

October 1, 2021

Re: Project's NH 0018(184)39, NH 018B(02)40, NH 0385(48)35, NH 0385(60)35, NH 0385(00)35, HS 2020-100 () & 2021-001 – PCN's 03TH, 06DE, 028Z, 07V4, 07W3, X05J & X05P – US18, US18B & US385 Urban Reconstruction in Hot Springs, Suspended Sidewalk, City Water Main and Sanitary Sewer.

To Whom It May Concern,

A pre-bid meeting for the Hot Springs urban reconstruction project is being held on October 21st, 2021 at 1:00 PM MDT in Hot Springs, SD. Interested contracting parties are invited to attend the meeting in-person at the Mueller Center in Hot Springs or virtually via the Microsoft Teams Meeting Link provided below.

Mueller Center
801 South 6th Street
Hot Springs, SD 57747

This meeting will include a presentation of the project covering topics such as the overall scope of work, design aspects, traffic control, and contract time. There will be an opportunity for Contractors to present questions to Department staff, consultants, and project stakeholders. In addition, at the conclusion of the meeting, an on-site tour of the project will be offered to those attending in-person.

Attendance is not a requirement, but all interested contracting parties are strongly encouraged to attend.

If attending the meeting virtually you must join the meeting via the link provided. In order to reduce sound feedback please mute the microphone on your computer. When joining virtually we are requesting that you please enter the name of your company followed by the individuals from your company attending the meeting into the chat feature of Microsoft Teams.

Join Pre-Bid Meeting

Date: October 21, 2021

Time: 1:00-2:30 (MDT)

Video Conference ID: 119 433 928 6

Additional instructions regarding the meeting format will be provided at the beginning of the meeting.

We look forward to seeing you there!

Sincerely,
SD DOT



**DEPARTMENT OF
TRANSPORTATION**

DEPARTMENT OF TRANSPORTATION

**NOTICE TO CONTRACTORS,
PROPOSAL, SPECIAL PROVISIONS,
CONTRACT AND CONTRACT BOND
FOR**

SUSPENDED SIDEWALK

CITY

**PROJECT NO. NH 0385(00)35
(PCN 07W3)**

US HIGHWAY 385

IN FALL RIVER COUNTY

NOTICE TO ALL BIDDERS

TO REPORT BID RIGGING ACTIVITIES, CALL: 1-800-424-9071

THE U.S. DEPARTMENT OF TRANSPORTATION (DOT) OPERATES THE ABOVE TOLL-FREE "HOTLINE" MONDAY THROUGH FRIDAY, 8:00 A.M. TO 5:00 P.M., EASTERN TIME. ANYONE WITH KNOWLEDGE OF POSSIBLE BID RIGGING, BIDDER COLLUSION, OR OTHER FRAUDULENT ACTIVITIES SHOULD USE THE "HOTLINE" TO REPORT SUCH ACTIVITIES.

THE "HOTLINE" IS PART OF THE DOT'S CONTINUING EFFORT TO IDENTIFY AND INVESTIGATE HIGHWAY CONSTRUCTION CONTRACT FRAUD AND ABUSE AND IS OPERATED UNDER THE DIRECTION OF THE DOT INSPECTOR GENERAL.

ALL INFORMATION WILL BE TREATED CONFIDENTIALLY AND CALLER ANONYMITY WILL BE RESPECTED.

* * * *

PLANS, PROPOSALS AND ADDENDA

AFTER AWARD OF CONTRACT, THE LOW BIDDER WILL RECEIVE TEN (10) COMPLIMENTARY SETS OF PLANS, PROPOSALS, PROJECT Q & A FORUM, AND ADDENDA FOR FIELD AND OFFICE USE. AN ELECTRONIC COPY WILL ALSO BE PROVIDED. ANY ADDITIONAL COPIES REQUIRED WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.

* * * *

NOTICE TO CONTRACTORS

Bid proposals for this project will be prepared, transmitted, and received electronically by the South Dakota Department of Transportation (SDDOT) via the South Dakota Electronic Bid System until 10 A.M. Central time, on November 3, 2021, at which time the SDDOT will open bids. All bids will be checked for qualifications with results posted on the SDDOT website. The South Dakota Transportation Commission will consider all bids at a scheduled Commission meeting.

The work for which proposals are hereby requested is to be completed within the following requirement(s):

FIELD WORK COMPLETION: **DECEMBER 15, 2023**

The DBE goal for this project is: **NONE**

Work Type for this project is: **Work Type 3**

Bidding package for the work may be obtained at:
<http://apps.sd.gov/hc65bidletting/ebslettings1.aspx#no-back-button>

An electronic version of the most recent version of the South Dakota Standard Specifications for Roads and Bridges may be obtained at <https://dot.sd.gov/doing-business/contractors/standard-specifications/2015-standard-specifications>

The electronic bid proposal must be submitted by a valid bidder as designated by their company's <http://apps.sd.gov/Hc65C2C/EBS/BidAdminAuthorizationForm.pdf>. A bidding administrator will have privileges in the SDEBS to prepare bids, submit bids, and authorize additional company employees to prepare and submit bids. Additionally, a bidding administrator will be responsible for maintaining the list of authorized bidders for the company and will have the ability to add employees, remove employees, and set-up bidder identifications and passwords within the SDEBS. Bidding Administrator authorization will remain in full force and effect until written notice of termination of this authorization is sent by an Officer of the company and received by the Department.

A bidder identification and password, coupled with a company identification previously assigned by the Department, will serve as authentication that an individual is a valid bidder for the company.

Contact information to schedule a preconstruction meeting prior to commencing with the work on this project.

Rich Zacher
PO Box 431
Custer, SD 57730-0431
Phone: 605/673-4948

PROPOSAL

Revised 8/10/11

SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION, STATE OF SOUTH DAKOTA:

Ladies / Gentlemen:

The following proposal is made on behalf of the undersigned and no others. It is in all respects fair and is made without collusion on the part of any other person, firm or corporation not appearing in the signature to this proposal.

The undersigned certifies that she / he has carefully examined the plans listed herein, the Specifications hereinbefore referred to, the Special Provisions and the form of contract, both of which are attached hereto. The undersigned further certifies that she / he has personally inspected the actual location of the work, together with the local sources of supply and that she / he understands the conditions under which the work is to be performed, or, that if she / he has not so inspected the actual location of the work, that she / he waives all right to plea any misunderstanding regarding the location of the work or the conditions peculiar to the same.

On the basis of the plans, Specifications, Special Provisions and form of contract proposed for use, the undersigned proposes to furnish all necessary machinery, tools, apparatus and other means of construction, to do all the work and furnish all the materials in the manner specified, to finish the entire project **within the contract time specified** and to accept as full compensation therefore the amount of the summation of the products of the actual quantities, as finally determined, multiplied by the unit prices bid.

The undersigned understands that the quantities as shown in the Bid Schedule are subject to increase or decrease, and hereby proposes to perform all quantities of work, as increased or decreased, in accordance with the provisions of the specifications, and subject to any applicable special provisions, and at the unit prices bid.

The undersigned understands that the "Total or Gross Amount Bid" as immediately hereinbefore set forth is not the final amount which will be paid if this proposal is accepted and the work done, but that such amount is computed for the purpose of comparison of the bids submitted and the determination of the amount of the performance bond.

The undersigned further proposes to perform all extra work that may be required on the basis provided in the specifications, and to give such work personal attention in order to see that it is economically performed.

The undersigned further proposes to both execute the contract agreement and to furnish a satisfactory performance bond, in accordance with the terms of the specifications, within twenty (20) calendar days after the date of Notice of Award from the South Dakota Department of Transportation that this proposal has been accepted.

REV. 8/6/18

INDEX OF SPECIAL PROVISIONS

PROJECT NUMBER(S): NH 0385(00)35 PCN: 07W3

TYPE OF WORK: SUSPENDED SIDEWALK

COUNTY: FALL RIVER

The following clauses have been prepared subsequent to the Standard Specifications for Roads and Bridges and refer only to the above described improvement, for which the following Proposal is made. In case of any discrepancy or conflict between said specifications and these Special Provisions, the latter are to govern.

The Contractor's attention is directed to the need for securing from the Department of Environment & Natural Resources, Foss Building, Pierre, South Dakota, permission to remove water from public sources (lakes, rivers, streams, etc.). The Contractor should make his request as early as possible after receiving his contract, and insofar as possible at least 30 days prior to the date that the water is to be used.

Kara Palmer is the official in charge of the Hot Springs Career Center for Fall River County.

THE FOLLOWING ITEMS ARE INCLUDED IN THIS PROPOSAL FORM:

Instructions for Bidders, dated 9/28/21.

Special Provision Regarding Quadruple Combination Bids, dated 9/1/21.

Special Provision Regarding the City Portion for Subletting, dated 9/28/21.

Riverfront Suspended Walkway, dated 8/18/21.

Special Provision for South Dakota Electronic Bid System, dated 7/23/18.

Standard Title VI Assurance, dated 3/1/16.

Special Provision For Implementation of Clean Air Act & Federal Water
Pollution Control Act, dated 9/1/97.

**NH 0385(00)35, PCN 07W3
SUSPENDED SIDEWALK
US HIGHWAY 385**

INSTRUCTIONS FOR BIDDERS

September 28, 2021

- 1) This Suspended Sidewalk Project will be let and awarded by the South Dakota Department of Transportation.
- 2) Department of Transportation procedures regarding letting and awarding of contracts shall be followed.
- 3) Bidders submitting a bid on this project shall also submit a bid for Project Number NH 0018(184)39, NH 018B(02)40, NH 0385(48)35, NH 0385(60)35, 2021-001 (), HS 2020-100 () PCN 03TH, 06DE, 028Z, 07V4, X05P, X05J, Fall River County. Award of these projects will be to the same bidder based on the total of the four projects.
- 4) A prospective bidder must request any explanation regarding the meaning or interpretation of the bidding package in adequate time to allow a Department reply to reach all prospective bidders before submission of final bid proposals. The bidder will contact the Department by submitting a request for explanation to the project Q&A forum.
- 5) All bid bonds shall be made out to the Department of Transportation
- 6) The contract completion date for this project will be the same as specified of Project Project Number NH 0018(184)39, NH 018B(02)40, NH 0385(48)35, NH 0385(60)35, 2021-001 (), HS 2020-100 () PCN 03TH, 06DE, 028Z, 07V4, X05P, X05J, Fall River County. Any delays in completing this contract will not be a basis for an extension of the contract completion time for PCN 03TH, 06DE, 028Z, 07V4, X05P, X05J, Fall River County.
- 7) After award of contract, the Contractor shall furnish satisfactory proof of coverage of insurance. Copies of Certificates of Insurance shall be furnished to the Department of Transportation AND City of Hot Springs. The Contractor will be required to provide a performance bond in a sum equal to the total amount of the contract, in a form acceptable to the City. The performance bond shall remain in effect for a period of one year after the City considers the contract to be completed and accepted.
- 8) The contractor is required to schedule and conduct a preconstruction meeting that shall be held jointly with the preconstruction meeting for the state contract. Additionally the contractor is responsible for contacting the city for a list of required submittals upon receiving Notice of Award of the contract.
- 9) Construction engineering for this contract will be performed by the City of Hot Springs.
- 10) Payment for this Suspended Sidewalk project will be made to the Contractor by the City of Hot Springs.

* * * *

**STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION**

**SPECIAL PROVISION REGARDING
QUADRUPLE COMBINATION BIDS**

**NH 0385(00)35, PCN 07W3
SUSPENDED SIDEWALK
FALL RIVER COUNTY**

SEPTEMBER 1, 2021

Bidders submitting a bid on this project **MUST ALSO** submit a bid on projects:

NH 0018(184)39, NH 018B(02)40, NH 0385(48)35, PCN 03TH, 06DE, 028Z
US HIGHWAY 18 AND 18B & US HIGHWAY 385
URBAN RECONSTRUCTION, PCC SURFACING, CURB & GUTTER, SIDEWALK,
LIGHTING, SIGNALS
FALL RIVER COUNTY

NH 0385(60)35, PCN 07V4
US HIGHWAY 385
URBAN RECONSTRUCTION, PCC SURFACING, LIGHTING, CURB &
GUTTER, STORM SEWER

2021-001 (), HS 2020-100 (), PCN X05P, X05J
US HIGHWAY 18, 18B & 385
WATER MAIN, SANITARY SEWER
FALL RIVER COUNTY

Award of the four projects will be to the same bidder based on the total of the four projects.

Work on PCN's (03TH, 06DE, 028Z, 07V4, X05P, X05J) CANNOT be used to meet the DBE Goal established for this project.

After award, the contracts will be administered as entirely separate contracts.

* * * *

**STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION**

**SPECIAL PROVISION REGARDING
THE CITY PORTION FOR SUBLETTING**

**NH 0385(00)35, PCN 07W3
FALL RIVER COUNTY**

SEPTEMBER 28, 2021

This project is let in combination with State Project Number NH 0018(184)39, NH 018B(02)40, NH 0385(48)35, NH 0385(60)35, 2021-001 (), HS 2020-100 () PCN 03TH, 06DE, 028Z, 07V4, X05P, X05J. The provisions of section 8.1 of the specifications requiring the Contractor to perform work amounting to not less than 50% of the total contract cost with the Contractor's own organization will not apply to the work on this contract.

* * * *

Riverfront Suspended Walkway

Hot Springs, South Dakota

Date: August 18, 2021

Project No.: 18-22567



Architecture
Engineering
Environmental
Planning

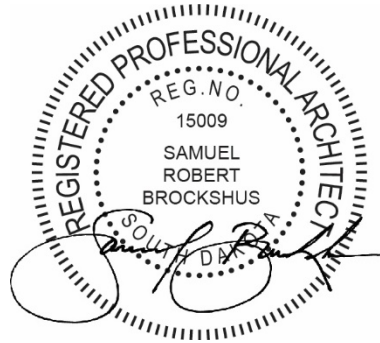
ISGInc.com

FROM:

ISG – Sioux Falls Office
101 South Reid Street, Suite 202
Sioux Falls, South Dakota 57103
Contact: Kyle Renneke
Phone: 605.274.6401
Email: Kyle.Renneke@ISGInc.com

SECTION 00 0105
CERTIFICATIONS PAGE

RIVERFRONT SUSPENDED WALKWAY
HOT SPRINGS, SOUTH DAKOTA
ISG NO. 18-22567



DATED THE 18TH DAY OF AUGUST 2021
END OF SECTION

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END OF SECTION

**SECTION 00 3100
AVAILABLE PROJECT INFORMATION**

PART 1 GENERAL

1.01 SUBSURFACE INVESTIGATION REPORT

- A. A copy of the geotechnical evaluation report with respect to the building site is included with this document:
 - 1. Title: Geotechnical Evaluation Report for Riverfront Suspended Walkway.
 - 2. Date: July 24, 2020.
 - 3. Prepared by: American Engineering Testing, Inc.
- B. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price accruing to Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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CONSULTANTS
• ENVIRONMENTAL
• GEOTECHNICAL
• MATERIALS
• FORENSICS

REPORT OF GEOTECHNICAL EXPLORATION

Proposed Riverfront Walkway

N River Street

Hot Springs, South Dakota

AET No. 17-20990

Date:

July 24, 2020

Prepared for:

ISG, Inc.
115 E Hickory Street, Suite 300
Mankato, Minnesota 56001





CONSULTANTS
• ENVIRONMENTAL
• GEOTECHNICAL
• MATERIALS
• FORENSICS

July 24, 2020

ISG, Inc.
115 E Hickory Street, Suite 300
Mankato, Minnesota 56001

Attn: Mr. Kyle Renneke, P.E.

RE: Geotechnical Exploration
Proposed Riverfront Walkway
North River Street
Hot Springs, South Dakota
AET No. 17-20990

Dear Kyle:

American Engineering Testing, Inc. (AET) is pleased to present the results of our subsurface exploration program and geotechnical engineering review for the new proposed riverfront walkway along North River Street in Hot Springs, South Dakota. These services were performed according to our proposal to you dated June 17, 2020 and your written authorization to proceed provided on June 19, 2020. We are submitting one (1) electronic copy of the report to you.

