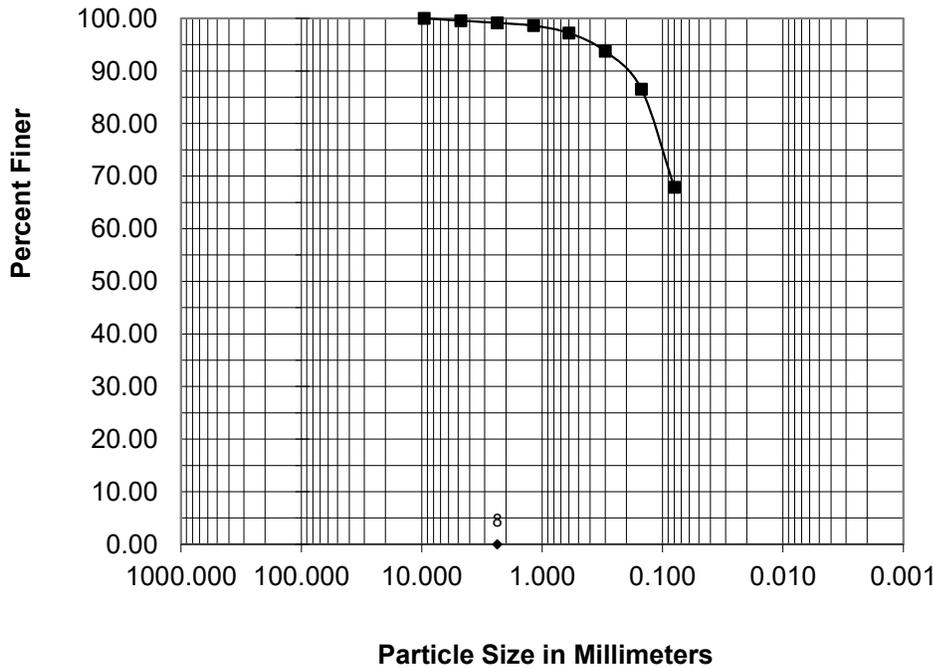
PARTICLE SIZE ANALYSIS

JFC ENGINEERS & SURVEYORS

CLIENT: Wyoming State Construction Department
PROJECT: Wyoming State Hospital
JOB NO: 11648-25E
TESTED DATE: 11/18/2025
TESTED BY: AMJ
TEST METHOD: ASTM C-136/C-117, ROUND SHAKER,
STANDARD STACK UNIFIED SOIL

SAMPLE NO: 11648-04 BH-2 #1 2.5' Gradati
SAMPLED BY: RDP
SOURCE: BH-2 #1 2.5'
SAMPLE DESCRIPTION: CL - Sandy Lean Clay
GRADATION DESCRIPTION: NO PROBLEMS
ENCOUNTERED ADHERED

Cumulative Particle-Size Plot



COMMENTS: NO HYDROMETER ANALYSIS CONDUCTED.

JFC ENGINEERS & SURVEYORS

Signature

Printed Name & Title

APPENDIX D

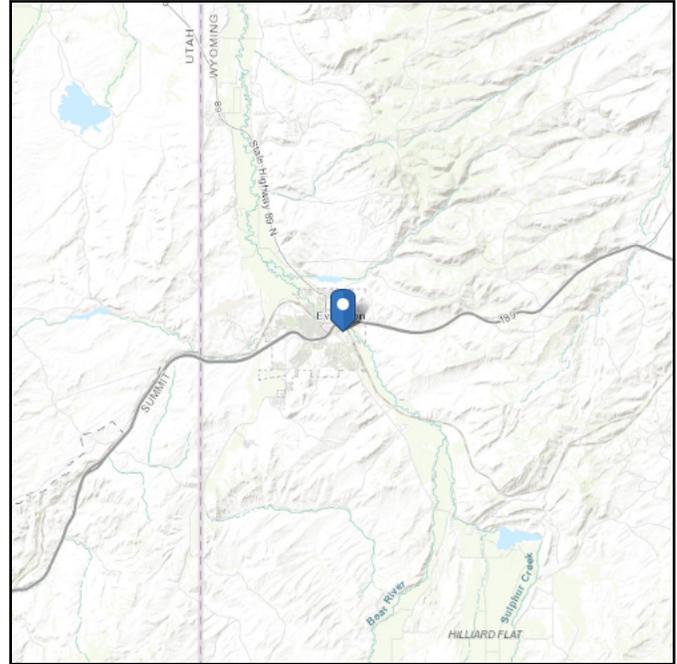
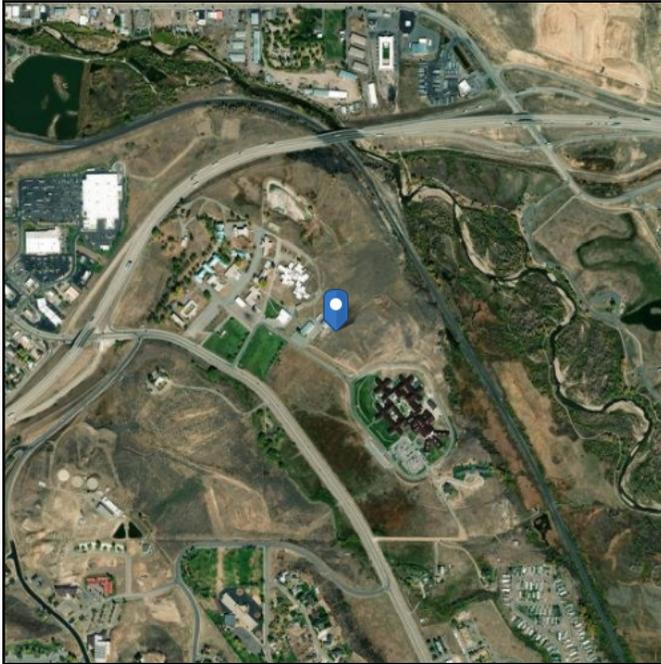
ASCE Hazards Report

ASCE Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-22
Risk Category: I
Soil Class: DE

Latitude: 41.262259
Longitude: -110.945513
Elevation: 6856.52867428752 ft (NAVD 88)

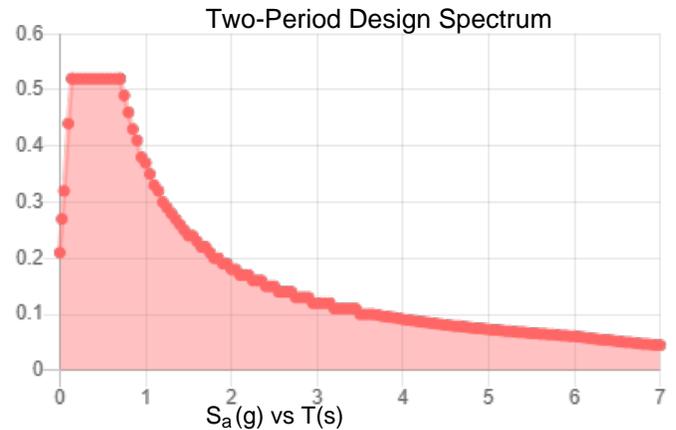
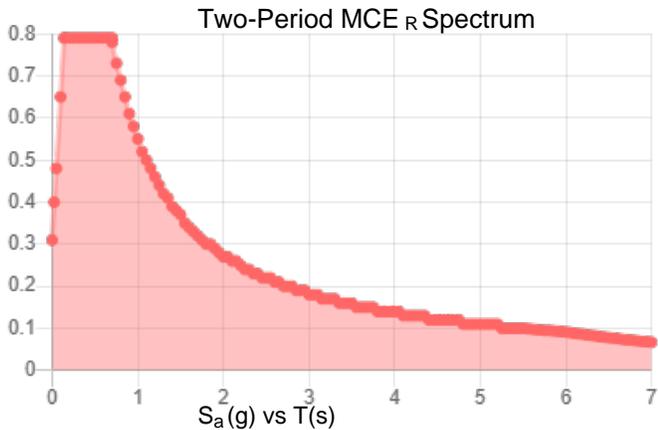
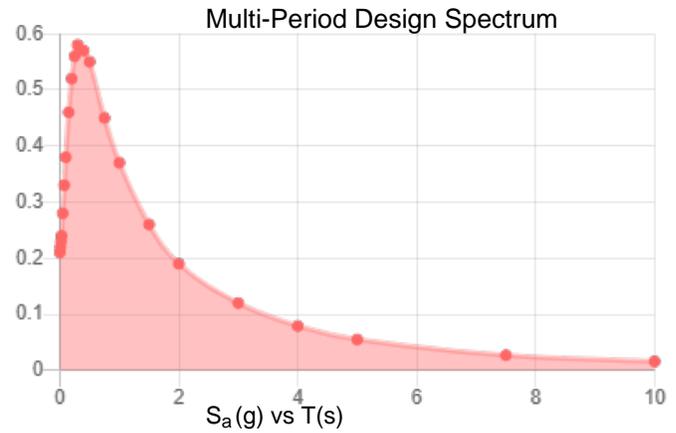
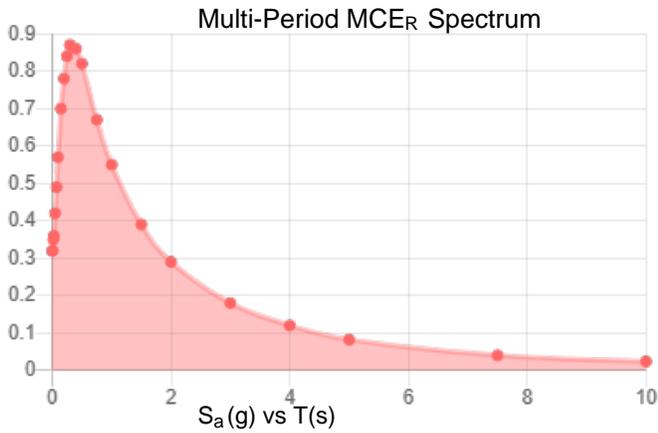


Site Soil Class: DE

Results:

PGA _M :	0.3	T _L :	6
S _{MS} :	0.79	S _s :	0.55
S _{M1} :	0.55	S ₁ :	0.17
S _{DS} :	0.52	V _{S30} :	185
S _{D1} :	0.37		

Seismic Design Category: D



MCE_R Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.



Data Accessed: Thu Nov 13 2025

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

Flood

Results:

Flood Zone Categorization: X (unshaded)

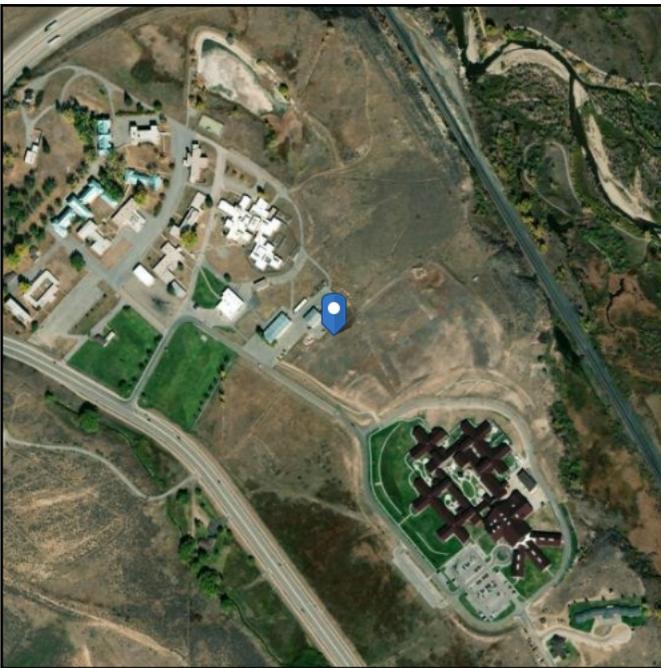
Base Flood Elevation: Refer to map for local elevations and interpolate according to the Authority Having Jurisdiction.

Data Source: FEMA National Flood Hazard Layer - Effective Flood Hazard Layer for US, where modernized (<https://msc.fema.gov/portal/search>)

Date Accessed: Thu Nov 13 2025

FIRM Panel: If available, download FIRM panel [here](#)

Insurance Study Note: Download FEMA Flood Insurance Study for this area [here](#)



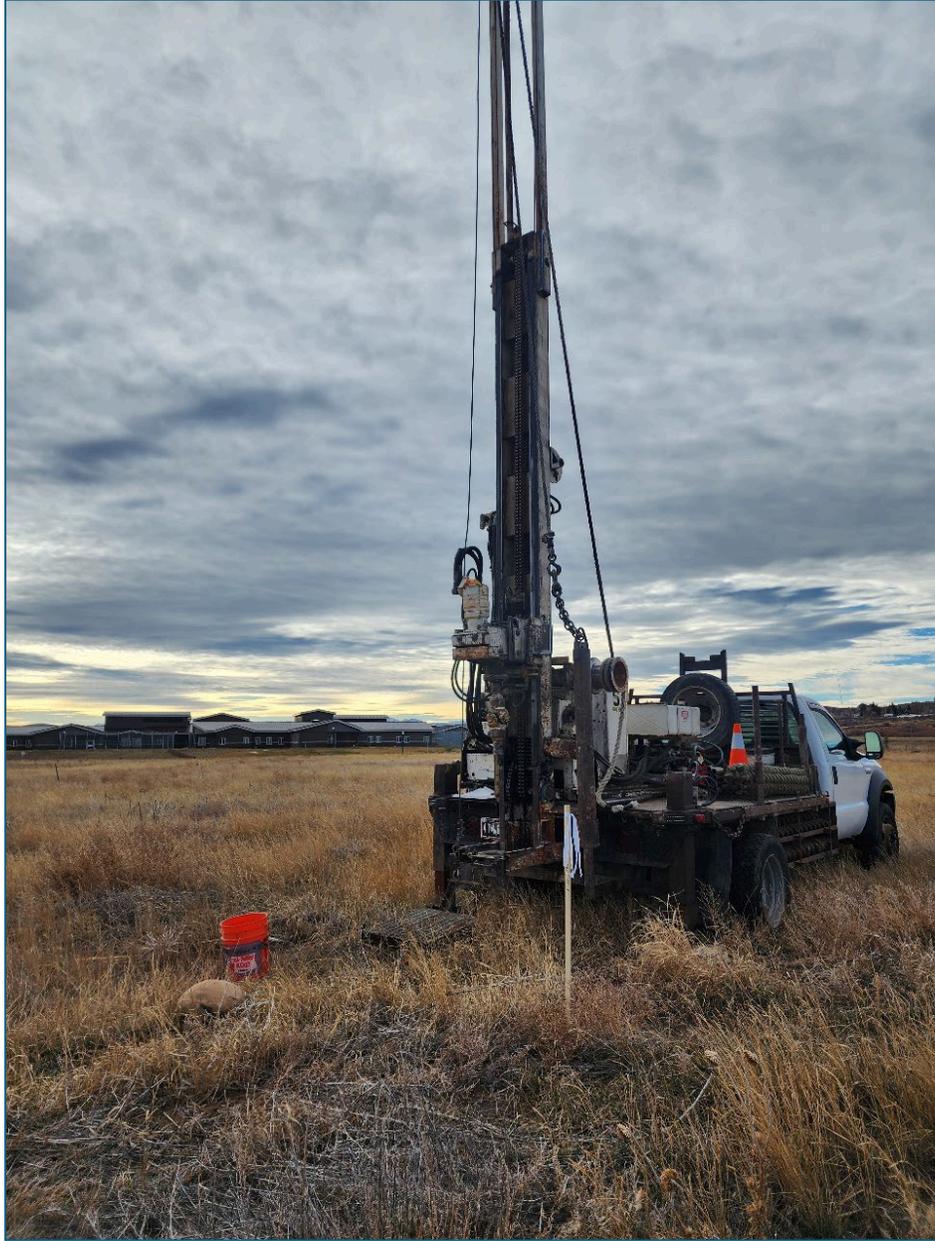
The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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APPENDIX E

Site Photos



Borehole #1



Borehole #2

WYOMING STATE HOSPITAL PRE-ENGINEERED METAL BUILDING
SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.
- B. Wyoming Public Works Standard Specifications (2023).
- C. Wyoming Standard Specifications for Road and Bridge Construction (WYDOT 2021).