Please contact me if you have any questions about the report. I can also be contacted for arranging construction observation and testing services during construction of the project.

Sincerely,
American Engineering Testing, Inc.

A handwritten signature in blue ink that reads "Kristen R. Yates".

Kristen R. Yates, P.E.
Rapid City Manager
Phone: (605) 388-0029
kyates@amengtest.com

Page i

1745 Samco Road | Rapid City, SD 57702
Phone 605-388-0029 | www.amengtest.com

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Report of Geotechnical Exploration

Proposed Riverfront Walkway, Hot Springs, South Dakota
July 24, 2020
Report No. 17-20990

AMERICAN
ENGINEERING
TESTING, INC.

SIGNATURE PAGE

Prepared for:

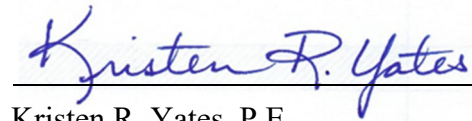
ISG, Inc.
115 E Hickory Street, Suite 300
Mankato, Minnesota 56001

Attn: Mr. Kyle Renneke, P.E.

Prepared by:

American Engineering Testing, Inc.
1745 Samco Road
Rapid City, South Dakota 57702
(605) 388-0029
www.amengtest.com

Authored by:



Kristen R. Yates, P.E.
Rapid City Manager

Reviewed by:



Walt Feeger, P.E.
Senior Geotechnical Engineer



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Report of Geotechnical Exploration

Proposed Riverfront Walkway, Hot Springs, South Dakota

July 24, 2020

Report No. 17-20990

AMERICAN
ENGINEERING
TESTING, INC.**TABLE OF CONTENTS**

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Report of Geotechnical Exploration

Proposed Riverfront Walkway, Hot Springs, South Dakota

July 24, 2020

Report No. 17-20990

AMERICAN
ENGINEERING
TESTING, INC.

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Boring Log Notes

Unified Soil Classification System

Figure 1: Site Location Map

Figure 2: Boring Location Map

Subsurface Boring Logs

Sieve Analysis Results

Moisture-Density Relationships

APPENDIX B – Geotechnical Report Limitations and Guidelines for Use

Report of Geotechnical Exploration

Proposed Riverfront Walkway, Hot Springs, South Dakota

July 24, 2020

Report No. 17-20990

AMERICAN
ENGINEERING
TESTING, INC.**1.0 INTRODUCTION**

We understand the construction of a new riverfront walkway has been proposed along the southwest side of North River Street in Hot Springs, South Dakota. Please refer to the Figure 1 within Appendix A for the approximate location of the site. To assist with the planning and design, American Engineering Testing, Inc. (AET) has been authorized to conduct a subsurface exploration program at the site, conduct soil laboratory testing, and perform a geotechnical engineering review for the project. This report presents the results of the above services and provides our engineering recommendations based on this data.

2.0 SCOPE OF SERVICES

AET's services were performed in general accordance with our proposal dated June 17, 2020. The authorized scope consists of the following:

- Eight (8) standard penetration test (SPT) borings at the site. Three (3) of the SPT borings were sampled to depths of about 50 feet below grade, and five (5) of the SPT borings were sampled to depths of about 30 feet below grade using a truck mounted drill rig.
- Soil laboratory testing.
- Geotechnical engineering analysis based on the gained data and preparation of this report.

These services are intended for geotechnical purposes only. The scope is not intended to explore for the presence or extent of environmental contamination in the soil or groundwater.

3.0 PROJECT INFORMATION

Based on the information provided, we understand the project will consist of a walkway that overhangs the existing retaining wall along North River Street between Jennings Avenue and Minnekahta Avenue. We understand the design of the walkway will require deep foundations due to the subsurface constraints with existing structures and the loads on the proposed structure. We have taken into consideration several types of deep foundation options and have presented them in this report for consideration.

Our foundation design assumptions include a minimum factor of safety (FS) of 3 with respect to the ultimate bearing capacity. We assume the structure will be able to tolerate total settlements of up to 1 inch, and differential settlements over a 30-foot distance of up to ½ inch.

Report of Geotechnical Exploration

Proposed Riverfront Walkway, Hot Springs, South Dakota

July 24, 2020

Report No. 17-20990

AMERICAN
ENGINEERING
TESTING, INC.

The previously stated information represents our understanding of the proposed construction. This information is an integral part of our engineering review. It is important that you contact us if there are changes from that described so that we can evaluate whether modifications to our recommendations are appropriate.

4.0 SUBSURFACE EXPLORATION AND TESTING**4.1 Field Exploration Program**

The subsurface exploration program conducted for the project consisted of eight (8) standard penetration test (SPT) borings. ISG, Inc. provided the number of borings at the approximate locations and depths in the RFP sent out on June 15, 2020. The logs of the borings and details of the methods used appear in Appendix A. The logs contain information concerning soil layering, soil classification, geologic origins, and moisture condition. A density description or consistency is also noted for the natural soils, which is based on the standard penetration resistance (N-value).

The boring locations are shown on Figure 2 in Appendix A. Our field crew located the borings as near as possible from the site plan provided. Surface elevations were measured in the field by AET personnel using an engineer's level. The benchmark reference was the rim elevation of the existing sanitary sewer manhole in North River Street near the center of the project alignment. The approximate location of the TBM is identified on Figure 2 in Appendix A.

4.2 Laboratory Testing

The laboratory test program included natural moisture content, dry density, Atterberg Limits, percent passing #200 sieve, sieve analysis, and moisture-density relationship (Standard Proctor) tests. The test results appear in Appendix A on the individual boring logs adjacent to the samples upon which they were performed, or on the data sheets following the logs.

It should be noted the bulk soil sample for the Standard Proctor test represents a mixture of the soils encountered within the upper 5-foot interval of the borehole. As such, the soil classification as presented on those data sheets may differ from the classifications of the individual soil layers identified on the respective Subsurface Boring Logs.

Report of Geotechnical Exploration

Proposed Riverfront Walkway, Hot Springs, South Dakota

July 24, 2020

Report No. 17-20990

AMERICAN
ENGINEERING
TESTING, INC.**5.0 SITE CONDITIONS****5.1 Surface Observations**

The site for the proposed riverfront walkway is on the southwest side of North River Street between Jennings Avenue and Minnekahta Avenue in Hot Springs, South Dakota. This area of Hot Springs is currently developed with commercial businesses. Where the walkway alignment is proposed, the ground surface is paved for parking and is next to an existing retaining wall along Fall River. In general, the ground surface is fairly level with a slight drainage downward to the southeast as determined from the boring elevations.

5.2 Subsurface Soils/Geology

It should be noted that several of the borings (B-1, B-2, B-3, and B-4) encountered auger refusal before the planned terminal depth due to difficult drilling conditions. Typically, very large boulders and/or very dense/hard bedrock can cause auger or sampler refusal. In all of the borings where refusal was encountered, the borings were terminated within about 5 feet of the planned terminal depth.

In general, the borings behind the retaining wall (B-1 through B-3, and B-5 through B-8) encountered a thin layer of pavement over approximately 12 to 15 feet of variable fill. Although not encountered, we understand the fill may contain large pieces of concrete, rebar, railroad ties, and other debris. The fill encountered in our borings primarily consisted of gravelly sand, sandy lean clay, and clayey sand with varying amounts of gravel. Below the fill, varying layers of alluvium were encountered to approximately 29 to 43 feet below grade. The alluvium ranged from sandy gravel with clay and cobbles with possible boulders, to gravelly sand, to clayey sand, to sandy lean clay with gravel. Underlying the alluvium, the Spearfish Formation was encountered in three of the six borings. The very stiff to hard, red, silty to sandy lean clay soils encountered were consistent with Spearfish Formation bedrock in those three borings.

Boring (B-4), located on the opposite side of Fall River from the retaining wall, encountered a thin layer of topsoil overlying various alluvial layers consisting of sandy lean clay with gravel, clayey sand, and sandy gravel to the terminal depth of the boring. The Spearfish Formation soils were not encountered within the drilled/sampled depth of Boring B-4.

The Subsurface Boring Logs included in Appendix A give a more detailed description of the soils encountered within the borings.

Report of Geotechnical Exploration

Proposed Riverfront Walkway, Hot Springs, South Dakota

July 24, 2020

Report No. 17-20990

AMERICAN
ENGINEERING
TESTING, INC.**5.3 Groundwater**

At the time of our field work, groundwater was encountered in all of the boings, ranging from about 14.5 to 21.0 feet below grade. The presence and depth of groundwater noted at the boring locations should not be taken as an accurate representation of the actual groundwater levels. A long period of time is generally required for groundwater to stabilize in the soils present at the site; this period of time is generally not available during a typical subsurface exploration program. Also note, groundwater levels fluctuate due to varying seasonal and annual rainfall and snow melt amounts, as well as other factors.

6.0 RECOMMENDATIONS**6.1 Discussion**

At this time, we have no knowledge of how the existing fill soils were placed behind the retaining wall at the site. We understand various debris, including but not limited to concrete slabs, rebar, and railroad ties, were likely included in the fill. The fill soils encountered in our borings did have a wide range of N-values from as low as weight of hammer to as high as 28 (coincidentally in the same boring, B-7) indicating highly variable materials. Below the fill soils, the alluvial soils behind the retaining wall, as well as on the other side of the river, were also variable with N-values ranging from weight of hammer to 100+ and included large obstructions, likely boulders and large cobbles.

Therefore, the options for deep foundations is limited due to constructability in these soils. We understand the initial plan was to utilize helical piers. However, it is our opinion the helical piers will not be a suitable foundation option due to the difficulty of installing them to an appropriate load bearing depth. Driven piles and large drilled shafts will also have the same difficulty. Therefore, we recommend the use of cased micropiles through the fill and alluvial soils and bearing at a depth within the Spearfish Formation.

Our recommendations in the following sections are intended to minimize, to varying degrees, movement related problems for the proposed foundations. Even if our recommendations are followed, we cannot guarantee that some movement will not occur. The present state of the art is such that the risk of movement cannot be accurately assessed. It depends on a number of uncontrolled variables such as climatic conditions during and after construction, long term fluctuations of the groundwater level, utility line leakage, landscaping, and other similar aspects. The risk of detrimental movement must be assumed by the project owner.

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To reduce the risk of movement of the bearing strata, good drainage must be maintained during and after construction. We recommend the final site grading be designed with positive drainage away from the construction area for at least a distance of 10 feet. We also recommend any excavations be left open a minimal amount of time to reduce the possible amount of surface water to accumulate in the base of the excavation.

We suggest avoiding the planting of deep rooted trees within 15 feet of the structure to minimize changes in the moisture content of the subsurface soils. Additionally, the walkway should be structurally independent of any columns and all footings should be founded below the depth of seasonal moisture change.

6.2 Site Preparation

All existing pavement, topsoil, any organic matter, or construction/manmade debris (if encountered) should be removed from within the construction limits. Any available topsoil (west side of the project site) may be stockpiled on-site for later reuse in landscaped areas. All pavement debris, organic material and construction/manmade debris encountered at the site should be wasted from the site.

Significant grading will likely not be required for this project. It is our opinion any excavated site soils are suitable for use as overlot grading material where required. Prior to use, the moisture content of the excavated soils should be adjusted to within $\pm 3\%$ of optimum and the soils compacted to at least 95% of maximum Standard Proctor dry density (ASTM D 698). Prior to placement of structural elements and within areas to receive fill, the exposed subgrade should be scarified to a depth of at least 8-inches, the moisture content of the scarified soils adjusted to within $\pm 3\%$ of optimum moisture content and the soils compacted to at least 95% of maximum Standard Proctor dry density. All exposed surfaces should be free of mounds and depressions which could prevent uniform compaction. For more information on site preparation see the Standard Sheets section of this report.

If any additional fill is required, we recommend an imported granular engineered fill be used, which should be pre-approved by the geotechnical engineer prior to its use. The engineered fill should be a non-expansive granular material with a maximum size of 2-inches, 40% to 85% passing the #4 sieve, and no more than 15% passing the #200 sieve with a Liquid Limit less than 25. Engineered fill should be placed in 8-inch thick maximum loose lifts; the moisture content conditioned to within $\pm 3\%$ of optimum moisture content and compacted to at least 95% of maximum Standard Proctor (ASTM D 698) dry density.

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Groundwater was encountered at depths ranging from about 14.5 to 21.0 feet below grade during our site work. Again, the accuracy of the groundwater elevations should not be relied upon due to many contributing factors. However, we anticipate the deep foundations will likely encounter groundwater throughout the project site near these depths. Therefore, be aware that temporary dewatering or installation in groundwater conditions may be necessary if it is encountered or surface drainage is allowed to accumulate in the construction excavations. Contractors working on the project should have equipment on-site that will lower and maintain the groundwater level below the base of the excavations.

6.3 Deep Foundation Design

Based on the subsurface site conditions, it is our opinion the installation of helical piers, driven piles, and drilled shafts will be extremely difficult due to large obstructions in the fill and alluvial soils. The installation may be possible, but will be time consuming and there is a great risk of obstructing on an object that will not properly bear the required structural loads.

Therefore, it is our opinion that the new structure should be founded on micropiles with casing installed through the fill and alluvial soils and bearing in the silty to sand lean clay of the Spearfish Formation. Micropiles are a series of foundation elements constructed using high-strength, small-diameter (usually 3 to 10 inches) steel casing, installed by a drilling technique and filled with a high-strength grout. Capacities of the micropiles vary with size, depth, and subsurface profile.

The overburden soils (sands and gravels of the fill and alluvium) will likely cave into the hole drilled for the micropiles; therefore, we recommend a permanent casing be installed as the hole is advanced. Additionally, the casing will help reduce the amount of groundwater entering the boring when attempting to install the grout for the micropile.

Although we have not been provided loads for the structure at this time, we recommend the micropiles be installed no less than 5 feet into the Spearfish Formation. We recommend a specialty contractor be contacted to design the micropiles and a qualified installing contractor be used to install micropiles. We also recommend a structural engineer design the foundation and how to best connect the underpinning system to the pile cap.

We recommend the pile cap be placed at an elevation below the depth of seasonal frost, typically 4 feet below finished grade. Additionally, we highly recommend the base of the pile cap excavations be observed and properly compacted to verify a firm and unyielding subgrade has been obtained on which to place structural elements.

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It is our recommendation the design should have a factor of safety (FS) of at least 3 against the ultimate bearing capacity. If the micropiles properly bear in the Spearfish Formation soils, we judge that total settlements, if properly constructed, should not exceed 1 inch and differential settlements of conditions depicted by the borings should not exceed ½ inch.

6.4 Exterior Backfill Considerations

It is our opinion exterior backfill around the cast-in-place pile caps and cantilevered beam may consist of the excavated site soils, which should be placed as follows. All backfill recommendations are based on the Standard Proctor method (ASTM: D698).

1. All backfill should be free of deleterious/frozen material and have a maximum aggregate size of 2-inches.
2. Cohesive (clay) backfill should be moisture conditioned to within -1% to +3% of optimum moisture content prior to being placed. Granular backfill (sands and gravels) should be moisture conditioned to within $\pm 3\%$ of optimum.
3. All backfill should be placed in loose lift thicknesses of 8-inches or less. If hand-operated compaction equipment is used, the loose lift thickness should be reduced to 4-inches or less.
4. Each lift should be compacted to at least 95% of maximum proctor density. The final lift of backfill within areas to receive pavement or exterior concrete slabs should be compacted to a minimum of 98% of the maximum proctor density.
5. Compaction density tests should be performed on alternating lifts to ensure the minimum density is maintained.

6.5 Exterior Concrete Flatwork

Exterior concrete flatwork for sidewalks typically consists of 4-inch thick concrete placed on 6-inches of gravel base course. Increased moisture contents of the clay soils present on site, due to landscaping and seasonal weather, may result in upward movement of these slabs and sidewalks especially during colder weather.

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While this upward movement may not immediately or directly affect the integrity of the building foundations and interior slabs, over time positive drainage away from the building may be lost. In addition, upward movement tends to cause distress cracks and potential tripping hazards. To minimize these potential issues, we recommend placement of these exterior slabs and sidewalks on at least 1-foot of non-expansive granular engineered fill with good drainage designed into the subgrade below the structure.

7.0 CONSTRUCTION CONSIDERATIONS**7.1 Potential Difficulties*****7.1.1 Cobbles and Boulders***

The subsurface soils at this site included large cobbles and boulders to depths of approximately 29 to 43 feet below grade. We were also informed other debris such as concrete rubble, rebar, and railroad ties may be present within the fill. Installation of deep foundations may obstruct on these subsurface objects. Therefore, we recommend the contractor be made aware of this additional difficulty. Surface excavating procedures may also be somewhat more difficult than normal if debris and/or cobbles/boulders are encountered when excavating for the pile caps and cantilevered beam.

7.1.2 Existing Pavement Considerations

We understand much of the project site is already paved. Therefore, we anticipate the soils below the pavements will have moisture contents well above optimum. Processing, scarifying, and drying of the soils will likely be required prior to construction of paving/structural elements. Additionally, the fine grained silty and clay soils present at this site are frost susceptible; therefore, we recommend the design includes good drainage and edge drains below the sidewalks and pavement sections.

7.1.3 Soft Subgrade Soils

Depending on the time of year in which construction takes place, unstable subgrade soils could be encountered during the site and building grading operations. If encountered, additional conditioning of the soils may be required to obtain moisture contents which allow for firm and unyielding subgrade and/or compaction. Localized areas of soft wet subgrades can be remedied with additional excavation to expose firmer soils, placement of coarse rock to provide a solid base on which to place additional fill and/or the use of geotextiles between the soft soils and the overlying fill and/or pavement sections. The appropriate means of subgrade stabilization should be evaluated by the geotechnical engineer at the time of construction.

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AMERICAN
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Water can be expected to collect in the excavation bottom during times of inclement weather or snow melt. To allow observation of the excavation bottom, to reduce the potential for soil disturbance, and to facilitate filling operations, we recommend water be removed from within the excavation during construction. Based on the soils encountered, we anticipate the groundwater can be handled with conventional sump pumping.

7.1.5 Disturbance of Soils

The on-site soils can be disturbed under construction traffic, especially if the soils are wet. If soils become disturbed, they should be subcut to the underlying undisturbed soils. The subcut soils can then be dried and recompacted back into place, or they should be removed and replaced with drier imported fill.

7.2 Excavation Backsloping

If excavation faces are not retained, the excavations should maintain maximum allowable slopes in accordance with *OSHA Regulations (Standards 29 CFR), Part 1926, Subpart P, "Excavations"* (can be found on www.osha.gov). Even with the required OSHA sloping, water seepage or surface runoff can potentially induce sideslope erosion or sloughing which could require slope maintenance.

7.3 Observation and Testing

The recommendations in this report are based on the subsurface conditions found at our test boring locations. Since the soil conditions can be expected to vary away from the soil boring locations, we recommend on-site observation by a geotechnical engineer/technician during construction to evaluate these potential changes. Soil density testing should also be performed on new fill placed in order to document that project specifications for compaction have been satisfied.

8.0 LIMITATIONS

Within the limitations of scope, budget, and schedule, we have endeavored to provide our services according to generally accepted geotechnical engineering practices at this time and location. Other than this, no warranty, expressed or implied, is intended.

Important information regarding risk management and proper use of this report is given in Appendix B entitled "Geotechnical Report Limitations and Guidelines for Use."

Report of Geotechnical Exploration

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Standard Sheets

DEFINITIONS RELATING TO PAVEMENT CONSTRUCTION

Top of subgrade: Grade which contacts the bottom of the aggregate base layer.

Sand subbase: Uniform thickness sand layer placed as the top of subgrade which is intended to improve the frost and drainage characteristics of the pavement system by increasing drainage of excess water in the aggregate base and subbase, by reducing and “bridging” frost heaving, and by reducing spring thaw weakening effects.

Critical subgrade zone: The subgrade portion beneath and within three vertical feet of the top of subgrade. A sand subbase, if placed, would be considered the upper portion of the critical subgrade zone.

Suitable Grading Material: Mineral soil materials, typically from the project site, excluding the following: 1) soils which have an organic content exceeding 3%, 2) cohesive soils having a Liquid Limit exceeding 50%, 3) soils which include debris, cobbles, and/or boulders, and 4) soils which are considered acceptable from an environmental standpoint. The soil must also be capable of attaining the specified compaction level at its current water content or at a water content that can be reasonably scarified, blended, and moisture conditioned to a uniform water content in order to uniformly meet compaction requirements.

Granular Material: Soils meeting MnDOT Specification 3149.2B.1. This refers to granular soils which, of the portion passing the 1" sieve, contain less than 20% by weight passing the #200 sieve.

Select Granular Material: Soils meeting MnDOT Specification 3149.2B.2. This refers to granular soils which, of the portion passing the 1" sieve, contain less than 12% by weight passing the #200 sieve.

Select Granular Material (Super Sand): Soils meeting MnDOT Specification 3149.2B.3. This material is cleaner and coarser than Select Granular Material (see specification for specific requirements).

Compaction Subcut: Construction of a uniform thickness subcut below a designated grade to provide uniformity and compaction within the subcut zone. Replacement fill can be the materials subcut, although the reused soils should be blended to a uniform soil condition, moisture conditioned as needed to meet MnDOT Specification 2105.F; and re-compacted per the Specified Density Method defined in MnDOT Specification 2105.3F.1.

Test Roll: A means of evaluating the near-surface stability of subgrade soils (usually non-granular). Suitability is determined by the depth of rutting or deflection caused by passage of heavy rubber-tired construction equipment, such as a loaded dump truck, over the test area. Yielding of less than 1" is normally considered acceptable, although engineering judgment may be applied depending on the equipment used, soil conditions present, and/or depth below final grade.

Unstable Soils: Subgrade soils which do not pass a test roll. Unstable soils typically have water content exceeding the *standard optimum water content* defined in ASTM:D698 (Standard Proctor test).

Organic Soils: Soils which have sufficient organic content such that the soils engineering properties are negatively affected (typically more than 3% organic content). These soils are usually black to dark brown in color.

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Appendix A

Geotechnical Field Exploration and Testing

Boring Log Notes

Unified Soil Classification System

Figure 1: Site Location Map

Figure 2: Boring Location Map

Subsurface Boring Logs

Sieve Analysis (Gradation) Results

Moisture-Density Relationship (Proctor) Test Results

Appendix A

Geotechnical Field Exploration and Testing

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A.1 FIELD EXPLORATION

The subsurface conditions at the site were explored by drilling and sampling eight (8) standard penetration test (SPT) borings. The locations of the borings appear on Figure 2, preceding the Subsurface Boring Logs in this appendix.

A.2 SAMPLING METHODS

A.2.1 Split spoon Samples

Standard penetration samples were collected in general accordance with ASTM: D1586. The ASTM test method consists of driving a split-barrel sampler into the in-situ soil with a 140-pound hammer dropped from a height of 30 inches. The sampler is driven a total of 18 inches into the soil. After an initial set of 6 inches, the number of hammer blows to drive the sampler the final 12 inches is known as the standard penetration resistance or N-value.

A.2.2 Disturbed Samples (DS)/Spin-up Samples (SU)

Sample types described as “DS” or “SU” on the boring logs are disturbed samples, which are taken from the flights of the auger. Because the auger disturbs the samples, possible soil layering and contact depths should be considered approximate.

A.2.3 Sampling Limitations

Unless actually observed in a sample, contacts between soil layers are estimated based on the spacing of samples and the action of drilling tools. Cobbles, boulders, and other large objects generally cannot be recovered from test borings, and they may be present in the ground even if they are not noted on the boring logs.

Determining the thickness of “topsoil” layers is usually limited, due to variations in topsoil definition, sample recovery, and other factors. Visual-manual description often relies on color for determination, and transitioning changes can account for significant variation in thickness judgment. Accordingly, the topsoil thickness presented on the logs should not be the sole basis for calculating topsoil stripping depths and volumes. If more accurate information is needed relating to thickness and topsoil quality definition, alternate methods of sample retrieval and testing should be employed.

A.3 CLASSIFICATION METHODS

Soil descriptions shown on the boring logs are based on the Unified Soil Classification (USC) system. The USC system is described in ASTM: D2487 and D2488. Where laboratory classification tests (sieve analysis or Atterberg Limits) have been performed, accurate classifications per ASTM: D2487 are possible. Otherwise, soil descriptions shown on the boring logs are visual-manual judgments. Charts are attached which provide information on the USC system, the descriptive terminology, and the symbols used on the boring logs.

The boring logs include descriptions of apparent geology. The geologic depositional origin of each soil layer is interpreted primarily by observation of the soil samples, which can be limited. Observations of the surrounding topography, vegetation, and development can sometimes aid this judgment.

A.4 WATER LEVEL MEASUREMENTS

The ground water level measurements are shown at the bottom of the boring logs. The following information appears under “Water Level Measurements” on the logs:

- ♦ Date and Time of measurement
- ♦ Sampled Depth: lowest depth of soil sampling at the time of measurement
- ♦ Casing Depth: depth to bottom of casing or hollow-stem auger at time of measurement
- ♦ Cave-in Depth: depth at which measuring tape stops in the borehole
- ♦ Water Level: depth in the borehole where free water is encountered
- ♦ Drilling Fluid Level: same as Water Level, except that the liquid in the borehole is drilling fluid

The true location of the water table at the boring locations may be different than the water levels measured in the boreholes. This is possible because there are several factors that can affect the water level measurements in the borehole. Some of these factors include: permeability of each soil layer in profile, presence of perched water, amount of time between water level readings, presence of drilling fluid, weather conditions, and use of borehole casing.

Appendix A
Geotechnical Field Exploration and Testing
Report No. 17-20990

A.5 LABORATORY TEST METHODS

A.5.1 Water Content Tests

Conducted per AET Procedure 01-LAB-010, which is performed in general accordance with ASTM: D2216 and AASHTO: T265.

A.5.2 Atterberg Limits Tests

Conducted per AET Procedure 01-LAB-030, which is performed in general accordance with ASTM: D4318 and AASHTO: T89, T90.

A.5.3 Sieve Analysis of Soils (thru #200 Sieve)

Conducted per AET Procedure 01-LAB-040, which is performed in general conformance with ASTM: D6913, Method A.

A.5.4 Particle Size Analysis of Soils (with hydrometer)

Conducted per AET Procedure 01-LAB-050, which is performed in general accordance with ASTM: D422 and AASHTO: T88.

A.5.5 Unconfined Compressive Strength of Cohesive Soil

Conducted per AET Procedure 01-LAB-080, which is performed in general accordance with ASTM: D2166 and AASHTO: T208.

A.5.6 Laboratory Soil Resistivity using the Wenner Four-Electrode Method

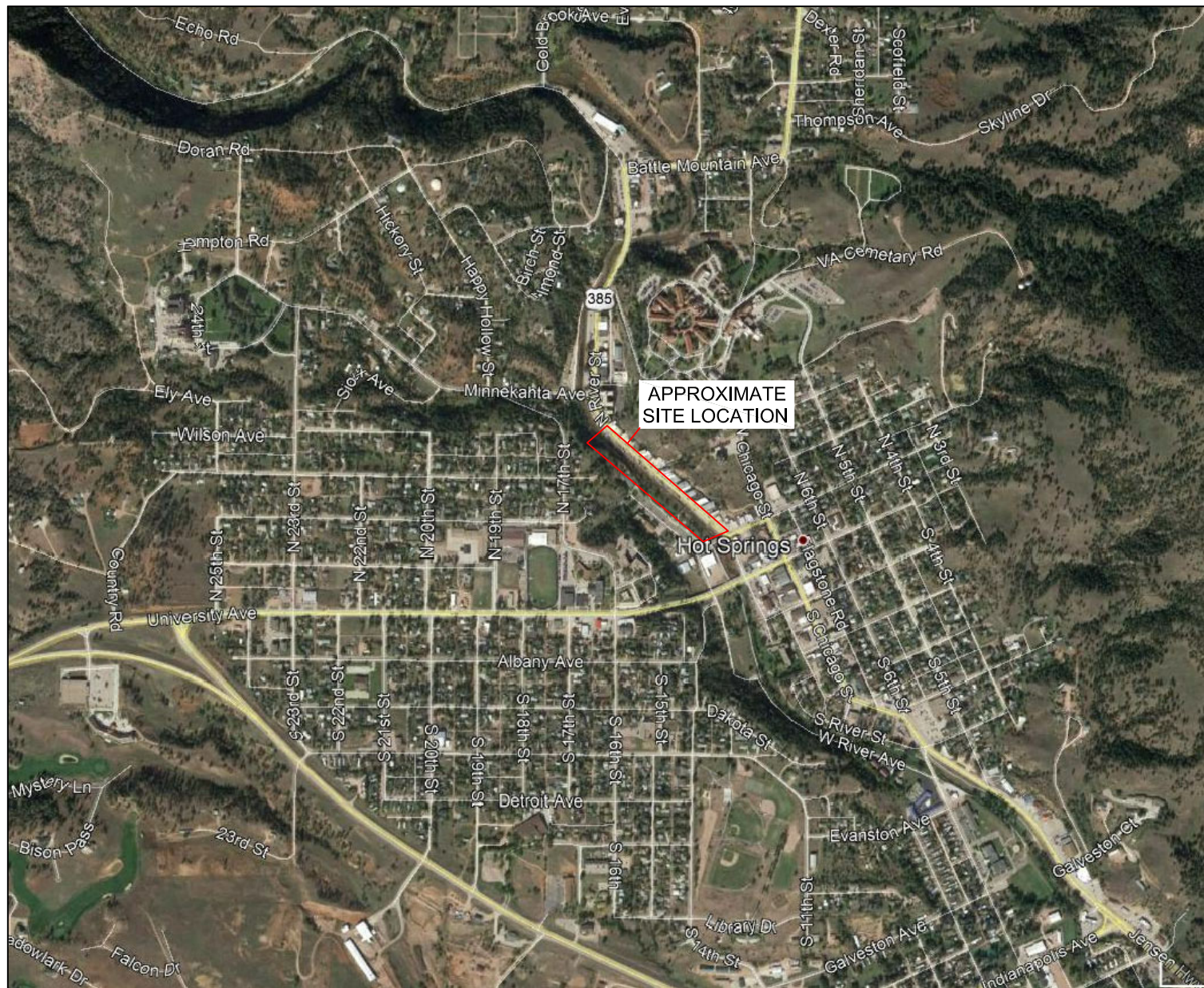
Conducted per AET Procedure 01-LAB-090, which is performed using Soil Box apparatus in the laboratory in general accordance with ASTM: G57

A.6 TEST STANDARD LIMITATIONS

Field and laboratory testing is done in general conformance with the described procedures. Compliance with any other standards referenced within the specified standard is neither inferred nor implied.

A.7 SAMPLE STORAGE

Unless notified to do otherwise, we routinely retain representative samples of the soils recovered from the borings for a period of 30 days.