1.2 DEFINITIONS

- A. Owner's' Representative shall have the same meaning as "Engineer".

1.3 SUMMARY

- A. Related Requirements:
 - 1. Section 024119 "Selective Demolition.

1.4 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: The General Contractor shall schedule and conduct a site conference at the project site before any construction activities. Detailed minutes shall be recorded by the General Contractor and provided to the Owner's Representative in typewritten form no later than 3 business days after the meeting.
 - 1. Review requirements for protecting paving work, including restriction of traffic during the installation period and for remainder of the construction period.
 - a. Go, no-go decision for pavement operations with pending rainstorms.
 - 2. Review acceptable pavement temperatures for:
 - a. Asphalt arrival temperature range.
 - b. Minimum temperature to spread asphalt mix.
 - c. Minimum temperature to complete compaction.
 - d. Minimum temperature for joints.
 - 3. Responsibility for temperature assurance during paving operations.
 - a. Contractor shall provide a full-time, on-site superintendent with this authority and responsibility.
 - b. Acceptable method(s) for temperature measurements.

1.5 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Job-Mix Designs: At least 14 days prior to paving operations, provide certification by a Wyoming licensed professional Engineer or qualified testing agency of approval of each job mix proposed for the Work.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if base course is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 - 1. Tack Coat: Minimum surface temperature of 60 deg F.
 - 2. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.
 - 3. Weather and Seasonal Limitation: Per Wyoming Standard Specifications for Road and Bridge Construction.

WYOMING STATE HOSPITAL PRE-ENGINEERED METAL BUILDING
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PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: ASTM D 692/D 692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- C. Fine Aggregate: ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
 - 1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.
- D. Mineral Filler: ASTM D 242/D 242M, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

- A. Aggregates shall be Type II Pavement Aggregate (1/2" Max).
- B. Asphalt Binder: AASHTO M 320, PG 64-28.
- C. Asphalt Cement: ASTM D 3381/D 3381M.
- D. Cutback Prime Coat: ASTM D 2027, medium-curing cutback asphalt, MC-250.
- E. Tack Coat: AASHTO M 140 emulsified asphalt, or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- F. Water: Potable.

2.3 MIXES

- A. Recycled Content of Hot-Mix Asphalt: Postconsumer recycled content not more than 15 percent by weight.
- B. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes meeting Wyoming Department of Transportation requirements and complying with the following requirement:
 - 1. Provide mixes with a history of satisfactory performance in the geographical area where Project is located.
- C. Emulsified-Asphalt Slurry: ASTM D 3910, Type 1.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that base and subbase are dry and in suitable condition to begin paving.

3.2 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces.
- B. Tack Coat: Apply uniformly to all vertical faces of existing asphalt and concrete at a rate of 0.05 to 0.15 gal./sq. yd.
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.3 PLACING HOT-MIX ASPHALT

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
 - a. Compacted asphalt thickness greater than 4 inches shall be place in two (2) lifts with a tack coat between.
 - 2. Spread mix at a minimum temperature of 250 deg F.

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3. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
 4. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches from strip to strip to ensure proper compaction of mix along longitudinal joints.
 2. Complete a section of asphalt base course before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.
- 3.4 JOINTS
- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
1. Clean contact surfaces and apply tack coat to joints.
 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "
 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 6. Compact asphalt at joints to a density within 2 percent of specified course density.
- 3.5 COMPACTION
- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
- D. Average Density: 96 percent of reference laboratory density but not less than 94 of the Marshall Stability Value as determined in accordance with ASTM D6927, or greater than 100 percent.
- E. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.
- 3.6 INSTALLATION TOLERANCES
- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
1. Base Course: Plus or minus 1/2 inch.

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2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
1. Base Course: 1/4 inch.
 2. Surface Course: 1/8 inch.
- 3.7 FIELD QUALITY CONTROL
- A. All material testing sufficient for the Contractor to properly execute the work under this contract will be completed by the Contractor.
 - B. The Contractor shall perform its own Quality Control to ensure all work is in accordance with the contract requirements prior to Owner Acceptance Testing.
 - C. The Contractor shall establish and maintain an inspection and testing system that assures compliance with the contract requirements.
 - D. Any indication of system deficiencies, whether discovered as a result of the Owner's observations or the Contractor's inspections and tests, shall result in modifications to the Contractor's construction methods to correct all deficiencies.
 - E. The Contractor shall maintain up-to-date Quality Control testing and inspection records on-site and make them available to the Owner, Engineer, and Observer(s) immediately upon request.
 - F. The Contractor shall perform Quality Control measures, whether or not Owner Quality Acceptance testing is performed. Owner Quality Acceptance tests and inspections are for its benefit and do not take the place of the Contractor's Quality Control and testing obligations.
- 3.8 FIELD QUALITY ACCEPTANCE
- A. Testing Agency: Owner will engage a qualified testing agency to perform tests.
 - B. Density: At least one test for every 50 sq. yd. or less of paved area, but in no case fewer than three tests.
 - C. In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
 - D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
 - E. Replace and compact hot-mix asphalt where core tests were taken.
 - F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

END OF SECTION

WYOMING STATE HOSPITAL PRE-ENGINEERED METAL BUILDING
SECTION 321212 – CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.
- B. Wyoming Public Works Standard Specifications (2023).
- C. Wyoming Standard Specifications for Road and Bridge Construction (WYDOT 2021).

1.2 DEFINITIONS

- A. Owner's' Representative shall have the same meaning as "Engineer".

1.3 INFORMATIONAL SUBMITTALS

- A. Mix design meeting WYDOT requirements for Class 4,500 Cement Concrete.

1.4 QUALITY ASSURANCE

- A. Concrete Testing Service: Owner will engage a qualified testing agency to perform material evaluation tests.
- B. ACI Publications: Comply with ACI 301 unless otherwise indicated.

1.5 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Metal only for curb and gutter tangent section, metal form only for all sidewalks to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. to provide full-depth, continuous, and smooth exposed surfaces. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- B. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, Grade 60 deformed bars.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, gray Portland cement Type II
 - a. Fly Ash: ASTM C 618, Class F. Calls C not allowed.
- B. Normal-Weight Aggregates: uniformly graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: Potable and complying with ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

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1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.4 FIBER REINFORCEMENT

- A. Synthetic Fiber: Monofilament polypropylene fibers engineered and designed for use in concrete paving, complying with ASTM C 1116/C 1116M.

2.5 CURING MATERIALS

- A. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.6 CONCRETE MIXTURES

- A. Proportion mixtures to provide normal-weight concrete with the following properties:
 1. Compressive Strength (28 Days): 4,500 psi.
 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
 3. Slump Limit: 4 inches, plus or minus 1 inch.
- B. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
 1. Air Content: 5-1/2 percent plus or minus 1.0 percent for 3/4-inch nominal maximum aggregate size.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
- E. Synthetic Fiber: Uniformly dispersed in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete with electronic controls according to ASTM C 94/C 94M. Furnish batch certificates to the Owner Representative for each batch discharged and used in the Work.
 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Not allowed.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subgrade per Section 312000 "Earth Moving", below concrete paving to identify soft pockets and areas of excess yielding before identity testing.
- C. Verify compaction for prepared subgrade below concrete sidewalks by use of compaction equipment, to identify soft pockets and areas of excess yielding before identity testing.
 1. Compaction by vibratory plate only shall be considered to be inadequate.
- D. Correct subbase with soft spots and areas of pumping or rutting as identified or exceeding depth of 1/2 inch according to requirements in Section 312000 "Earth Moving."
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

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SECTION 321212 – CONCRETE PAVING

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

3.5 JOINTS

- A. General: Form construction, isolation, expansion and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
- B. EXPANSION JOINTS - Expansion joints shall be constructed at right angles to the curb line at immovable structures and at points of curvature for short-radius curves.
 - 1. Filler material for expansion joints shall be furnished in a single 3/4-inch-thick piece for the full depth and width of the joint.
 - 2. Expansion Joints shall be installed at all new-to-existing curb and gutter joints.
 - 3. Joint filler shall be installed at all Expansion Joints.
- C. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match the jointing of existing adjacent concrete paving.
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 3/8-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
- A. Control Joints: Control joints shall be aligned within the curb and gutter, sidewalk, and retaining walls (as applicable) at a maximum spacing of ten (10) linear feet. All components shall be similarly jointed. For sidewalks, control joint spacing shall be no longer than the width of the sidewalk. The joint shall be finished using a joint tool guided by a straight edge leaving a slightly rounded edge on each side of the joint.
- B. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 3/8-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.
- C. Joint Filler: Elastomeric Tube (Backer Rod): Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, non-absorbent to water and gas, capable of remaining resilient at temperatures down to -26°F. Provide product with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise.
 - 1. Hot or Cold applied according to Wyoming Public Works Standard Specifications Section 03250.