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PROJECT: PROPOSED RIVERFRONT WALKWAY
N RIVER STREET, HOT SPRINGS, SOUTH DAKOTA

SUBJECT: FIGURE 1: SITE LOCATION MAP

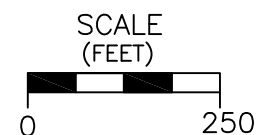
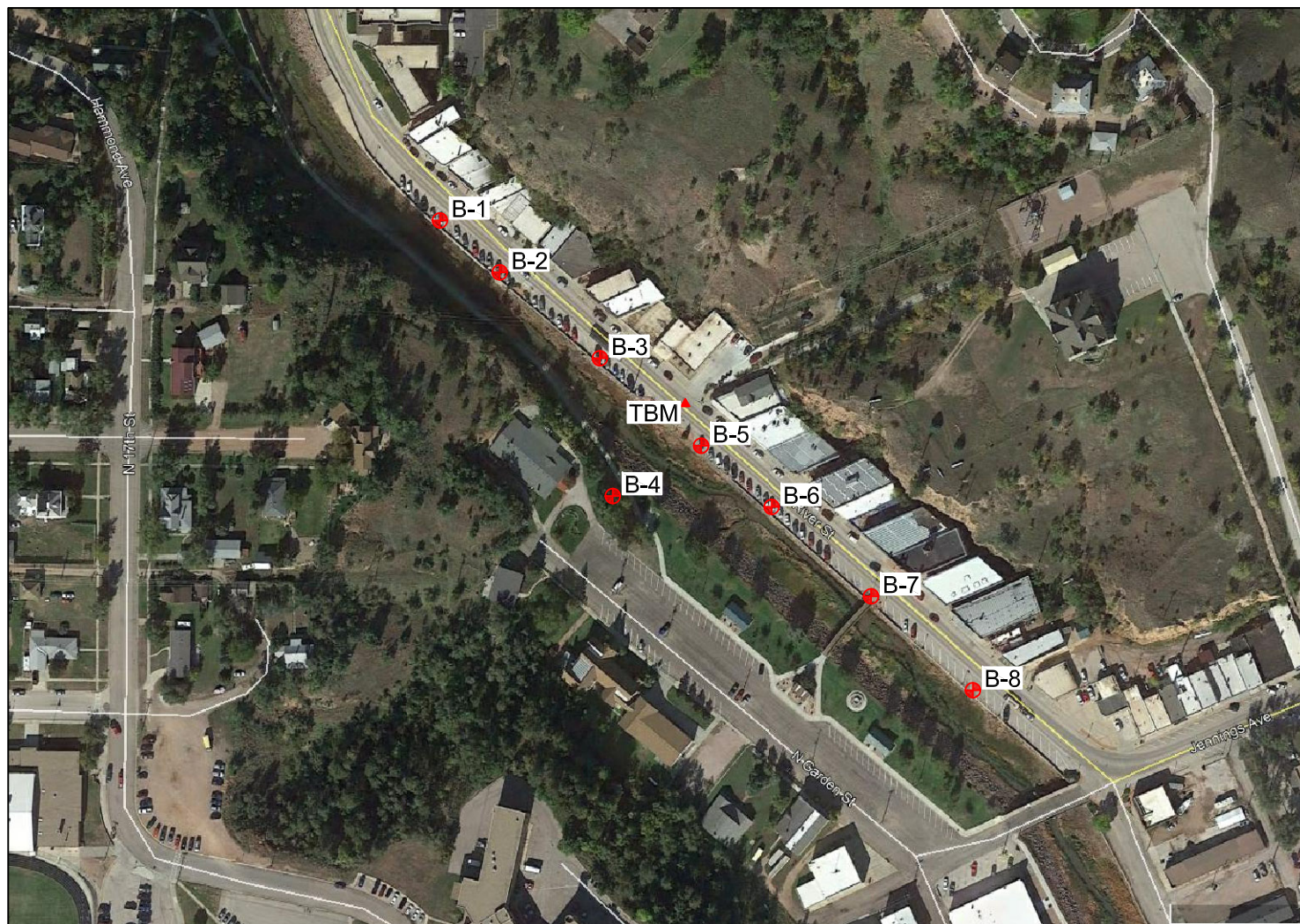
SCALE: 1 INCH = 1,250 FEET

DRAWN BY: KY

PROJECT NO.
17-20990

DATE:
JULY 9, 2020

REVIEWED BY: WF



PROJECT: PROPOSED RIVERFRONT WALKWAY N RIVER STREET, HOT SPRINGS, SOUTH DAKOTA	PROJECT NO. 17-20990
SUBJECT: FIGURE 2: BORING LOCATION MAP	DATE: JULY 9, 2020
SCALE: 1 INCH = 250 FEET	DRAWN BY: KY REVIEWED BY: WF



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SUBSURFACE BORING LOG

AET JOB NO: **17-20990**

LOG OF BORING NO. **B-1 (p. 1 of 1)**

PROJECT: **Proposed Riverfront Walkway; Hot Springs, South Dakota**

DEPTH IN FEET	SURFACE ELEVATION: <u>105.0</u>		GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS					
	MATERIAL DESCRIPTION							WC	DEN	LL	PL	%-#200	
1	ASPHALT 5-inches		PAVEMENT FILL										
2	BASE COURSE 6-inches												
3	FILL, Gravelly Sand with clay, red-brown			7	M	SS	18						
4													
5													
6				8	M	SS	18	4					
7													
8													
9													
10													
11													
12													
13	CLAYEY SAND with gravel, red-brown, very loose to loose (SC)		ALLUVIUM	2	M	SS	18						
14													
15													
16													
17													
18													
19	SANDY GRAVEL with clay and cobbles, red-brown, dense to very dense (GP)												
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													
31													
32													
33													
34													
35													
36	with flowing sand and boulders												
37													
38													
39													
40													
41													
42													
43	SANDY LEAN CLAY with gravel, with siltstone lenses, red, hard (CL)		SPEARFISH FORMATION	50/.3	W	SS	4	18					
44													
45	Bottom of Boring - Auger Refusal at 46.5'												
46													

DEPTH: DRILLING METHOD		WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
46.5	3.25" HSA	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
		7/6/20	14:15	46.5	45.0	NA	NA	17.3	
BORING COMPLETED: 7/6/20									
DR: ES LG: JH Rig: 15									

AET CORP 17-20990.GPJ AET-CPT+WELL.GDT 7/21/20

03/2011

01-DHR-060



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SUBSURFACE BORING LOG

AET JOB NO: **17-20990**

LOG OF BORING NO. **B-2 (p. 1 of 1)**

PROJECT: **Proposed Riverfront Walkway; Hot Springs, South Dakota**

DEPTH IN FEET	SURFACE ELEVATION: 102.8 MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS				
							WC	DEN	LL	PL	%-#200
1	ASPHALT 5-inches	PAVEMENT FILL									
2	BASE COURSE 6-inches										
3	FILL, Silty Sand with gravel, red-brown		10	M	SS	18					
4											
5											
6			23	M	SS	18					
7											
8			20	M	SS	18	10				
9											
10											
11	FILL Clayey Sand with trace gravel, red-brown	ALLUVIUM	12	M	SS	18	14	109			47
12											
13	GRAVELLY SAND, red-brown, very dense (SP)		50/.3	M	SS	4					
14											
15											
16	SANDY GRAVEL with silt, with some cobbles and possible boulders, red-brown, very dense (GP)		50/.1	M	SS	2					
17											
18											
19											
20											
21			62	W	SS	18					
22											
23											
24											
25											
26			50/.2	W	SS	3					
27											
28											
Bottom of Boring - Auger Refusal at 28'											

DEPTH: DRILLING METHOD		WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
28.0	3.25" HSA	7/7/20	10:15	28.0	28.0	NA	NA	17.5	
BORING COMPLETED: 7/7/20									
DR: ES LG: JH Rig: 15									

AET CORP 17-20990.GPJ AET-CPT+WELL.GDT 7/21/20



01-DHR-060



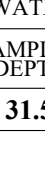
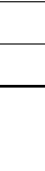
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SUBSURFACE BORING LOG

AET JOB NO: **17-20990**

LOG OF BORING NO. **B-4 (p. 1 of 1)**

PROJECT: **Proposed Riverfront Walkway; Hot Springs, South Dakota**

DEPTH IN FEET	SURFACE ELEVATION: <u>103.6</u> MATERIAL DESCRIPTION		GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS					
								WC	DEN	LL	PL	%-#200	
1	TOPSOIL Sandy Lean Clay, with organics, dark brown		TOPSOIL ALLUVIUM										
2													
3	SANDY LEAN CLAY with gravel and sandstone lenses, tan to red-brown, hard (CL)			78	M		SS	18					
4													
5				41	M		SS	18					
6													
7	CLAYEY SAND , red-brown, very dense (SC)			55	M		SS	18	11				49
8													
9				40	M		SS	18					
10													
11	SANDY GRAVEL with clay, with sandstone lenses, red-brown, dense to very dense (GP)			50/.5	M		SS	6	6				
12													
13				62	M		SS	18					
14													
15													
16													
17	CLAYEY SAND with trace gravel, red-brown, loose (SC)			6			SS	18					
18													
19													
20													
21	SANDY GRAVEL with silt, red, dense to very dense (GP)			40	W		SS	18					
22													
23													
24													
25				52	W		SS	18					
26													
27													
28													
29													
30													
31													
Bottom of Boring													

AET CORP 17-20990.GPJ AET-CPT+WELL.GDT 7/21/20

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01-DHR-060



AMERICAN
ENGINEERING
TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **17-20990**

LOG OF BORING NO. **B-5 (p. 1 of 1)**

PROJECT: **Proposed Riverfront Walkway; Hot Springs, South Dakota**

DEPTH IN FEET	SURFACE ELEVATION: 99.2		GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS					
	MATERIAL DESCRIPTION							WC	DEN	LL	PL	%-#200	
1	ASPHALT 5-inches		PAVEMENT FILL										
2	BASE COURSE 4-inches												
3	FILL, Clayey Sand with gravel, red-brown			9	M	SS	18						
4													
5													
6				20	M	SS	18	8					
7													
8				8	M	SS	18						
9													
10				9	M	SS	18						
11													
12													
13	SANDY GRAVEL with silt, with cobbles and possible boulders, brown, very dense (GP)		ALLUVIUM	50/.1	M	SS	2						
14													
15	SANDY LEAN CLAY with gravel, dark brown, stiff (CL)			11	W	SS	18						
16													
17													
18													
19	SANDY GRAVEL with a little silt, with some cobbles and possible boulders, red-brown, loose to very dense (GP)												
20													
21				10	W	SS	18						
22													
23													
24													
25													
26			9	W	SS	18					8		
27	with flowing sands												
28													
29													
30													
31			65	W	SS	18							
32													
33	SANDY LEAN CLAY with gravel, with gypsum lenses and laminations, red, hard (CL)		SPEARFISH FORMATION										
34													
35													
36													
37				28	W	SS	18						
38													
39													
40													
41				50/.3	W	SS	4						
42													
43													
44													
45													
46			50/.5	W	SS	6	13	112					
Bottom of Boring - Auger Refusal at 46.5'													
DEPTH: DRILLING METHOD		WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG				
46.5 3.25" HSA		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL					
		7/1/20	14:15	46.5	45.0	NA	NA	14.9					
BORING COMPLETED: 7/1/20													
DR: ES LG: JH Rig: 15													

AET CORP 17-20990.GPJ AET-CPT+WELL.GDT 7/21/20

03/2011

01-DHR-060



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ENGINEERING
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SUBSURFACE BORING LOG

AET JOB NO: **17-20990**

LOG OF BORING NO. **B-6 (p. 1 of 1)**

PROJECT: **Proposed Riverfront Walkway; Hot Springs, South Dakota**

DEPTH IN FEET	SURFACE ELEVATION: <u>98.7</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS				
							WC	DEN	LL	PL	%-#200
1	ASPHALT 3-inches BASE COURSE 4.5-inches FILL , Sandy Lean Clay with gravel, with cobbles, red-brown	PAVEMENT FILL									
2											
3			19	M	SS	18					
4											
5											
6			8	M	SS	18					
7											
8											
9			10	M	SS	18	9	108			
10											
11											
12											
13											
14											
15	SANDY GRAVEL with silt, with cobbles and possible boulders, red to red-brown, dense to medium dense (GP)	ALLUVIUM									
16			35								

DEPTH: DRILLING METHOD		WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
30.0	3.25" HSA	7/2/20	15:15	31.5	30.0	NA	NA	15.0	
BORING COMPLETED: 7/2/20									
DR: ES LG: KK Rig: 15									

AET CORP 17-20990.GPJ AET+CPT+WELL.GDT 7/21/20



AMERICAN
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SUBSURFACE BORING LOG

AET JOB NO: **17-20990**

LOG OF BORING NO. **B-7 (p. 1 of 1)**

PROJECT: **Proposed Riverfront Walkway; Hot Springs, South Dakota**

DEPTH IN FEET	SURFACE ELEVATION: 98.2 MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS				
							WC	DEN	LL	PL	%-#200
1	ASPHALT 3-inches BASE COURSE 4.5-inches FILL , Clayey Sand with gravel, red-brown	PAVEMENT FILL									
2											
3			8	M	SS	18	7				22
4											
5			15	M	SS	18					
6											
7											
8											
9											
10											
11											
12											
13											
14					WH	M	SS	18			
15											
16	SANDY GRAVEL with silt, with cobbles, red to red-brown, medium dense to very dense (GP)	ALLUVIUM	51	M	SS	18					
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30	SILTY LEAN CLAY with sand and trace gravel, red, hard (CL)	SPEARFISH FORMATION	86/.8	W	SS	10	13				
31											
	Bottom of Boring										

DEPTH: DRILLING METHOD		WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
30.0	3.25" HSA	7/2/20	13:30	31.5	30.0	NA	NA	16.3	
BORING COMPLETED: 7/2/20									
DR: ES LG: KK Rig: 15									

AET CORP 17-20990.GPJ AET+CPT+WELL.GDT 7/21/20



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SUBSURFACE BORING LOG

AET JOB NO: **17-20990**

LOG OF BORING NO. **B-8 (p. 1 of 1)**

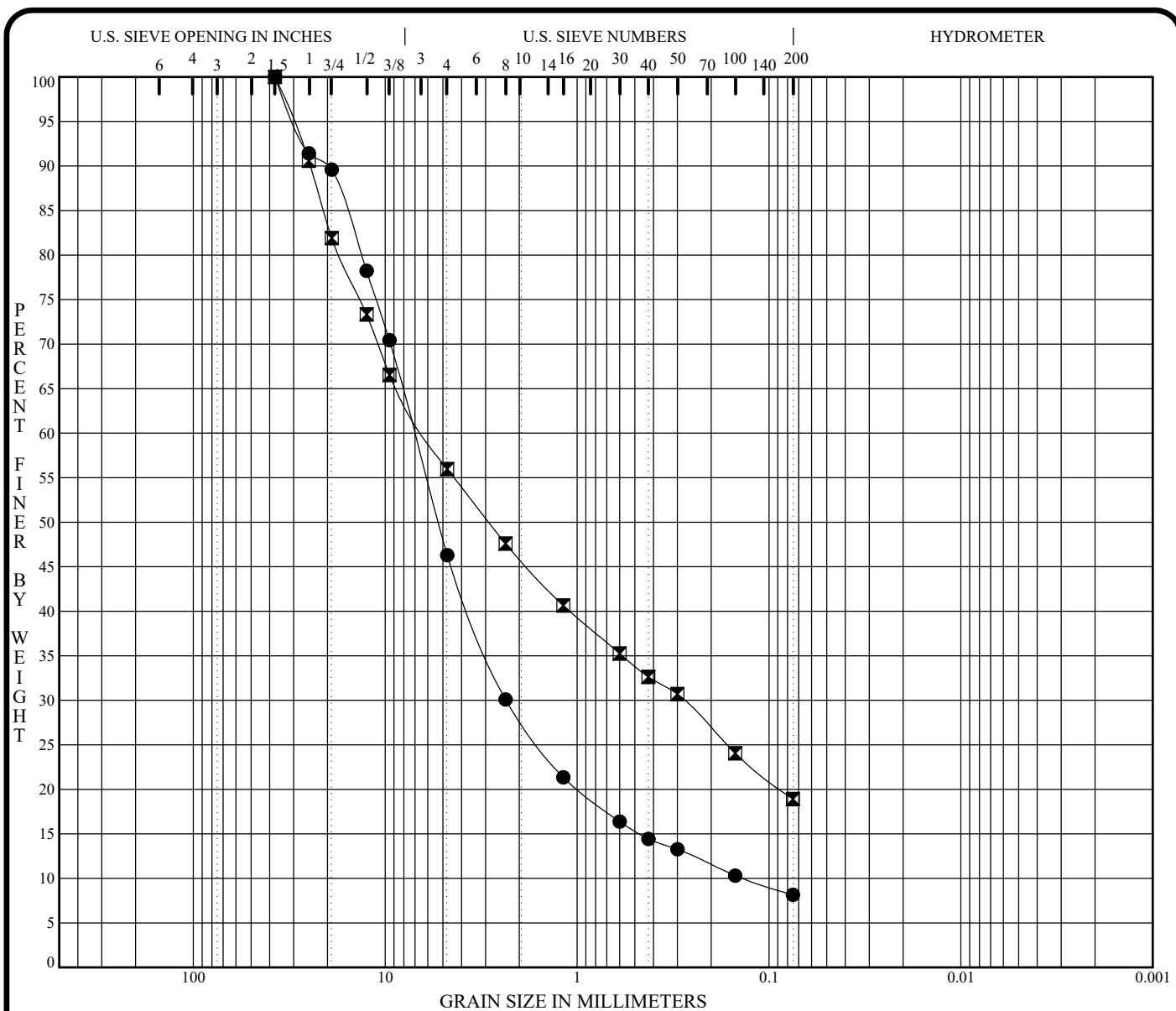
PROJECT: **Proposed Riverfront Walkway; Hot Springs, South Dakota**

DEPTH IN FEET	SURFACE ELEVATION: 97.6		GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS					
	MATERIAL DESCRIPTION							WC	DEN	LL	PL	%-#200	
1	ASPHALT 4-inches		PAVEMENT FILL										
2	BASE COURSE 4-inches												
3	FILL, Sandy Lean Clay with gravel, with cobbles, red-brown				16	M	SS	18					
				7	M	SS	18						
4					8	M	SS	18					
5													
6													
7													
8													
9													
10													
11													
12													
13	SANDY LEAN CLAY with trace gravel, dark red-brown, very soft (CL)		ALLUVIUM	WH	M	SS	18	9					
14	CLAYEY SAND with gravel, red-brown, dense (SC)												
15													
16				45	W	SS	18						
17													
18	SANDY GRAVEL with silt, with cobbles and possible boulders, red-brown, very dense (GP)												
19													
20													
21													
22													
23				50/.4	W	SS	5					19	
24													
25													
26				50/.2	W	SS	3						
27													
28													
29													
30	SILTY LEAN CLAY with sand and gravel, red, very stiff to hard (CL)		SPEARFISH FORMATION	32	W	SS	18						
31													
32													
33													
34													
35													
36					18	W	SS	18					
37													
38													
39													
40													
41					26	W	SS	18	16	117			
42													
43													
44													
45													
46				28	W	SS	18						
47													
48													
49													
50													
51	gypsum lens at 50'			31	W	SS	18						
Bottom of Boring													
DEPTH: DRILLING METHOD		WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG				
50.0	3.25" HSA	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL					
		7/1/20	12:00	51.1	50.0	NA	NA	25.0					
		7/1/20	12:15	51.5	50.0	NA	NA	16.0					
BORING COMPLETED: 7/1/20													
DR: ES LG: JH Rig: 15													

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03/2011

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					MC%	LL	PL	PI	Cc	Cu
● B-5 25.0'	Sandy Gravel with a little silt (GP)									5.74	51.8
☒ B-8 20.0'	Sandy Gravel with silt (GP)										

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-5 25.0'	37.50	7.04	2.343	0.1358	53.7	38.1	8.2	
☒ B-8 20.0'	37.50	6.19	0.279		44.0	37.1	18.9	

PROJECT **Proposed Riverfront Walkway; Hot Springs,**
South Dakota

AET JOB NO. **17-20990**
DATE **7/1/20**



AMERICAN
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GRADATION CURVES
ASTM D422



American Engineering Testing, Inc.
Rapid City Sheridan
1745 Samco Road 72 East Ridge Road Unit D
Rapid City, SD 57702 Sheridan, WY 82801
Phone: (605) 388-0029 (307) 675-1863
Toll Free: (800) 972-6364 www.amengtest.com

Proctor Report

Report No: PTR:20-14562-S1

Client: ISG, INC

CC:

Project: Proposed Riverfront Walkway
Hot Springs, SD

Date of Issue:

7/14/2020

Job No: 17-20990

Sample Details

Sample ID: 20-14562-S1

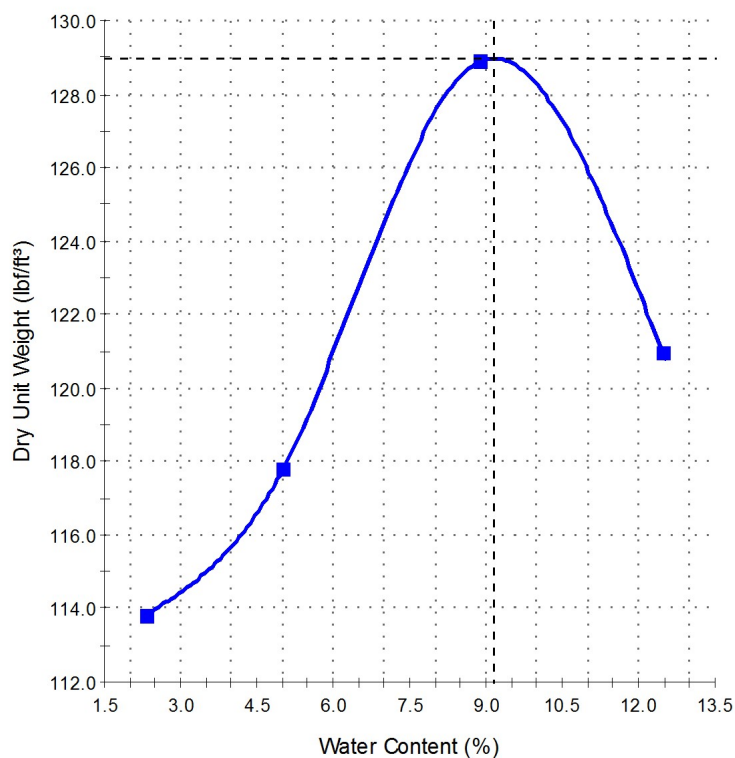
Field ID: Bulk B-2 1-5'

Date Sampled: 7/7/2020

Material: Silty Sand with gravel, red-brown (SM)

Location: Bulk B-2 1-5'

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D 698

Maximum Dry Unit Weight (lb/ft³): 129.0

Optimum Water Content (%): 9.2

Method: B

Preparation Method: Moist

Specific Gravity Method: Assumed

Retained Sieve 3/8" (9.5mm) (%): 14

Passing Sieve 3/8" (9.5mm) (%): 86

Tested By: Christian Heinrich

Date Tested: 7/8/2020

ASTM D 4718

Corrected Maximum Dry Unit Weight (lb/ft³): 133.0

Corrected Optimum Water Content (%): 9.2

Specific Gravity (Oversize): 2.65

Sieve Size (Oversize): 3/8

Oversize Particles (%): 14

Comments

Report of Geotechnical Exploration

Proposed Riverfront Walkway, Hot Springs, South Dakota

July 24, 2020

Report No. 17-20990

AMERICAN
ENGINEERING
TESTING, INC.

Appendix B

Geotechnical Report Limitations and Guidelines for Use

Appendix B

Geotechnical Report Limitations and Guidelines for Use

Report No. 17-20990

B.1 REFERENCE

This appendix provides information to help you manage your risks relating to subsurface problems which are caused by construction delays, cost overruns, claims, and disputes. This information was developed and provided by GBA¹, of which, we are a member firm.

B.2 RISK MANAGEMENT INFORMATION

B.2.1 Understand the Geotechnical Engineering Services Provided for this Report

Geotechnical engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical engineering services is typically a geotechnical engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

B.2.2 Geotechnical Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared solely for the client.

Likewise, geotechnical engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

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

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

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. If you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

¹ Geoprofessional Business Association, 1300 Piccard Drive, LL14, Rockville, MD 20850
Telephone: 301/565-2733; www.geoprofessional.org, 2019

B.2.3 Read the Full Report

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety.

Appendix B

Geotechnical Report Limitations and Guidelines for Use

Report No. 17-20990

Do not rely on an executive summary. Do not read selective elements only. Read and refer to the report in full.

B.2.4 You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

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

B.2.5 Most of the “Findings” Related in This Report Are Professional Opinions

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

B.2.6 This Report's Recommendations Are Confirmation-Dependent

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

B.2.7 This Report Could Be Misinterpreted

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

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

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

B.2.8 Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical engineering report, along with any attachments or appendices, with your contract documents, but be certain to note conspicuously that you've included the material for information purposes only. To avoid misunderstanding, you may also want to note that “informational purposes” means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, only from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and be sure to allow enough time to permit them to do so.

Appendix B

Geotechnical Report Limitations and Guidelines for Use

Report No. 17-20990

Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

B.2.9 Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. Read these provisions closely. Ask questions. Your geotechnical engineer should respond fully and frankly.

B.2.10 Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical engineering study. For that reason, a geotechnical engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Unanticipated subsurface environmental problems have led to project failures. If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

B.2.11 Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. Geotechnical engineers are not building-envelope or mold specialists.

SECTION 01 3510
STRUCTURAL TESTING AND SPECIAL INSPECTION

PART 1 GENERAL

1.01 INTENT AND CONDITIONS

- A. Intent
 - 1. Define and coordinate structural testing and special inspection services.
 - 2. Define and coordinate conventional testing and inspection services.
 - 3. Provide greater confidence that the specified work is constructed in compliance with the contract documents and Chapter 17 of the 2018 International Building Code.
 - 4. Testing and Inspection services are intended to assist in determining probable compliance of the work with requirements specified. These services do not relieve the Contractor of responsibility for compliance with the requirements of the contract documents.
- B. Conditions
 - 1. If inspection of fabricator's work is required, the Owner's representative may require testing and inspection of the work at the plant, before shipment. Owner, Architect and Structural Engineer of Record (SER) reserve the right to reject material not complying with the contract documents.
 - 2. Testing and inspection shall be performed in accordance with the industry standard used as the reference for the specific material or procedure unless other criteria are specified. In the absence of a referenced standard, tests shall be accomplished in accordance with generally accepted industry standards.
 - 3. Work shall be checked as it progresses, but failure to detect any defective work or materials shall in no way prevent later rejection if defective work or materials are discovered, nor shall it obligate Owner to accept such work.

1.02 RELATED REQUIREMENTS

- A. Refer to PART 3 for technical scope sections regarding specific qualifications, inspections, tests, frequency and standards required.

1.03 DEFINITIONS

- A. Testing – Evaluation of systems, primarily requiring physical manipulation and analysis of materials, in accordance with approved standards.
- B. Inspection – Evaluation of systems, primarily requiring observation and engineering judgment.
- C. Structural Testing and Special Inspection – Structural Testing and Special Inspection Services herein include items required by the 2018 International Building Code, and other items which in the professional judgment of the Structural Engineer of Record, are critical to the integrity of the building structure.
- D. Conventional Testing and Inspection – Conventional Testing and Inspection Services herein describe those items not specially required by Code but may be considered essential to the proper performance of the building systems.
- E. Architect of Record – The prime consultant in charge of overall design and coordination of the project.
- F. Structural Engineer of Record (SER) – The Licensed Engineer in responsible charge of the structural design for the project.
- G. Licensed Structural Engineer: – A professional engineer with education and experience in the design of structures similar to this project licensed to practice in the state in which the project is located.
- H. Testing Agency (TA) – The properly qualified firm performing testing services.
- I. Special Inspector (SI) – A properly qualified individual or firm performing special inspections.
- J. Building Official – The Officer or his duly authorized representative charged with the administration and enforcement of the 2018 International Building Code.
- K. Continuous –The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.
- L. Periodic –The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.

1.04 REFERENCES

- A. ASTM E329-02 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
- B. ASTM E43-02 - Standard Practice for Agencies Performing Nondestructive Testing.
- C. ASTM C1077-02 - Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- D. ASTM C1093-95 - Practice for Accreditation of Testing Agencies for Unit Masonry.
- E. ASTM D3740-01 - Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- F. AISC Steel Construction Manual 14th Edition (2010)
- G. 2018 International Building Code.
- H. See technical sections of PART 3 for specific references.

1.05 QUALIFICATIONS

- A. Testing Agency (TA) – The testing agency shall be an approved independent testing agency acceptable to the Owner, Architect, SER and as noted below:
 - 1. Authorized to operate in the state in which the project is located and experienced with the requirements and testing methods specified in the technical scope sections of PART 2.
 - 2. Meeting applicable requirements of Section 1.04 "References".
 - 3. Testing equipment shall be calibrated at reasonable intervals by devices of accuracy traceable to either the National Bureau of Standards, or to accepted values of natural physical constants.
- B. Special Inspector (SI) – The special inspector shall be under the direct supervision of a registered civil/structural engineer, experienced with the type of work requiring structural testing and special inspection.
 - 1. The categories of special inspector are:
 - a. Special Inspector - Technical I, II, and III: Usually an employee of a testing agency.
 - b. Special Inspector - Structural I and II: Preferably an employee of the SER's firm.
 - 2. Unique special inspector requirements, for specific materials and system, are noted in related technical specification sections.

1.06 RESPONSIBILITIES

- A. Structural Testing and Special Inspection
 - 1. Special Inspectors:
 - a. Sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencement of construction.
 - b. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
 - c. Test and/or inspect the work assigned for conformance with the building department approved design drawings, specifications and applicable material and workmanship provisions of the Code. Perform testing and inspection in a timely manner to avoid delay of work.
 - d. Bring discrepancies to the immediate attention of the contractor for correction, confirm that they are corrected and, if uncorrected after a reasonable period of time, bring to the attention of the Structural Engineer of Record, the Building Official, and to the Architect.
 - e. Submit test and/or inspection reports to the Building Official, Contractor, the Structural Engineer of Record, and other designated persons in accordance with the Structural Testing and Special Inspection Summary Schedule.
 - f. Submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications and the applicable workmanship provisions of the Code.
 - 2. Testing Agency:
 - a. Sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencement of construction.

- b. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
 - c. When engaged as a special inspector, provide structural testing and special inspection services as previously described.
- 3. Architect of Record (or other prime consultant):
 - a. Complete and sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencement of construction. Provide a completed copy of the schedule to all signed parties including Building Official.
 - b. If appropriate, arrange and attend a pre-construction meeting to review the scope of structural testing and special inspection. Include Contractor, Building Official, SER, Testing Agency and other parties concerned.
 - c. Coordinate the flow of reports and related information to expedite resolution of construction issues.
- 4. Structural Engineer of Record (SER):
 - a. Identify items requiring structural testing and special inspection including special cases.
 - b. Define "type" of special inspector required for "description" of work indicated on the structural testing and special inspection schedule.
 - c. Complete and sign the Structural Testing and Special Inspection Summary Schedule prior to commencement of construction.
 - d. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
 - e. Review reports submitted by special inspectors.
 - f. If engaged as a special inspector, provide structural testing and special inspection services as previously described.
- 5. Contractor:
 - a. Sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencement of construction.
 - b. Coordinate efforts to gain signatures of all signing parties other than the Architect and Structural Engineer of Record (SER).
 - c. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
 - d. Post or make available the Structural Testing and Special Inspection Summary Schedule within its office at the job site. Also, provide adequate notification to those parties designated on the schedule so they may properly prepare for and schedule their work.
 - e. Provide the special inspectors access to the approved drawings and specifications at the job site.
 - f. Review reports submitted by special inspectors.
 - g. Retain at the job site all reports submitted by the special inspectors for review by the building official upon request.
 - h. Correct in a timely manner, deficiencies identified in inspection and/or testing reports.
 - i. Provide the special inspector safe access to the work requiring inspection and/or testing.
 - j. Provide labor and facilities to provide access to the work and to obtain, handle and deliver samples, to facilitate testing and inspection and for storage and curing of test samples.
 - k. Verification of conformance of the work within specified construction tolerances is solely the Contractor's responsibility.
- 6. Fabricator:
 - a. Sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencing construction.
 - b. Submit a Certificate of Compliance to the Building Official, Special Inspector, and Structural Engineer of Record that the work was performed in accordance with the approved plans and specifications.
- 7. Building Official (Typical responsibilities noted for information only):
 - a. Determine work, which in the Building Officials opinion, involves unusual hazards or conditions in accordance with the 2018 International Building Code.