3.6 CONCRETE PLACEMENT

- A. Concrete Sidewalks, Driveway Approaches, Curb Turn Fillets, Valley Gutters & Miscellaneous New Concrete Construction: Installed per Section 0776 of Wyoming Public Works Standard Specifications.

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- B. Site Batch Tickets: Immediately upon delivery of each load of concrete, the Contractor shall furnish the Owners Agent with a computer-generated batch ticket that has been issued directly by the cement concrete batching plant.
- C. The Owner will have no obligation to pay for any load of concrete not accompanied by a proper ticket. Errant slips which are forwarded after the wet pour has ceased shall not serve to meet this requirement.
 - 1. Hand-written tickets will not be accepted.
 - 2. Document all re-dosing actions on the batch ticket and provide a copy to the Owner's on-site representative.
 - 3. Minimum Batch Ticket Information:
 - a. Project Name.
 - b. Batch date and time.
 - c. Contractor receiving material.
 - d. Mix Design.
 - e. Truck number.
 - f. Total yards batched per load.
 - g. Portland Cement weight.
 - h. Aggregate weights.
 - i. Aggregate moisture.
 - j. Cement and fly ash weight.
 - k. Admixtures and the amount added.
 - l. Water added at the plant.
 - m. Free water that may be added on-site.
- D. Before placing concrete, inspect and complete formwork installation and steel reinforcement.
- E. Remove snow, ice, or frost from subbase surface before placing concrete. Do not place concrete on frozen surfaces.
- F. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- G. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- H. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- I. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- J. Consolidate concrete according to ACI 30 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
- K. Screed paving surface with a straightedge and strike off.
- L. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- M. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow.

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3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

N. Hot-Weather Placement: Comply with ACI 301.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

1. The Owner will have no obligation to pay for concrete where water or an unapproved compound has been added to the surface of concrete.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
2. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by curing compound]as follows:

1. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.9 TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Lip of Gutter: 3/8 inches
2. Thickness: Plus 3/8-inch, minus 1/4 inch.
3. Surface: Gap below 10-foot-long, unlevelled straightedge not to exceed 3/8 inch.
4. Joint Spacing: 3 inches.
5. Contraction Joint Depth: Plus 1/4 inch, no minus.
6. Joint Width: Plus 1/8 inch, no minus.

3.10 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Owner's Representative.

B. Allow concrete paving to cure per the paint manufacturer's recommendations.

C. Sweep and clean the surface to eliminate loose material and dust.

D. Completely removed existing pavement markings by sandblasting where called out on the plans.

E. Apply paint with mechanical equipment to produce markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).

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3.11 FIELD QUALITY CONTROL

- A. All material testing sufficient for the Contractor to properly execute the work under this contract will be completed by the Contractor.
- B. The Contractor shall perform its own Quality Control to ensure all work is in accordance with the contract requirements prior to Owner Acceptance Testing.
- C. The Contractor shall establish and maintain an inspection and testing system that assures compliance with the contract requirements.
- D. Any indication of system deficiencies, whether discovered as a result of the Owner's observations or the Contractor's inspections and tests, shall result in modifications to the Contractor's construction methods to correct all deficiencies.
- E. The Contractor shall maintain up-to-date Quality Control testing and inspection records on-site and make them available to the Owner, Engineer, and Observer(s) immediately upon request.
- F. The Contractor shall perform Quality Control measures, whether or not Owner Quality Acceptance testing is performed. Owner Quality Acceptance tests and inspections are for its benefit and do not take the place of the Contractor's Quality Control and testing obligations.

3.12 FIELD QUALITY ACCEPTANCE

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain at least one composite sample for pours in excess of each 10 cu. yd. and one composite test for each additional 25 C.Y. each day.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
 - 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of five standard cylinder specimens for each composite sample.
 - 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and three specimens at 28 days with one space cylinder.
 - a. A compressive-strength test shall be the average compressive strength from three specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
- D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Owner's Representative but will not be used as sole basis for approval or rejection of concrete.
- E. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Owner's Representative.
 - 1. Re-testing for Owner acceptance shall be paid for by the Contractor.
- F. Concrete will be considered defective if:
 - 1. Concrete does not pass tests and inspections.
 - 2. Water or an unapproved compound is added to the surface.
- G. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

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SECTION 321212 – CONCRETE PAVING

- H. Prepare test and inspection reports.
- 3.13 REPAIRS AND PROTECTION
- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Owner's Representative.
 - B. Drill test cores, where directed by Owner's Representative, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
 - C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
 - D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

WYOMING STATE HOSPITAL PRE-ENGINEERED METAL BUILDING
SECTION 221113 - WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.
- B. Wyoming Public Works Standard Specifications (2023).
- C. Wyoming Standard Specifications for Road and Bridge Construction (WYDOT 2021).

1.2 SUMMARY

- A. This Section includes water-distribution piping and related components outside the building for Fire Hydrant installation only.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. All sizes of PVC pipe
 - 2. All Ductile Iron Fitting
 - 3. Pipe restraint system
 - 4. Fire hydrants
 - 5. Valve straps
 - 6. Valve boxes and covers
 - 7. Trench backfill and bedding materials

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For water valves and fire hydrants.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with requirements of the City of Evanston, Wyoming DEQ, and Uinta County Fire Department.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
- E. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
- G. NSF Compliance:
 - 1. Comply with NSF 14 for plastic potable-water-service piping.
 - 2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
 - 1. Ensure that valves are dry and internally protected against rust and corrosion.
 - 2. Protect valves against damage to threaded ends and flange faces.
 - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
 - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.

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2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
 - C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
 - D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
 - E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
 - F. Protect flanges, fittings, and specialties from moisture and dirt.
 - G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.
- 1.7 PROJECT CONDITIONS
- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others until the following notification has been made, and approved, in writing.
 1. Notify the following people no fewer than three (3) working days in advance of the proposed interruption of service.
 - a. Brent Sanders, PE - Owner's Representative: 307-679-2289, Crestllc19@gmail.com
 - b. Byron Harmon - Facility Manager: 307-444-0751, byron.harmon@wyo.gov
- 1.8 COORDINATION
- A. Coordinate connection to water main with the following:
 - a. Chad Hollingshead – Maintenance: 307-799-8113, chad.hollingshead@wyo.gov

PART 2 - PRODUCTS

2.1 PIPE

- A. All pipe shall be 6-inch C-900 DR-18, AWWA for a working pressure of 200 psi. All PVC pipes shall be new without sun-checking. Pipe shall be stamped to show the design working pressure.
- B. PVC pipe shall be manufactured in accordance with AWWA specification C900. All pipe shall bear the seal of approval of the National Sanitation Foundation for use in potable water systems.
- C. The pipe joints shall be provided with elastomeric gasket joints. The gasket shall be formed integral with the pipe. Gaskets shall be manufactured in accordance with ASTM F477. Spigot ends of the pipe shall be doubled marked to visually reference that the end has not been "over-belled".
- D. The Contractor shall submit evidence of compliance with all ASTM & AWWA specifications.

2.2 FITTINGS

- A. Ductile iron fittings for PVC pipe shall be mechanical joint in accordance with AWWA C110 or AWWA C153 specification and shall have a minimum working pressure rating of 250 pounds per square inch.
- B. All fittings shall be coated outside with a bituminous coating of either coal tar or asphalt. The inside coating shall be a cement-mortar lining in accordance with AWWA C104 specification.
- C. Mechanical joints shall be installed in accordance with the manufacturer's recommendations.