- b. Review special inspector qualifications.
 - c. Accept and sign the completed Structural Testing and Special Inspection Summary Schedule.
 - d. Review all fabricators who perform work in their shop, which requires special inspection.
 - e. Review reports and recommendations submitted by the special inspectors.
 - f. Review the "final signed reports" submitted by the special inspector(s). These documents should be accepted and approved by the building department prior to issuance of a Certificate of Occupancy.
- 8. Owner:
 - a. Establish direct funding to provide for cost of structural testing and special inspection services.
 - b. Provide special inspector with approved design drawings, specifications and approved shop drawings.
 - c. Provide special inspectors and testing agencies with full access to site at all times.
 - d. Sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencement of construction.
- B. Conventional Testing and Inspection
 - 1. Testing Agency:
 - a. Test or inspect the work assigned, for conformance with building department approved plans, specifications and applicable workmanship provisions of the 2018 International Building Code.
 - b. Bring non-conforming items to the immediate attention of the Contractor, and if uncorrected to the Architect of Record.
 - c. Submit test and/or inspection reports to the Architect of Record, the Contractor and other designated persons.
 - 2. Contractor:
 - a. Provide adequate notification to testing agency so they may properly prepare for and schedule their work.
 - b. Provide testing agency with access to the approved design drawings, approved shop drawings and specifications at the job site.
 - c. Correct in a timely manner, deficiencies identified in test and/or inspection reports.
 - d. Provide testing agency with safe access to the work requiring testing and inspection.
 - e. Provide labor and facilities to provide access to the work and to obtain and handle samples, to facilitate testing and inspection and for storage and curing of test samples.
 - f. Verification of conformance of the work within specified construction tolerances is solely the Contractor's responsibility.
 - 3. Architect of Record (or other prime consultant):
 - a. Coordinate the flow of reporting and related information to expedite resolution of construction issues.
- C. Inspections by Building Official
 - 1. Contractor shall provide adequate notice for inspections performed by the Building Official, as required by the 2018 International Building Code, and local ordinance.
- D. Periodic Site Observations by Design Consultant
 - 1. Special structural testing and inspection, conventional testing and inspection, and periodic inspections by the Building Official do not preclude the normal field involvement and site observations by Architect or Structural Engineer of Record, nor shall it relieve the Contractor of any responsibility to complete the work in accordance with the approved drawings and specifications.
- E. Limits of Authority
 - 1. Testing agents and/or special inspectors may not waive or alter contract requirements, or approve or accept any portion of the work unless specifically authorized by the Architect or Structural Engineer of Record. They may not assume any duties of the Contractor, and they have no authority to stop or reject "Work".

1.07 PAYMENT

- A. Owner shall directly employ and pay for services of the special inspectors to perform required Structural Testing and Special Inspection.
- B. Owner shall employ and pay for services of the testing agency to perform required Conventional Testing and Inspection.
- C. Unless noted otherwise, the Contractor shall provide and pay for all materials, samples, mock-ups, and assemblies required for testing and inspection and shall pay for all shipping costs related to delivery of this work. Testing agency will pay for shipping costs of samples transported from site to lab.
- D. If exploratory work is required to determine the cause of defects, the cost of such work shall be paid by the Contractor, if the work is found to be defective, in the judgment of the Architect/Engineer. Contractor shall reimburse the Owner for all costs incurred in this event.
- E. Any tests required to qualify the Contractor, or the workmen for any phase of the work, shall be performed at no additional cost to the Owner.

1.08 INSPECTION NOTICE

- A. Contractor shall provide minimum of 24 hours notice for all items requiring testing or inspection. Items requiring testing and inspection services prior to or during placement shall not be placed until testing and inspection services are available. Items requiring testing and inspection services after placement shall not be enclosed or obscured until testing and inspection services are performed.

1.09 REPORTS

- A. Testing agency and/or special inspectors shall submit reports in accordance with the Structural Testing and Special Inspection Summary Schedule and shall conduct and interpret tests and inspections and state in each report whether; (1) test specimens and observations comply with Contract Documents, and specifically state any deviations, (2) record types and locations of defects found in work, (3) record work required and performed, to correct deficiencies.
- B. Reports for structural testing and special inspection, shall be submitted in timely manner to the Contractor, Building Official, SER, and Architect of Record.
 - 1. Submit reports for ongoing work, to provide the information noted below:
 - a. Date issued.
 - b. Project title and number.
 - c. Firm name and address.
 - d. Name and signature of tester or inspector.
 - e. Date and time of sampling.
 - f. Date of test or inspection.
 - g. Identification of product and specification section.
 - h. Location in project, including elevations, grid location and detail.
 - i. Type of test or inspections.
 - j. Results of tests or inspections and interpretation of same.
 - k. Observations regarding compliance with Contract Documents or deviations there from.
 - 2. Submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications and the applicable workmanship provisions of the code.
- C. Reports for conventional testing and inspection shall be submitted in a timely manner to the Contractor and the Architect of Record.

1.10 FREQUENCY OF TESTING AND INSPECTION

- A. For detailed requirements see technical sections of PART 3.

1.11 PROTECTION AND REPAIR

- A. Upon completion of testing, sample-taking, or inspection, the Contractor shall repair damaged work and restore substrates and finishes to eliminate deficiencies, including deficiencies in the visual qualities of exposed surfaces, as judged solely by the Architect/Engineer of Record. Protect work exposed by or for testing and/or inspection and protect repaired work. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for testing and/or inspection.

1.12 TESTS TO DEMONSTRATE QUALIFICATION

- A. If the Contractor proposes a product material, method, or other system that has not been pre-qualified, the Architect may require applicable tests, to establish a basis for acceptance or rejection. These tests will be paid for by the Contractor.
- B. The Architect/Engineer of Record reserves the right to require certification or other proof that the system proposed, is in compliance with any tests, criteria or standards called for. The certificate shall be signed by a representative of an independent testing agency.

PART 2 MATERIALS (NOT USED)

PART 3 SCOPE OF TESTING AND INSPECTION

3.01 STRUCTURAL TESTING AND SPECIAL INSPECTION PROGRAM SUMMARY

- A. The parties involved shall complete and sign the Structural Testing and Special Inspection Summary Schedule. The Program, including Summary Schedule, shall be submitted to the building official for approval prior to issuance of a building permit. The completed schedule includes the following:
 - 1. A specific listing of the items requiring inspection and testing.
 - 2. The associated technical scope sections that define the applicable standards by which to judge conformance with the approved plans and specifications in accordance with 2018 International Building Code. The technical scope sections should also include the degree or basis of inspection and testing; i.e., intermittent/will-call or full-time/continuous.
 - 3. The frequency of reporting, i.e., weekly, monthly, per test/inspection, per floor, etc.
 - 4. The parties responsible for performing the inspection and testing work.
 - 5. The required acknowledgments by each designated party.

3.02 CONVENTIONAL TESTING AND INSPECTION

- A. (Not Used)

3.03 STRUCTURAL TESTING AND SPECIAL INSPECTION STATEMENT OF SPECIAL INSPECTIONS

- A. Refer to attached Program Summary Schedule for this project. It includes a schedule of Special Inspection services applicable to this project and the identity of agencies to be retained for conducting these inspections and tests.
- B. The Special Inspector shall keep records of all inspections and shall furnish inspection reports to the Building Official, the Architect and Structural Engineer of Record. Discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official, the Architect and SER. The Special Inspection program does not relieve the Contractor of his or her responsibilities.
- C. Interim reports shall be submitted to the Building Official, Architect, and SER.
- D. A Final Report of Special Inspections documenting completion of all required Special Inspections, testing and correction of any discrepancies noted in the inspections shall be submitted prior to issuance of a Certificate of Use and Occupancy.

3.04 TECHNICAL SECTIONS

- A. **Section 31 2200 - Earthwork - Grading, Excavation Filling**
 - 1. (Not Used)
 - 2. Definitions
 - a. Refer to PART 1 for standard definitions.
 - b. Special Inspector – Technical
 - 1) Technical I: Technician shall be under the direct supervision of a Technical III. Work shall be performed in a qualified geotechnical/testing laboratory.
 - 2) Technical II: Technical with a minimum of 2 years experience, or a graduate engineer, and is an employee of a qualified and approved geotechnical/testing laboratory, under the direct supervision of a Technical III.

- 3) Technical III: A civil/geotechnical engineer regularly engaged in this type of work with a minimum of 4 years experience, licensed in the State in which the project is located, and is an employee of a qualified and approved geotechnical/testing laboratory. This licensed engineer shall review and approve all final field reports.
 3. Structural Testing and Special Inspection Requirements (Item and Frequency and Qualifications)
 - a. Classification of materials used and encountered during construction per ASTM:D2488 and ASTM:D2487. Technical I
 - b. Performance of laboratory testing of materials, as needed (Proctor, Sieve Analysis, Atterberg Limits, Consolidation Test, etc.). Technical I
 - c. Field Density Tests: Technical I
 - d. Provide periodic results of field compaction and laboratory work for general compliance with Contract Documents and Geotechnical Reports. Technical I
 - e. Observe all subgrades/excavation bases below footings and slabs and verify design bearing capacity is achieved. Technical II
 - f. Document presence of groundwater within excavations. Technical I
 - g. Provide reports of subgrade observations for general compliance with Contract Documents and Geotechnical Report. Technical II
 - h. Verify cut and fill slopes as specified in the contract documents. Technical III
 4. Conventional Testing and Inspections Requirements
 - a. Contractor shall verify that footings comply with frost depth requirements and shall report any variances to the SER in a timely manner.
- B. Section 31 6200 - Driven Piles**
1. General
 - a. Cast-in-place concrete for concrete filled steel pipe piles required by this section shall have structural testing and special inspection as required by Section 03 3000 Cast-in-Place Concrete.
 2. Definitions
 - a. Refer to PART 1 for standard definitions.
 - b. Special Inspector – Technical
 - 1) Technical I: Technician shall be under the direct supervision of a Technical III. Work shall be performed in a qualified geotechnical/testing laboratory.
 - 2) Technical II: Technician with a minimum of 2 years experience, or a graduate engineer, and is an employee of a qualified and approved geotechnical/testing laboratory, under the direct supervision of a Technical III.
 - 3) Technical III: A civil/geotechnical engineer regularly engaged in this type of work with a minimum of 4 years experience, licensed in the State in which the project is located, and is an employee of a qualified and approved geotechnical/testing laboratory. This licensed engineer shall review and approve all final field reports.
 - c. Special Inspector – Structural
 - 1) Structural I: Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in the design of structural systems of this type. Inspections shall be performed under the direct supervision of a Structural II.
 - 2) Structural II: Civil/structural engineer regularly engaged in the design of structural systems of this type, licensed in the state in the state in which the project is located. The licensed engineer shall review and approved all inspection reports.
 - 3) Special Inspector - Structural may be an employee of the SER.
 3. Structural Testing and Special Inspection Requirements (Item and Frequency and Qualifications)
 - a. Observe all pile driving operations and maintain piling records for all piles driven. Technical I
 - 1) Pile location (grid) and variance from plan.
 - 2) Type and size of hammer used.
 - 3) Continuous record of number of blows/foot for each foot of penetration.
 - 4) Pile dimensions (diameters and wall thickness).

- 5) Tip elevation/depth.
 - 6) Elevation of butt before and after cut-off.
 - 7) Pile plumbness, if applicable.
 - 8) Documentation of pile damage.
 - b. Review field data, judge pile capacity for general compliance with Contract Documents and Geotechnical Report; and submit report. Technical III
- 4. Conventional Testing and Inspections Requirements
 - a. (Not Used)
- C. **Section 03 3000 - Cast-in-Place Concrete**
 - 1. General
 - a. Structural testing is required for all concrete. Thus, Special inspections as outlined below are not required for the following items:
 - 1) Isolated spread footings of buildings three stories or less in height that are fully supported on earth or rock.
 - 2) Strip footings of buildings three stories or less in height that are fully supported on earth or rock, where the footings support walls of light frame construction, the footings are designed in accordance with Table 1808.8, or the footing structural design is based on a f'_c no greater than 2500 psi.
 - 3) Non-structural slabs on grade, including prestressed slabs on grade when effective prestress in concrete is less than 150 pounds per square inch.
 - 4) Concrete foundation walls constructed in accordance with Table 1807.1.6.2.
 - 2. Definitions
 - a. Refer to PART 1 for standard definitions.
 - b. Special Inspector – Technical
 - 1) Technical I: ACI Certified Grade I inspector. Inspector shall be employed by a testing laboratory, under the direct supervision of a Technical III.
 - 2) Technical II: ACI Certified Grade II inspector. Inspector shall be employed by a testing laboratory, under the direct supervision of a Technical III.
 - 3) Technical III: A civil/structural engineer regularly engaged in this type of work, with a minimum of 4 years experience and licensed in the State in which the project is located and is an employee of a qualified and approved testing laboratory. The licensed engineer shall review and approve all reports.
 - 4) Testing laboratory shall have C.C.R.L. certification at the National Bureau of Standards.
 - c. Special Inspector – Structural
 - 1) Structural I: Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in the design of structural systems of this type. Inspections shall be performed under the direct supervision of a Structural II.
 - 2) Structural II: Civil/structural engineer regularly engaged in the design of structural systems of this type, licensed in the State in which the project is located. The licensed engineer shall review and approve all inspection reports.
 - 3) Special Inspector - Structural may be an employee of the SER.
 - 3. Structural Testing and Special Inspection Requirements (Item and Frequency and Qualifications)
 - a. Sample and test all cast in place concrete; Technical I.
 - 1) Prepare compression test specimens (ASTM C31), one set of four standard cylinders of concrete for each compressive strength test, mold and store cylinders for laboratory-cured specimens. Specimens shall be 4x8 cylinders except where an alternate size has been approved by the structural engineer.
 - 2) Perform compressive strength tests (ASTM C39). One set of four cylinders for each day's pour between one and 25 cubic yards. If a day's pour exceeds 25 cubic yards, one set of four cylinders for each additional 50 cubic yards, or fraction thereof. One specimen at seven days, two at 28 days, and one specimen retained in reserve for later testing if required. For post tensioned concrete, make and test an additional cylinder at three days to verify strength prior to stressing. (When frequency of testing will provide less than five strength tests for a given class of concrete, conduct at least five strength tests from randomly selected batches. If fewer than five batches are used, conduct one test from each batch.)