2.3 GATE VALVES

- A. Cast-Iron Gate Valves comply with AWWA C600 and AWWA M44:
 1. Non-rising-Stem, Resilient-Seated Gate Valves:
 - a. Description: Gray or ductile-iron body and bonnet; with bronze or gray or ductile-iron gate, resilient seats, bronze stem, and stem nut for vertical installation with valve box and concrete collar.
 - 1) Standard: AWWA C509.
 - 2) Minimum Pressure Rating: 200 psig.

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- 3) End Connections: Mechanical joint.
- 4) Equipped with a 2" operating nut with the direction of opening to the left (counter-clockwise)
- 5) Interior Coating: Complying with AWWA C550.

2.4 GATE VALVE ACCESSORIES AND SPECIALTIES

- A. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.
 1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

2.5 FIRE HYDRANTS

- A. Dry-Barrel Fire Hydrants:
 1. Mueller Super Centurion 250, 3-way hydrant with 5 1/4" main valve opening.
 - a. Stainless steel bolts and hardware required.

2.6 THRUST BLOCKS

- A. All thrust block concrete shall be ready mix batch plans concrete meeting class 3,500 concrete.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.
- B. Assemble all PVC joints in accordance with recommendations of the manufacturer. If unusual jointing resistance is encountered or if the insertion mark does not reach the flush position, disassemble the joint, inspect for damage, reclean the joint components and repeat the assembly steps. Some joints may require barring to seat the joint; if so a block shall be used to protect the end of the barred pipe.
- C. For shorter than standard pipe lengths, field cuts may be made with either hand or mechanical saws or plastic pipe cutters. Ends shall be cut square and perpendicular to the pipe axis. Spigots shall have burrs removed and ends smoothly beveled by a mechanical beveler or by hand with a rasp or file. Field spigots shall be stop-marked with an adequate marker for the proper length of assembly insertion. The angle and depth of field bevels and lengths to stop-marks shall be comparable to factory pipe spigots. Where joints have been made, the void under the bell should be filled with bedding or haunching material to provide adequate support to the pipe throughout its entire length. Joints shall not be covered until approved by Engineer or his representative. Connections which are for future use shall be properly capped. All pipe shall be laid and maintained to the lines and grades shown on the plans. Wherever it is necessary to deflect pipe from a straight line, the degree of deflection at each joint shall not exceed the maximum deflection recommended by the manufacturers of the pipe being laid. Bell ends shall face the direction of laying. After pipe is laid, care shall be taken to avoid the intrusion of dirt, water or other substances by the use of tight bulkheads or plugs. Gasket material shall be kept in clean containers and shall not be allowed to come in contact with the ground. Gasket material which has become contaminated or dirty shall be destroyed.
- D. Bury piping with depth of cover over top at least equal to the existing pipe, or no less than 6 feet below finished grade.
- E. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

3.2 ANCHORAGE INSTALLATION

- A. Install Concrete thrust blocks at all vertical and horizontal changes in direction exceeding the pipe manufacturer maximum allowed joint deflection.
- B. Install locking mechanical joints anchorages for all fittings and hydrant.

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3.3 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. Valves shall be jointed to the pipe by as prescribed above. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the operating nuts, with the cover flush with the pavement surface or such other level as indicated in the plans.
- C. All valves shall bear on a batch plant concrete (Class 3,500) anchor isolated by a bond breaker and connect by stainless steel strapping/rods.

3.4 FIRE HYDRANT INSTALLATION

- A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright (plumb) position with their pumper connections at right angles to the curb line.
- B. Wet-Barrel Fire Hydrants: Install with valve below frost line. Provide for drainage. Do not allow thrust block concrete to cover weep holes.

3.5 IDENTIFICATION

- A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate as indicated in the plans.

END OF SECTION

WYOMING STATE HOSPITAL PRE-ENGINEERED METAL BUILDING
SECTION 133419 – METAL BUILDING SYSTEMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. AISC 360 - Specification for Structural Steel Buildings; American Institute of Steel Construction, Inc.; 2010.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2012.
- D. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- F. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2011.
- G. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.
- H. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2012.
- I. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010 w/Errata.
- J. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems; 2012.
- K. MBMA (MBSM) - Metal Building Systems Manual; Metal Building Manufacturers Association; 2012.
- L. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).
- M. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.02 DESIGN REQUIREMENTS

- A. Structural design for the metal building system shall be performed by the manufacturer of the metal building system in accordance with the building code provided in the contract documents.
- B. Design structures in accordance with MBMA Practices and Manual, including fabrication and erection tolerances.
- C. Design members to withstand dead load, applicable snow load, and design loads due to pressure and suction of wind, calculated in accordance with applicable code and as noted herein and on drawings.
 - 1. See "Design load values for Evanston, Wyoming" (Attachment at the end of this Section).
- D. Design members to withstand UL 580 Uplift Class 90.
- E. Permit movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects, when subject to a temperature range of -20° F to 120° F., ambient.
- F. Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.
- G. Thermal Performance: Provide metal building roof and wall assemblies with the following thermal-resistance values (R-value):
 - 1. Roof Assemblies: R-30
 - 2. Wall Assemblies: R-19

1.03 FABRICATION - FRAMING

- A. Fabricate members in accordance with AISC 360 for plate, bar, tube, or rolled structural shapes.
- B. Anchor Bolts: Formed with bent shank, assembled with template for casting into concrete.
- C. Provide wall opening framing for doors, windows, louvers, and other accessory components.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Conference: The General Contractor shall schedule and conduct a conference at the project site, with the Owner's Representative present, before any work under this section. Detailed minutes shall be recorded by the General Contractor and provided to the Owner's Representative in typewritten form no later than 3 business days after the meeting.

1.05 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of the following metal building system components:
 - 1. Structural-framing system.
 - 2. Roof panels.
 - 3. Wall panels.
 - 4. Insulation.
 - 5. Vapor retarders.
 - 6. Trim and closures.
 - 7. Sectional Doors, motors, operators, and hardware.
 - 8. Man-Door's, frames, and hardware.
 - 9. Windows.
 - 10. Louvers.
 - 11. Intakes and Vents.
 - 12. Fasteners and accessories.
- B. Submit color chips showing the manufacturer's full range of available colors and patterns for each finished product.
 - 1. After color selection, submit samples representing the actual product, color, and patterns.
- C. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections, attachments, openings, cambers, and loads; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, installation; framing anchor bolt settings, sizes, and locations from datum, foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.
 - 1. For installed components indicated to comply with design loads, include structural analysis data signed and sealed by the qualified Wyoming professional engineer responsible for their preparation.
 - i. The Contractor shall provide the structural analysis data that is necessary for completion of the structural design of the concrete foundation system. An updated structural plan set will be issued upon final foundation system design.
- D. Manufacturers' Instructions:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Indicate preparation requirements and anchor bolt placement.
- E. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.
- F. Structural Design Calculations: Two sets sealed and signed by a Wyoming professional engineer licensed in accordance with applicable state law.
- G. Manufacturer Qualification Statement: Provide documentation showing the metal building manufacturer is accredited under IAS AC472.
 - 1. Include a statement that the manufacturer designs and fabricates a metal building system as integrated components and assemblies, including but not limited to primary structural members, secondary members, joints, roof, and wall cladding components specifically designed to support and transfer loads, and properly assembled components form a complete or partial building shell.

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2. Product Certificates: Signed by manufacturers of metal building systems certifying that products furnished comply with requirements.
- H. Certified Erector Certificate issued to the erector by the manufacturer.
- I. Project Record Documents: Record actual locations of concealed components and utilities.

1.06 QUALITY ASSURANCE

- A. Design structural components, develop shop drawings, and perform shop and site work under the direct supervision of a Professional Structural Engineer experienced in the design of this Work.
 1. Design Engineer Qualifications: Licensed in Wyoming.
 2. Conform to applicable code, including those listed on sheet C-001, for submission of design calculations as required for acquiring permits.
 3. Cooperate with all regulatory agencies or authorities and provide data as requested.
- B. Perform work in accordance with AISC 360 and MBMA (MBSM).
- C. Perform welding in accordance with AWS D1.1/D1.1M.
- D. Manufacturer Qualifications: Company specializing in the manufacturing of metal building systems similar to those required for this Project and with a record of successful in-service performance.
 1. Not less than 7 years of documented experience
 2. Accredited by IAS in accordance with IAS AC472.
- E. Erector Qualifications: Single installer with a minimum of 5 years of experience in installing products of the same or similar type and scope.
 1. Installer must be certified by the metal building manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package roof and wall panels for protection during transportation and handling.
- B. Handling: Unload, store, and erect roof and wall panels to prevent bending, warping, twisting, and surface damage.
- C. Protect steel products from weather as specified by manufacturer instructions
- D. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weather-tight and ventilated covering. Store roof and wall panels to ensure dryness. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.
- E. Protect plastic insulation as follows:
 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 2. Protect against ignition at all times. Do not deliver plastic insulation materials to Project site before installation time.
 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.08 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when weather conditions permit roof and wall panel installation to be performed according to the manufacturer's written instructions and warranty requirements.
- B. Field Measurements: Verify metal building system foundations by field measurements before metal building fabrication and indicate measurements on Shop Drawings. Coordinate the fabrication schedule with construction progress to avoid delays to the Work.
- C. Established Dimensions for Foundations: Where field measurements cannot be made without delaying the work, establish foundation dimensions and proceed with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that the actual anchorage dimensions match the established dimensions.

- D. Established Dimensions for Panels: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating roof and wall panels without field measurements or allow for field-trimming panels. Coordinate roof and wall construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.09 COORDINATION

- A. Coordinate the size and location of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings.

1.10 WARRANTY

- A. Manufacturer's Warranty: On manufacturer's standard form, in which the manufacturer agrees to repair or replace metal building system components that fail in materials and workmanship within one year from the date of Substantial Completion.
 - 1. Correct defective Work within one year from the date of Substantial Completion.
- B. Weathertightness Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal building system components that fail to remain weathertight, including leaks, [without monetary limitation] [up to cost limitation of seven dollars (\$7.00) per square foot of covered area] [up to cost limitation of fourteen dollars (\$14.00) per square foot of covered area] within [5] [10] [15] [20] years from date of Substantial Completion.
- C. Panel Finish Warranty: On Manufacturer's standard form, in which Manufacturer agrees to repair or replace metal panels that evidence deterioration of factory-applied finish within the specified number of years from date of Substantial Completion, including:
- D. Include coverage for exterior pre-finished surfaces to cover pre-finished color coat against chipping, cracking, or crazing, blistering, peeling, chalking, or fading.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Buildings:
 - 1. Butler Manufacturing Company: www.butlermfg.com.
 - 2. Ceco Building Systems: www.cecobuildings.com.
 - 3. Chief Buildings: www.chiefbuildings.com.
 - 4. Kirby Building Systems: www.kirbybuildingsystems.com.
 - 5. Metallic Building Company: www.metallic.com.
 - 6. Nucor Building Systems: www.nucorbuildingsystems.com.
 - 7. VP Buildings: www.vp.com.
 - 8. American Buildings Company: www.americanbuildings.com.
- B. Insulation:
 - 1. Thermal Design – Simple Saver System: <https://thermaldesign.com/>
 - 2. Approved Equal

2.02 METAL BUILDING

- A. Single-span rigid frame.
- B. Bay Spacing: As indicated on Drawings.
- C. Primary Framing: Rigid frame of rafter beams and columns, end wall columns, and wind bracing, steel joists and wide flange beams with steel deck & closure angles at mezzanine level.
- D. Secondary Framing: Purlins, Girts, Eave struts, Flange bracing, Sill supports, Clips, and other items detailed.
- E. Wall System: Preformed metal panels of vertical profile, with sub-girt framing/anchorage assembly, insulation, and liner sheets, and accessory components.

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- F. Roof System: Preformed metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly and insulation, and accessory components.
- G. Roof Slope: As indicated on Drawings.

2.03 MATERIALS - FRAMING

- A. Structural Steel Members: ASTM A992/A992M.
- B. Anchor Bolts: ASTM A307, galvanized to ASTM A153/A153M.
- C. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, galvanized to ASTM A153/A153M, Class C.
- D. Welding Materials: Type required for materials being welded.
- E. Primer: SSPC-Paint 20, zinc rich.
- F. Grout: ASTM C1107/C1107M, Non-shrink type, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, capable of developing minimum compressive strength of 2400 psi in two days and 7000 psi in 28 days.

2.04 MATERIALS - WALLS AND ROOF

- A. Roof Panels (minimum): Ribbed panels, 24 gauge: 0.0212 inch (0.538 mm) minimum uncoated thickness, 50 ksi (340 MPa) yield strength, 36" wide, 12" rib spacing over fiberglass batt insulation.
 - 1. Color: Per Owner from manufacturer's standard colors.
- B. Wall Panel (minimum): Ribbed panels, 26 gauge: 0.0172 inch (0.437 mm) minimum uncoated thickness, 80 ksi (550 MPa) yield strength, 36" wide, 12" rib spacing over fiberglass batt insulation.
 - 1. Color: Per Owner from manufacturer's standard colors.
- C. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, SS Grade 33/230, with G90/Z275 coating.
- D. Joint Seal Gaskets: Manufacturer's standard non-curing butyl type.
- E. Fasteners: Manufacturer's standard type, galvanized to comply with requirements of ASTM A153/A153M, finish to match adjacent surfaces when exterior exposed.
- F. Sealant: Manufacturer's standard non-curing butyl type.
- G. Trim, Closure Pieces, Caps, Flashings, Gutters, Downspouts, Rain Water Diverter, Fascias, and Infills: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

2.05 MATERIALS - INSULATION

- A. Glass-Fiber-Blanket Insulation: Thermal insulation, complying with ASTM C 991, Type I, or NAIMA 202, of 0.5-lb/cu. ft. (8-kg/cu. m) density, thickness as indicated, with a flame-spread rating of 25 or less, and 2-inch- (50-mm-) wide, continuous, with white vinyl baking and vapor-tight edge tabs.
- B. Vapor-retarder Facing: Complying with ASTM C 1136, with permeance not greater than the following when tested according to ASTM E 96, Desiccant Method:
 - 1. Composition: Vinyl, with permeance not greater than 1.0 perm (57.5 ng/Pa x s x sq. m).
- C. Retainer Strips: 0.019-inch- (0.5-mm-) thick, formed, galvanized steel or PVC retainer clips colored to match insulation facing.

2.06 ACCESSORY COMPONENTS

- A. MAN-DOORS AND FRAMES.
 - 1. Man-doors: Provide standard jamb, head, sill trim package for man-doors as standard with metal building system manufacturer. Prepare and reinforce doors and frames to receive factory and field-applied hardware. Comply with the following:
 - i. Steel Doors: 1-3/4 inches (44 mm) thick; Zinc-Coated (Galvanized) Steel face sheet: ASTM A 653/A 653M, commercial quality, with G60 (Z180) coating designation; mill phosphatized
 - ii. Size: As indicated on Drawings.
 - iii. Elevation: Solid.

- iv. Color: Per Owner from manufacturer's standard colors
- v. Type: Insulated
 - a. U-value rating of at least 0.47 Btu/sq. ft. x h x deg F (2.67 W/sq. m x K).
- 2. Hardware: Provide hardware for each door, as follows:
 - i. Hinges: One-and-one-half-pair, full-mortise, steel template ball-bearing hinges, 4-1/2 by 4-1/2 inches (114 by 114 mm), with non-removable pin.
 - ii. Lockset: Material to be provided by Owner:
 - a. Schlage Lock Company SCHND80-JD-ATH-626.
 - iii. Threshold: Extruded aluminum with vinyl sweep.
 - iv. Silencers: Pneumatic rubber; three silencers on strike jambs of single door frames.
 - v. Closer: Surface-applied, heavy-duty hydraulic type.
 - vi. Weather Stripping: Vinyl applied to head, jambs, and sill.
- 3. Anchors and Accessories: Manufacturer's standard units, galvanized according to ASTM A 123.
- 4. Fabricate doors and frames to be rigid; neat in appearance; and free from defects, warp, or buckle. Provide continuous welds on exposed joints; grind, dress, and make welds smooth, flush, and invisible.
- 5. Baked-Enamel Finish: Immediately after cleaning and pre-treating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat, with total minimum dry film thickness of 1 mil (0.025 mm).