- 3) Slump (ASTM C143): One test at point of discharge for each set of compression test specimens; additional tests when concrete consistency appears to have changed.
- 4) Air entrainment (ASTM C231): Test the first batch of air entrained concrete and one additional test for each set of compression test specimens.
- 5) Concrete Temperature: Test concrete temperature hourly when air temperature is 40F and below and when 80F and above, and each time a set of compression test specimens is made.
- b. On a periodic basis, perform concrete mix verification; Technical I.
 - 1) Verify mixer truck trip ticket conforms to approved mix design.
 - 2) Verify that total water added to mix on site does not exceed that allowed by concrete mix design.
 - 3) Verify that concrete quality is indicative of adequate mixing time, consistency, and relevant time limits. Technical I
- c. On a continuous basis, inspect preparation and placement of all concrete.
 - 1) Verify the following; Structural I:
 - (a) Verify acceptable general condition of concrete base prior to placement.
 - (b) Verify concrete has been sampled for required concrete tests.
 - (c) Verify that concrete conveyance and depositing avoids segregation and contamination.
 - (d) Verify that concrete is properly consolidated.
 - (e) Verify reinforcement remains at proper location.
 - (f) Unless noted, inspections shall be on a continuous basis. Inspections may be performed on a periodic basis for the following types of work:
- d. On a periodic basis, observe protection and curing methods for all concrete requiring inspections as outlined above; Structural I:
 - 1) Verify specified curing procedures are followed.
 - 2) Verify specified hot and cold weather procedures are followed.
- e. On a continuous basis, inspect all bolts installed in concrete prior to and during concrete placement; Structural I:
 - 1) Verify specified size, type, spacing, configuration, embedment, and quantity.
 - 2) Verify proper concrete placement and means have been taken to achieve consolidation around all bolts.
4. Conventional Testing and Inspection Requirements
 - a. (Not Used)

D. Section 04 2000 - Masonry

1. General
 - a. Special inspection of masonry is required during preparation of masonry wall prisms or test specimens, sampling and placing of masonry units, placement of structural reinforcement, cleanout of grout space immediately prior to closing of elements, and during all grouting operations.
 - b. Inspections noted below as being periodic shall be performed at least once per 500 square feet, except 100% of shear walls, masonry beams, and masonry columns shall be inspected.
2. Definitions
 - a. Refer to PART 1 for standard definitions.
 - b. Special Inspector – Technical
 - 1) Technical I: Technician shall be under the direct supervision of a Technical III regularly engaged in testing and inspection of this type of work. The licensed engineer shall review and approve all inspection reports.
 - 2) Technical II: Graduate civil/structural engineer, with experience in this type of work. Supervised by a Technical III. The licensed engineer shall review and approve all inspection reports.
 - 3) Technical III: A civil/structural engineer regularly engaged in this type of work with a minimum of 4 years experience, licensed in the State in which the project is located, and is an employee of a qualified and approved testing laboratory. The licensed engineer shall review and approve all reports.
 - c. Special Inspector – Structural

- 1) Structural I: Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in the design of structural systems of this type. Inspections shall be performed under the direct supervision of a Structural II.
 - 2) Structural II: Civil/structural engineer regularly engaged in the design of structural systems of this type, licensed in the state in which the project is located. The licensed engineer shall review and approve all inspection reports.
 - 3) Special Inspector - Structural may be an employee of the SER.
3. Structural Testing and Special Inspection Requirements – **Level B** (Item and Frequency and Qualifications)
- a. Samples and Tests for Special Inspections
 - 1) Masonry Unit Test – shall be performed in accordance with 2018 IBC Section 2105 and 2018 IBC Section 1705.4, as follows:
 - (a) Units conform to ASTM C 55 or ASTM C 90.
 - (b) Test units according to ASTM C 140 prior to the start of construction.
 - (c) During construction one set of tests for each 5,000 SF of wall area, but not less than one set for the project. Technical I
 - 2) Prism Tests - number and frequency in accordance with 2018 IBC Section 2105, as follows:
 - (a) A set of 3 masonry prisms for each masonry type requiring testing, shall be built and tested in accordance with ASTM C1314 prior to the start of construction.
 - (b) During construction a set of 3 masonry prisms shall be built and tested in accordance with ASTM C1314 for each 5,000 SF of wall area in question, but not less than one set of 3 masonry prisms for the project.
 - (c) The compressive strength of masonry determined in accordance with ASTM C1314 for each set of prisms shall equal or exceed specified f'm. Technical I
 - 3) Preparation, storage, handling of prism tests. (Contractor shall provide labor and materials to construct all prism tests.) Technical I
 - b. Masonry Preparation and Placement
 - 1) Base Conditions: On a periodic basis, verify that masonry bearing surfaces are clean.
 - 2) Condition of Units: On a periodic basis, verify that masonry units are clean and sound and dry.
 - 3) Placement: On a periodic basis, inspect laying of masonry units for the following: nominal unit widths, stack or running bond, proper thickness and tooling of mortar joints, acceptable depth of furrowing of bed joints. Note temperature at time of inspection.
 - 4) Joints: On a periodic basis, inspect construction, expansion and contraction joints for location and continuity of steel.
 - 5) On a periodic basis, verify hot and cold weather procedures are followed.
 - 6) On a periodic basis, verify wall cavities are protected against entry of precipitation. Structural I
 - c. Masonry Reinforcement:
 - 1) Vertical Reinforcement: On a periodic basis, inspect placement and alignment of vertical bars and dowels for size, grade and spacing. Inspect length of lap splices, clearances between bars, clearances to masonry units and outside face of walls, and positioning of steel.
 - 2) Horizontal Reinforcement: On a periodic basis, inspect horizontal joint reinforcement steel and masonry reinforcement bars for size, length of lap splices, dowels, clearances between bars, clearance to masonry units and outside face of walls, and alignment.
 - 3) Ties: On a periodic basis, inspect ties in masonry for type, straightness, embedment, spacing and size.
 - 4) Dowels and Anchors: On a periodic basis, inspect the installation of masonry anchor bolts, joist anchors, inserts, straps, and dowels. Structural I
 - 5) Welding Reinforcement: Welded splices should be done only upon approval; continuous inspection during welding.
 - d. Prior to Masonry Grouting and Capping

- 1) Grout Spaces: On a periodic basis, verify that grout spaces are correctly sized and clean, cleanouts are closed after inspection and grout barriers are in place before grouting.
- 2) Reinforcement: On a periodic basis, verify placement of reinforcement and connectors remains consistent with construction documents.
- 3) Site Prepared Grout: On a periodic basis, verify proportions of site prepared grout are consistent with previously submitted materials. Structural I
- e. During Grouting Operations
 - 1) Grouting: On a periodic basis, verify proper grouting technique including consolidation to approved height of grout space, reconsolidation and vibration.
 - 2) Dry Packing: On a periodic basis, verify proper application of dry packing. Structural I
- f. General Compliance
 - 1) On a periodic basis, verify that work is being performed in accordance with the contract documents and the approved submittals and that materials used are consistent with prior submittals. Structural I
4. Conventional Testing and Inspection Requirements
 - a. Not Used.

E. Section 05 1200 - Structural Steel

1. General
 - a. If special inspection of fabricators work is required, testing agent may test and inspect structural steel at plant before shipment. Owner and SER reserve right to reject material not complying with Contract Documents at any time before final acceptance.
2. Definitions
 - a. Refer to PART 1 for standard definitions.
 - b. A.S.N.T.: The American Society for Non-destructive Testing.
 - c. N.D.E.: Non-destructive Evaluation.
 - d. A.W.S./C.A.W.I.: American Welding Society/Certified Associate Weld Inspector.
 - e. A.W.S./C.W.I.: American Welding Society/Certified Weld Inspector.
 - f. R.C.S.C.: Research Council On Structural Connections
 - g. Special Inspector – Technical: Shall be employed by a testing agency and shall be supervised by an A.W.S./C.W.I. with a minimum of 10 years experience or an A.S.N.T. Level III with a minimum of 10 years experience. These individuals shall satisfy the following requirements:
 - 1) Technical I: Non-destructive Testing Technician S.N.T.-TC-1A Level I, and/or A.W.S. Certified Associate Weld Inspector (C.A.W.I.)
 - 2) Technical II: Non-destructive Testing Technician A.S.N.T. TC-1A Level II, (NDE Technician II), A.W.S./C.A.W.I., with minimum 3 years experience, or an A.W.S./C.W.I.
 - 3) Technical III: A.S.N.T. Level III with a minimum of 10 years experience or an A.W.S./C.W.I. with a minimum of 10 years experience.
 - h. Special Inspector – Structural
 - 1) Structural I: Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in design of structural systems of this type. Inspections shall be performed under the direct supervision of a Structural II.
 - 2) Structural II: Civil/structural engineer regularly engaged in the design of structural systems of this type, licensed in the state in which the project is located. The licensed engineer shall review and approve all inspection reports.
 - 3) Special Inspectors - Structural may be an employee of the SER.
3. Structural Testing and Special Inspection Requirements (Item and Frequency and Qualifications)
 - a. High Strength Bolting (Field Installed):
 - 1) General
 - (a) On a periodic basis, visually inspect mating surfaces and bolt type for all slip-critical bolted connections for general conformance with the contract documents prior to bolting.
 - (b) Determine the requirements for bolts, nuts, washers, paint and installation/tightening standards are met.

- (c) Observe calibration procedures when such procedures are required in the contract documents and verify that selected procedure is used to tighten bolts. Technical II
 - 2) Slip Critical Bolts and Tension Bolts
 - (a) Test bolt tightening in 10% of all bolts. Test a minimum of two bolts in each connection. Verify that all plies of connected elements have been brought into contact, at 100% of connections. Verify all tips are removed from "twist"-off bolts. Technical II
 - 3) Bearing Bolts
 - (a) On a periodic basis, visually inspect to confirm all plies of connected elements have been brought into contact, at 100% of connections. (Applies only to bolts designed for values not requiring exclusion of threads from failure plane, all other bolts require testing as for tension bolts.) Technical II
 - 4) Standard
 - (a) Test High Strength bolted connections per R.C.S.C. "Specifications for Structural Joints Using ASTM A325 or A490 Bolts."
- b. High Strength Bolting (Shop Installed):
 - 1) For shop fabricated work, perform tests required for field installation, except that bolt testing may be reduced or deleted, if fabrication shop satisfies AISC Quality Certification Program - Current Certification, or more stringent criteria, or is approved by building official and SER.
 - 2) In addition to 2018 IBC Chapter 17 refer to the following tables in Chapter N of the AISC Steel Construction Manual:
 - (a) Table N5.6-1 Inspection Tasks Prior to Bolting.
 - (b) Table N5.6-2 Inspection Tasks During Bolting.
 - (c) Table N5.6-3 Inspection Tasks After Bolting.
- c. Welding (General): The Special Inspector shall perform the following on a periodic basis:
 - 1) Prior to start of fabrication determine if fabrication shop meets the criteria for exempting shop welds from inspection and confirm in writing to building official and SER.
 - 2) Verify qualifications of all welders as AWS certified.
 - 3) Verify Manufacturer's certificate of compliance for weld filler materials.
 - 4) Verify proposed welding procedures and materials.
 - 5) Verify adequate preparation of faying surfaces.
 - 6) Verify preheat and interpass temperatures of steel, proper technique and sequence of welding, and cleaning and number of passes are provided as required. Technical II
- d. Welding (Field):
 - 1) Fillet Welds: On a periodic basis, visually inspect 100% of all fillet welds, for size, length, and quality, per AWS D1.1. Technical II
 - 2) Partial Penetration Welds: Test 100% of all partial penetration welds exceeding 5/16 inch, using Ultrasonic Testing per A.W.S. D1.1. Test 25% of all partial penetration welds less than 5/16 inch, using Magnetic Particle Testing per ASTM E-109, performed on root pass and on finished weld. Technical II
 - 3) Full Penetration Welds: Test 100% of all full penetration welds exceeding 5/16 inch, using Ultrasonic Testing per A.W.S. D1.1 Test 25% of all full penetration welds less than 5/16 inch, using Magnetic Particle Testing per ASTM E-109, performed on root pass and on finished weld. Technical II
 - 4) Stud Shear Connector Welds: Visually inspect 100% of installed studs for full 360° flash. Test all questionable studs, not showing full 360° flash by bending studs to 15° from vertical, away from weld discontinuity, per AWS D1.1. All ceramic welding ferrules shall be removed by contractor. Randomly test all other studs by bending to 15° from vertical as noted:
 - (a) Studs welded thru deck 15%.
 - (b) Studs welded to bare steel 5%.
 - (c) Alternatively, sound 100% of installed studs, for full penetration weld, using an 8 lb. maul. Test questionable studs as noted above. Welding ferrules need not be removed. Technical I

- 5) Steel Joist/Joist Girder Welds: Provide testing and inspection for field welds previously described.
- 6) Deck Welds: On a periodic basis, visually inspect size, location, length and burn thru for 100% of puddle welds on metal deck designed as a structural element, per AWS D1.3. Technical I
- 7) Cold Formed Metal Framing Welds: On a periodic basis, visually inspect 100% of welds for specified length, size, and continuity in accordance with AWS D1.3 for metal less than 1/8" in thickness, for work designed as a structural element. Technical I
- 8) Welding of Reinforcing Bars: Visually inspect 100% of all reinforcing bar welds as the welding is performed, per AWS D1.4.
 - (a) Verify weldability of reinforcing steel other than ASTM A706.
 - (b) Verify proper joint preparation is provided and proper electrodes are used and properly stored and dried. Technical II
- 9) Miscellaneous Metals, Inserts and Prefabricated Components: Where integrity of the connections impact life safety or performance of the building structure, provide testing and inspection as for typical welds previously specified.
- e. Welding (Shop):
 - 1) Perform inspections as for field welding except weld testing may be reduced or deleted, if fabrication shop satisfies AISC Quality Certification Program - Current Certification, or more stringent criteria, and is approved by building official and SER.
 - 2) In addition to 2018 IBC Chapter 17 refer to the following tables in Chapter N of the AISC Steel Construction Manual:
 - (a) Table N5.4-1 Inspection Tasks Prior to Welding.
 - (b) Table N5.4-2 Inspection Tasks During Welding.
 - (c) Table N5.4-3 Inspection Tasks After Welding.
- f. Mechanical Fasteners (Misc.):
 - 1) Fasteners: Visually inspect specified size, spacing, embedment, and location. Technical I
- g. Structural Configuration:
 - 1) Submittals: Verify mill test reports and other submitted documentation, for compliance with contract document. Structural I
 - 2) Materials: Verify materials delivered to site comply with contract documents and approved shop drawings. Materials include:
 - (a) Structural Steel
 - (b) Bolts
 - (c) Electrodes
 - (d) Mechanical fasteners
 - (e) Deck gauge Technical I
 - 3) Detail Compatibility. On a periodic basis:
 - (a) Review project documents affecting integrity of the structure, including contract documents and pertinent submittals (approved shop drawings).
 - (b) Visit site, at intervals appropriate to the stage of construction, to perform review of the structure and visually confirm general compliance with the project documents.
 - (c) Inspect the following to verify member orientation, configuration, type, and size complies with details indicated on the contract documents an approved shop drawings:
 - (1) Bracing and stiffening members.
 - (2) Proper applications of joint details at connections for structural members.
 - (3) Other work critical to the integrity of the building structure. Structural I
4. Conventional Testing and Inspection Requirements (Item and Frequency and Qualifications)
 - a. High Strength Bolting
 - 1) Bolt Material Test: Test a minimum of two bolts of each ASTM class specified, for bolt hardness and tensile properties. SNT-TC-1A

- 2) Fabrication and Erection Tolerances: Verify in-place structure satisfies specified tolerances.

END OF SECTION

Structural Testing and Special Inspection Program Summary Schedule

Project Name: Riverfront Suspended Walkway

Project No. 18-22567

Location: Hot Springs, South Dakota

Permit No. _____ (1)

Technical (2)		Description (3)	Type of Inspector (4)	Specific Report Frequency (5)	Assigned Firm (6)
Section	Article				
31 2200	1705.6	Soils	TA	IBC Table 1705.6	
31 6216.16	1705.7	Driven Piles	TA	IBC Table 1705.7	
03 3000	1705.3	Cast-In-Place Concrete	TA	IBC Table 1705.3	
04 2000	1705.4	Masonry	TA	Per IBC 1705.4	
04 2000	1705.4	Masonry – Level B	TA	Per IBC 1705.4	
05 1200	1705.2.1	High-Strength Bolts	SI-T	Per IBC 1705.2.1	
05 1200	1705.2.1	Welding	SI-T	Per IBC 1705.2.1	

Note: This schedule shall be filled out and included in a Special Structural Testing and Inspection Program.
(If not otherwise specified, assumed program will be "Guidelines for Special Inspection & Testing".)