B. WINDOWS

- 1. Size: As indicated on Drawings.
- 2. Type: Insulated.
- 3. Material: Provide aluminum windows as standard with metal building system manufacturer and complying with the following:
 - i. Performance Requirements: Tested for compliance with requirements in AAMA 101 for air infiltration; water penetration; and structural performance for type, grade, and performance class required.
 - ii. Window Types, Grade, and Performance Class: Provide windows of the following type, grade, and performance class according to AAMA 101.
 - iii. Fixed Units: AAMA Grade and Performance Class F-C20.
 - iv. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (152-MPa) ultimate tensile strength and 0.062-inch (1.6-mm) thickness at any location for main frame and sash members.
 - v. Thermally Improved Construction: Fabricate window units with an integral, concealed, low-conductance, thermal barrier; located between exterior materials and window members exposed on interior; in a manner that eliminates direct metal-to-metal contact.
 - vi. Fasteners, Anchors, and Clips: Aluminum, nonmagnetic stainless steel, or other non-corrosive material, compatible with aluminum window members, trim, hardware, anchors, and other components of window units. Fasteners shall not be exposed, except for attaching hardware.
 - vii. Reinforcement: Where fasteners screw anchor into aluminum less than 0.125 inch (3.2 mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads or provide standard, non-corrosive, pressed-in, splined grommet nuts.
- 4. Glazing: Provide the following glazing materials:
 - i. Insulating Glass: Units consisting of two lites of 2.5-mm-thick clear float glass and air space, with a total overall unit thickness of 7/16 inch (11 mm). Seal with manufacturer's standard sealant.

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C. SECTIONAL (OVERHEAD) DOORS:

1. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
 - i. See “Design load values for Evanston, Wyoming” (Attachment at the end of this Section).
2. Wiring Connections: Location and load as required.
3. Submittals
 - i. Product Data: Manufacturer's data sheets on each product to be used, including:
 - a. Preparation instructions and recommendations.
 - b. Storage and handling requirements and recommendations.
 - c. Installation methods.
 - ii. Shop Drawings: Clearly show and describe in detail, detailed door assemblies and adjacent construction, including elevations, sections and details of door, track, hardware and operating components, dimensions, gauges, finishes and relationship of door, track, hardware, and operating components to adjacent construction.
 - iii. Selection Samples: For each finish product specified, one complete set of color chips representing the manufacturer's full range of available colors and patterns.
 - iv. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
 - v. Operation and Maintenance Data.
4. Quality Assurance
 - i. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum of five years documented experience.
 - ii. Installer Qualifications: Authorized representative of the manufacturer with a minimum of five years documented experience.
 - a. Installation shall be only by the specified manufacturer or an authorized representative for the region.
 - iii. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.
5. Warranty
 - i. Paint finish: 10-year warranty against film integrity (peeling), against color performance (fading), and against chalking.
 - ii. Delamination: 5-year warranty against delamination.
 - iii. Hardware: 5-year warranty.
 - iv. Paint finish: 20-year warranty against film integrity (peeling) and against color performance (fading) and chalking.
6. Acceptable Manufacturers:
 - i. Amarr Garage Doors
 - ii. Midland Garage Door Mfg.
 - iii. Raynor
 - iv. Marrin
7. Overhead Doors - General
 - i. Provide each door with door sections, brackets, tracks, counterbalance mechanisms, and hardware to suit the opening and headroom available.
 - ii. Hardware:
 - a. Minimum of 14-gauge galvanized steel hinges and 13-gauge galvanized steel track brackets.

- b. Rollers have 10 ball bearings with case-hardened inner and outer races.
 - c. Sliding end stile locking device provided with a spring-loaded bolt for inside operation only.
 - iii. Tracks: 2 inches (51 mm) or 3 inches (76 mm) as required.
 - a. Vertical track 17 or 19-gauge minimum galvanized steel, inclined using adjustable brackets to assure weather-tight closure at the jambs.
 - b. Horizontal tracks 16-gauge minimum galvanized steel, reinforced with 13-gauge galvanized steel angles as required by door size and weight.
 - c. Provide vertical lift tracks as indicated.
 - iv. Spring Counterbalance: Torsion springs for door counter-balance mounted on a continuous cross header shaft. Springs to be oil tempered, helical wound and custom computed for each door. Cable drums to be die cast aluminum. Galvanized lift cable to provide minimum safety factor of five to one. Springs to comply with ANSI/DASMA 102-2004 as follows:
 - a. Standard Cycle Spring: 10,000 cycles.
 - v. Handle: Galvanized steel step plate/lift handle provided on inside and outside of bottom section.
 - vi. Lock: Standard interior sliding end stile lock with hole to receive padlock.
 - vii. Weatherstripping: Full length dual contact EPDM rubber bottom seal attached to bottom section.
 - viii. Weatherstripping: Perimeter seal for header and jambs.
 - ix. Mounting: Continuous reverse-angle mounting for steel jambs.
- 8. Commercial 2 inches (51 mm) heavy-duty insulated door.
 - i. Door Size: As indicated on the Drawings.
 - ii. Door Sections: 2 inches (51 mm) thick roll formed from commercial quality hot dipped galvanized 20, 24, or 25 gauge steel per ASTM A 653.
 - a. Each section has two deep ribs and six shallow ribs and a tongue and groove joint for a weather tight seal between sections.
 - b. End and intermediate stiles to be formed from 0.042 inch (1.1 mm) 19 gauge minimum galvanized steel and engineered for quick hardware attachment through prepunched extruded holes.
 - c. Stiles fastened to the section using the TOG-L-LOC joining system.
 - d. Finish: Exterior skin is ribbed and interior skin is stucco embossed texture. Door exterior pre-painted steel consisting of a hot dipped galvanized coating applied to base metal, a 0.2 mil baked prime coat and an 0.8 mil baked polyester top coat. Interior coat 0.2 mil primer with a 0.3 mil white top coat.
 - I. Exterior Color: White.
 - II. Windows: NONE.
- 9. Operation
 - i. Electric Motor Operation: Provide a UL-listed electric operator of size and type recommended by the manufacturer. Operator shall meet UL 325 requirements for continuous monitoring of safety devices.
 - a. Primary Monitored Entrapment Protection: Required for momentary contact, including radio control operation.
 - b. Photoelectric sensors monitored to meet UL 325.
 - ii. Operator Control Operation:
 - a. Interior, surface-mounted, push-button-operated control stations with open, close, and stop buttons

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10. Execution

- i. Examination
 - a. Do not begin installation until substrates have been properly prepared.
 - b. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- ii. Preparation
 - a. Clean surfaces thoroughly prior to installation.
 - b. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.
- iii. Installation
 - a. Install in accordance with manufacturer's instructions. Doors to be interior face-mounted on a prepared surface.
 - b. Anchor assembly to wall construction and building framing without distortion.
 - c. Securely brace door tracks suspended from structure. Secure tracks to structural members or solid backing only.
 - d. Fit and align door assembly, tracks, and operating hardware.
 - e. Install perimeter weatherstripping.
 - f. Adjust door assembly to smooth operation and in full contact with weatherstripping.
- iv. Cleaning
 - a. Clean doors, frames and glass.
 - b. Remove labels and visible markings.
- v. Protection
 - a. Protect installed products until completion of project.
 - b. Touch-up, repair or replace damaged products before Substantial Completion.

D. Roof Ventilators.

1. Continuous Ridge-Type: Factory-engineered and -fabricated, continuous unit; fabricated from minimum 0.0179-inch- (0.45-mm-) thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating; in 10-foot- (3-m-) long sections. Complete with side baffles, ventilator assembly, end caps, splice plates, and reinforcing diaphragms. Finish ventilators to match roof panels

E. Louvers: Size and design indicated. Fabricate welded frames from 0.0478-inch- (1.2-mm-) thick, zinc-coated (galvanized) steel sheet to be self-framing and self-flashing. Form blades from 0.0359-inch- (0.9-mm-) thick, zinc-coated (galvanized) steel sheet with 65 percent free area; folded or beaded at edges; set at an angle that excludes driving rains; and secured to frames by riveting or welding. Finish louvers to match wall panels.

1. Bird Screens: 1/2-by-1/2-inch (13-by-13-mm) galvanized steel mesh in re-wirable frames on exterior face of louvers. Provide removable screens, secured with clips. Fabricate frames of same type metal as louvers.
2. Provide flanges on interior face of frames where louvers are indicated to be connected with mechanically operated dampers or metal ductwork.

2.07 FABRICATION - WALL AND ROOF PANELS

- A. Siding: Minimum 0.0177 inch metal thickness, vertical profile, 1 1/4 inch deep, lapped edges fitted with continuous gaskets.
- B. Roofing: Minimum 0.0225 inch metal thickness, Standing Seam profile, lapped edges fitted with continuous gaskets.
- C. Liner: Minimum 0.0177 inch metal thickness, flat profile, lapped V edges.
- D. Soffit Panels: Minimum 0.0177 inch metal thickness, flat profile, unperforated.

- E. Girts/Purlins: Rolled formed structural shape to receive siding, roofing and liner sheet.
- F. Internal and External Corners: Same material thickness and finish as adjacent material, profile brake formed to required angles. Back brace mitered internal corners with 3/16" inch thick sheet.
- G. Flashings, Closure Pieces, Fascia: Same material and finish as adjacent material, profile to suit system.
- H. Fasteners: To maintain load requirements and weather tight installation, same finish as cladding, non-corrosive type.

2.08 FINISHES

- A. Framing Members: Clean, prepare, and shop prime. Do not prime surfaces to be field-welded.
- B. Exterior Surfaces of Wall and Roof Components and Accessories: Precoated enamel on steel of modified silicone finish, []color as selected from manufacturer's standard range.
- C. Interior Surfaces of Wall and Roof Components and Accessories: Precoated enamel on steel of modified silicone finish, []color as selected from manufacturer's standard range.
- D. Steel joists to be prime painted with manufacturers standard primer. Steel deck to be G60 Galvanized.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that the foundation, floor slab, mechanical and electrical utilities, and placed anchors are in the correct positions.

3.02 ERECTION – GENERAL

- A. Erect metal building system according to manufacturer's written instructions and erection drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Set structural framing in locations and to elevations indicated. Maintain the structural stability of the frame during erection.
- D. Base-plates and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces before setting base-plates and bearing plates. Clean bottom surface of base-plates and bearing plates.
- E. Set base-plates and bearing plates for structural members on wedges, shims, or setting nuts.
- F. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base-plate or bearing plate before packing with grout.
- G. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow curing.
- H. Comply with manufacturer's written instructions for proprietary grout materials

3.03 ERECTION - FRAMING

- A. Erect framing in accordance with AISC 360.
- B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing.
- C. Set column base plates with non-shrink grout to achieve full plate bearing.
- D. Do not field cut or alter structural members without approval.
- E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.04 ERECTION - WALL AND ROOF PANELS

- A. Install in accordance with manufacturer's instructions.
- B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.
- C. Fasten cladding system to structural supports, aligned level and plumb.
- D. Locate end laps over supports. End laps minimum 2 inches. Place side laps over bearing.
- E. Provide expansion joints where indicated.

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- F. Use exposed fasteners for wall panels and concealed fasteners for roof panels.
- H. Install sealant and gaskets, providing weather tight installation.

3.05 INSULATION INSTALLATION

- A. General: Install insulation concurrently with panel installation, according to manufacturer's written instructions and as follows:
 - 1. Set vapor-retarder faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
 - 2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
- B. Blanket Insulation: Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths with both sets of facing tabs sealed to provide a complete vapor retarder. Comply with the following installation method:
 - 1. Over-Framing Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing members. Hold in place by panels fastened to secondary framing.
 - 2. Between-Purlin Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder facing tabs up and over purlin, overlapping adjoining facing of next insulation course maintaining continuity of retarder. Hold in place with bands and cross bands below insulation.
 - 3. Over-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing members. Install layer of filler insulation over first layer to fill space formed by roof panel standoffs. Hold in place by panels fastened to standoffs.
 - 4. Two-Layers-between-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder facing tabs up and over purlin, overlapping adjoining facing of next insulation course maintaining continuity of retarder. Install layer of filler insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and cross-bands below insulation.
 - 5. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

3.06 INSTALLATION - ACCESSORY COMPONENTS IN WALL SYSTEM

- A. General: Install ventilators, louvers, and other accessories according to manufacturer's written instructions, with positive anchorage to building and weather-tight mounting. Coordinate installation with flashings and other components.
- B. Doors and Windows:
 - 1. Install door frames, doors, sectional doors, and windows in accordance with the manufacturer's written instructions.
 - 2. Coordinate installation with wall flashings and other components.
 - 3. Seal the perimeter of each door frame and window with the electrometric sealant used for panels.
- C. Louvers: Set louvers complete with necessary hardware, anchors, dampers, weather guards, and equipment supports according to manufacturer's written instructions. Locate and place louver units level, plumb, and at indicated alignment with adjacent work.
 - 1. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.
 - 2. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.
 - 3. Protect galvanized- and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
 - 4. Install concealed gaskets, flashings, joint fillers, and insulation, as louver installation progresses, where required to make louver joints weather-tight.

3.07 TOLERANCES

- A. Framing Members: 1/4 inch from level; 1/8 inch from plumb.
- B. Siding and Roofing: 1/8 inch from true position.

3.08 CLEANING AND PROTECTION

- A. Touchup Painting: Immediately after erection, clean, prepare, and prime or re-prime welds, bolted connections, and abraded surfaces of prime-painted primary and secondary framing, accessories, and bearing plates.
 - 1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
 - 2. Apply compatible primer of same type as shop primer used on adjacent surfaces.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded surfaces of shop-painted primary and secondary framing, accessories, and bearing plates.
- C. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- D. Roof and Wall Panels: Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.
- E. Replace panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- F. Doors: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.
- G. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.
- H. Windows: Clean metal surfaces promptly after installing windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts. Clean glass promptly after installing windows.

ATTACHMENTS

DESIGN LOAD VALUES FOR EVANSTON, WYOMING, FOR USE WITH THE CURRENT EDITION OF THE INTERNATIONAL BUILDING CODE.

WIND:

- 1. For structures less than 100 feet in height:
 - a. Use the 100-mph basic wind speed and exposure B within the 1980 developed city area.
 - b. Use 110 mph basic wind speed and exposure C on the bench areas surrounding Evanston.
- 2. For structures higher than 100 feet, contact the City Engineering Department for design requirements.
- 3. For wind velocities (if IBC approach is not used)
 - a. Use 103 mph in valleys.
 - b. Use 100 mph on bench areas.
- 4. No reduction in wind loading is allowed when considered with 100% of snow load.

SEISMIC:

- 1. Use zone D1 for residential seismic load evaluations, and IBC requirements for all nonresidential.
- 2. Use Effective Mass Analysis for structures containing fluids.
- 3. Culinary water system or sanitary sewer system structures should be evaluated using an I value equal to 1.5.

SNOW:

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1. Minimum snow load value to be used is 40 psf.
2. For structures with valleys or parapet walls, the snow depth shall be equal or greater than the height of the restraining structure with the water content of the snow assumed to be 30%.
3. In basin areas or areas where the structure is at the same level or lower than adjacent terrain, the minimum snow load value to be used is 60 psf.
4. No reduction in snow loading is allowed when considered with 100% of wind load.

FROST DEPTH:

1. Minimum depth of footings (where special soil precautions are not taken) is 54 inches from the bottom of the footing to the finished grade.
2. Minimum depth of unprotected footings (subject to frost creep), water lines, and movement sensitive structures, is 70 inches.
3. All soil retaining structures shall have 54 inches of free draining material for insulation or be designed for the loading associated with soil expansion from frost heave.

END OF SECTION