- (1) Permit No. to be provided by the Building Official
- (2) Referenced to the specific technical scope section in the program.
- (3) Use descriptions per IBC Chapter 17.
- (4) Special Inspector – Technical (SIT); Special Inspector – Structural (SIS)
- (5) Weekly, monthly, per test/inspection, per floor, etc. Per section 01 3510 of spec book.
- (6) Name of Firm contracted to perform services.

ACKNOWLEDGEMENTS (Each appropriate representative shall sign below)

Owner: _____	Firm: _____	Date: _____
Contractor: _____	Firm: _____	Date: _____
Architect: _____	Firm: _____	Date: _____
SER: 	Firm: ISG	Date: 08/18/2020
SI-T: _____	Firm: _____	Date: _____
SI-S: _____	Firm: _____	Date: _____
TA: _____	Firm: _____	Date: _____
F: _____	Firm: _____	Date: _____

If requested by engineer/architect of record or building official, the individual names of all prospective special inspectors and the work they intend to observe shall be identified as an attachment.

Legend: SER = Structural Engineer of Record SI-T = Special Inspector - Technical TA = Testing Agency
 SI-S = Special Inspector - Structural F = Fabricator

Accepted for the Building Department By _____ Date _____

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**SECTION 03 3000
CAST-IN-PLACE CONCRETE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete formwork.
- B. Floors and slabs on grade.
- C. Concrete foundation walls.
- D. Concrete reinforcement.
- E. Joint devices associated with concrete work.
- F. Miscellaneous concrete elements.
- G. Concrete curing.
- H. Concrete finishing.
 - 1. Floor surfaces to be left exposed.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.
- B. Section Division 22 - Plumbing Piping Specialties: Mechanical items for casting into concrete.
- C. Section Division 26 - Grounding and Bonding for Electrical Systems: Electrical items for casting into concrete. Coordinate location with electrical contractor.
- D. Section Division 32 - Exterior Concrete Flatwork. Refer to concrete flatwork for all aspects of exterior concrete flatwork except stoops, aprons, and any other concrete element bearing on the building's foundation walls.

1.03 REFERENCE STANDARDS

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete 1991 (Reapproved 2009).
- B. ACI 301 - Specifications for Structural Concrete 2016.
- C. ACI 302.1R - Guide to Concrete Floor and Slab Construction 2015.
- D. ACI 302.2R - Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials
- E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).
- F. ACI 305R - Guide to Hot Weather Concreting 2010.
- G. ACI 306R - Guide to Cold Weather Concreting 2016.
- H. ACI 308R - Guide to External Curing of Concrete 2016.
- I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary 2014 (Errata 2018).
- J. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2020.
- K. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2012.
- L. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
- M. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2021.
- N. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2021a.
- O. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens) 2020b.
- P. ASTM C150/C150M - Standard Specification for Portland Cement 2020.
- Q. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete 2016.

- R. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method 2016.
- S. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).
- T. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2019.
- U. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing 2017.
- V. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete 2021.
- W. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures 2020.
- X. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers 2020.
- Y. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs 2018a.
- Z. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs 2017.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Mix designs: Submit mix design for each mix showing compliance with specified requirements.
- D. Test Reports: Submit report for each test or series of tests specified.
- E. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- F. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 - 1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
 - 2. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
 - 3. Form Ties: Contractor's choice of standard product type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Type: Deformed billet-steel bars.
 - 2. Finish: Unfinished, unless otherwise indicated.
- B. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

3. Do not use clay bricks or similar blocks/chunks of material as rebar chairs. Concrete dobies as rebar chairs are acceptable.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
 1. Acquire cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
 1. Acquire aggregates for entire project from same source.
 2. Provide aggregate free of shale at all slab locations exposed to freeze/thaw action.
- C. Fly Ash: ASTM C618, Class C or F.
- D. Calcined Pozzolan: ASTM C618, Class N.
- E. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.
- F. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 ADMIXTURES

- A. Chemical Admixture:
 1. Manufacturers by concrete supplier:
 - a. BASF: www.basf.com.
 - b. Grace Construction Products: www.grace.com.
 - c. Fritz-Pak: www.fritzpak.com.
 - d. Mapei GRT: www.mapei.com.
 - e. Sika Corporation U.S.: www.sika.com.
 - f. Euclid Chemical: www.euclidchemical.com.
 - g. Substitutions: See Section 01 6000 - Product Requirements.
- B. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- C. Admixtures shall comply with ASTM C494.
- D. Air Entrainment Admixture: ASTM C260/C260M.

2.05 ACCESSORY MATERIALS

- A. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.
- B. Epoxy Grout Systems: Where indicated provide Hilti Hit-Hy 200 Epoxy System; other indicated systems; or approved equivalent system.
 1. Hilti: www.hilti.com.
 2. Substitutions: See Section 01 6000 - Product Requirements.

2.06 BONDING AND JOINTING PRODUCTS

- A. Latex Bonding Agent: Non-redispersible acrylic latex, complying with ASTM C1059 Type II.
 1. Manufacturers:
 - a. SpecChem, LLC; Strong Bond Acrylic Bonder: www.specchemllc.com/#sle.
 - b. W. R. Meadows, Inc; ACRY-LOK-: www.wrmeadows.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- B. Expansion-Joint Filler: Polyethylene/polypropylene semi-rigid closed-cell backing complying with ASTM D 3575/ASTM D 8139/ASTM D 1751, 1/2 inch thick and full depth of slab less 1/2 inch with peel-off feature. Provide product by BASF Construction Chemicals-Building Systems, W.R. Meadows, Namaco, or equivalent.
 1. Place peel-off feature at top of slab when sealants are specified. Remove peel-off portion of expansion-joint filler prior to application of sealants.
 2. Place peel off feature at bottom of slab when no sealants are specified.
- C. Plate Dowel System: Steel plate dowel and plastic dowel sleeve; with integral fasteners for attachment to formwork.

2.07 CURING MATERIALS

- A. Liquid Membrane Curing Compound: ASTM C 309, Type 2, Class B, White Pigmented.
 - 1. Product: L&M CURE R2 by Laticrete or approved equivalent.
 - a. Other Approved Products:
 - 1) SpecRez White by SpecChem.
 - 2. Application Locations: Exterior Concrete surfaces unless indicated otherwise. Finish surfaces to a light broom finish prior to applying curing compound.
- B. Moisture-Retaining Sheet: ASTM C171.
 - 1. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.

2.08 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
 - 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- D. Materials In General: Do not use materials or combinations thereof that will result in a reaction that is detrimental to the structural integrity or visual appearance of concrete.
- E. Normal Weight Concrete: Refer to structural notes on the drawings.

2.09 MIXING

- A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
- B. Transit Mixers: Comply with ASTM C94/C94M.
- C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
 - 1. Use latex bonding agent only for non-load-bearing applications.
- E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

- A. Locate joints as indicated on drawings.
 - 1. If no pattern is shown, contractor shall provide for 15 by 15 feet saw cut areas and shall contact Engineer for exact locations of joints.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
 - 1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.
- D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 24 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.
 - 1. Do not exceed 2 inches deep when/if slab thicknesses are greater than 8 inches.
- E. Construction Joints: Where not otherwise indicated, use materials compatible with plate dowel system steel plate dowel and plastic dowel sleeves with integral fasteners for attachment to formwork.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Refer to structural notes on the drawings.

3.07 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
 - 1. Where indicated install mechanical plugs for tie holes in accordance with manufacturers instructions.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide other finishes as follows:
 - 1. Grout-Cleaned Finish (Class A per ACI 347): Wet concrete surfaces and apply grout of a consistency of thick paint to coat surface and fill small holes. Mix one part portland cement to one and one-half parts fine sand with 1:1 moisture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 - a. Locations: Provide this finish only where indicated on the drawings.
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 - 1. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.
 - a. Installation of sealant is recommended prior to installation of floor sealers to prevent the need for cleaning of saw cut joints for proper sealant adhesion.
 - b. Chemical Curer/Sealer/Dustproofer/Hardener(When Applicable): Apply product per manufacturer's instructions after curing and protection procedures are complete.
 - 1) Acceptable Product:
 - (a) Laticrete: www.laticrete.com.
 - (b) Product: L&M Dress & Seal; Acrylic Cure, Sealer, and Dustproofer.
 - (1) Location: Storage/mechanical/exposed areas not to receive other finishes.
 - (c) Product: L&M Seal Hard; Concrete Sealer, Densifier, Chemical Hardener.
 - (1) Location: Garage/shop/warehouse type areas.
 - 2) Other Acceptable Manufacturers:
 - (a) Dayton Superior Corporation: www.daytonsuperior.com.
 - (b) BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - (c) Ashford Formula by Curecrete Distribution, Inc: www.ashfordformula.com.
 - (d) L.M. Scofield Company: www.scofield.com.
 - (e) The Euclid Chemical Company: www.euclidchemical.com.
 - 3) Substitutions: See Section 01 6000 - Product Requirements.

- E. At exterior slabs, aprons, and other horizontal locations provide a light broom finish and liquid membrane curing compound finish unless indicated otherwise.

3.08 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Surfaces Not in Contact with Forms:
 - 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than 7 days by saturated burlap unless noted otherwise.
 - a. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
 - 2. Final Curing: Begin after initial curing but before surface is dry.

3.09 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to Architect for review prior to commencement of concrete operations.
- D. For testing requirements refer to structural notes on the drawings and, where applicable, as indicated below.
- E. Refer to Section 01 3510 - Structural Testing and Special Inspection Requirements for testing requirements.

3.10 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
 - 1. Concrete damaged by the construction activities required to complete the Work of this section shall also be considered defective concrete.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.11 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

**SECTION 04 0511
MORTAR AND MASONRY GROUT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mortar for masonry.
- B. Grout for masonry.

1.02 RELATED REQUIREMENTS

- A. Section 04 2000 - Unit Masonry: Installation of mortar and grout.

1.03 REFERENCE STANDARDS

- A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.
- B. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2021a.
- C. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019.
- D. ASTM C476 - Standard Specification for Grout for Masonry 2020.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.
- C. Samples: Submit two samples of mortar, illustrating mortar color and color range.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of the contract documents.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.07 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 MORTAR AND GROUT APPLICATIONS

- A. Use only factory premixed packaged dry materials for mortar and grout, with addition of water only at project site.
- B. Mortar Mix Designs: ASTM C270, Property Specification.
- C. Grout Mix Designs:
 - 1. Bond Beams and Lintels: 2000 psi strength at 28 days; 8-11 inches slump; mix in accordance with ASTM C476.

2.02 MATERIALS

- A. Preblended and prepackaged Dry Mortar and Grout: ASTM C 270, Type Indicated.
 - 1. Masonry below grade and in contact with earth: Type M.
 - 2. Masonry above grade: Type S.
 - 3. Product: Provide packaged dry pre-blended mortar and grout products by Spec Mix or approved equivalent.
 - 4. Color: Natural gray except as follows:
 - a. Match existing color where existing masonry is present.
 - b. Exposed locations in finished areas, interior and exterior, as selected by the Architect from the manufactures full range of color where not otherwise indicated.
- B. Water: Clean and potable.
- C. Bonding Agent: Latex type.

2.03 MORTAR MIXING

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
- B. Do not use anti-freeze compounds to lower the freezing point of mortar.
- C. If water is lost by evaporation, re-temper only within two hours of mixing.
- D. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-one-half hours at temperatures under 40 degrees F.

2.04 GROUT MIXING

- A. Mix grout in accordance with ASTM C94/C94M.
- B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

PART 3 EXECUTION

3.01 PREPARATION

- A. Apply bonding agent to existing cementitious surfaces.
- B. Plug clean-out holes for grouted masonry with block masonry units. Brace masonry to resist wet grout pressure.

3.02 INSTALLATION

- A. Install mortar and grout to requirements of section(s) in which masonry is specified.
- B. Work grout into masonry cores and cavities to eliminate voids.
- C. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.
- D. Do not displace reinforcement while placing grout.
- E. Remove excess mortar from grout spaces.

3.03 GROUTING

- A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of contract documents.
- B. Low-Lift Grouting:
 - 1. Limit height of pours to 4 feet 8 inches.
 - 2. Limit height of masonry to 16 inches above each pour.
 - 3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
 - 4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.
- C. High-Lift Grouting:
 - 1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
 - 2. Hollow Masonry: Limit lifts to maximum 4 feet 8 inches and pours to maximum height of 8 feet.
 - 3. Place grout for spanning elements in single, continuous pour.

END OF SECTION

**SECTION 04 2000
UNIT MASONRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete block.
- B. Mortar and grout.
- C. Reinforcement and anchorage.
- D. Flashings.
- E. Accessories.
 - 1. Multicomponent Cavity Wall Drainage System.

1.02 RELATED REQUIREMENTS

- A. Section 04 0511 - Mortar and Masonry Grout.
- B. Section 07 1900 - Water Repellents: Water repellents applied to exterior masonry surfaces.
- C. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2020.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- D. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units 2016a.
- E. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units 2017.
- F. ASTM C150/C150M - Standard Specification for Portland Cement 2020.
- G. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes 2018.
- H. ASTM C404 - Standard Specification for Aggregates for Masonry Grout 2018.
- I. ASTM C476 - Standard Specification for Grout for Masonry 2020.
- J. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing 2017.
- K. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls 2005.
- L. BIA Technical Notes No. 46 - Maintenance of Brick Masonry 2017.
- M. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.
- N. IMIAWC (CW) - Recommended Practices & Guide Specifications for Cold Weather Masonry Construction; International Masonry Industry All-Weather Council; 1993.
- O. IMIAWC (HW) - Recommended Practices & Guide Specifications for Hot Weather Masonry Construction; International Masonry Industry All-Weather Council; current edition.
- P. UL (FRD) - Fire Resistance Directory Current Edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, flashing and related components, fabricated wire reinforcement, flashing and related components, mortar, flashing and related components, masonry accessories, flashing and related components, and flashing and related components.
- C. Samples: Submit one sample of each accessory related to masonry and grout.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of the contract documents.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
 - 2. Load-Bearing Units: ASTM C90, normal weight.
 - a. Hollow block.
 - 3. Non-Loadbearing Units: ASTM C129.
 - a. Hollow block.
 - 4. Standard Face Units: Manufacturer's standard color and texture unless noted otherwise; suitable for specified finish where applicable.

2.02 MORTAR AND GROUT MATERIALS

- A. Mortar and Grout: As specified in Section 04 0511.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers:
 - 1. Blok-Lok Limited: www.blok-lok.com/#sle.
 - 2. Hohmann & Barnard, Inc: www.h-b.com/#sle.
 - 3. Heckmann Building Products, Inc: www.heckmannbuildingprods.com.
 - 4. WIRE-BOND: www.wirebond.com/#sle.
- B. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi), deformed billet bars; uncoated.
- C. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
 - 1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners.
 - 2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
 - 3. Vertical adjustment: Not less than 3-1/2 inches.

2.04 FLASHINGS

- A. Pre-Coated Galvanized Steel Flashing: ASTM A653/A653M, with G90/Z275 coating, 24 gage, 0.0239 inch base metal thickness, shop precoated with fluoropolymer coating in color matching masonry.
 - 1. Termination Bar: Stainless steel termination Bars, 1 inch wide, .075 inch thick, 8 feet long with holes at 8 inch on center.
- B. Flashing Sealant/Adhesive: Polyurethane type as specified in Section 07 9200.

2.05 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
 - 1. Manufacturers:
 - a. Blok-Lok Limited: www.blok-lok.com/#sle.
 - b. Hohmann & Barnard, Inc: www.h-b.com/sle.
 - c. WIRE-BOND: www.wirebond.com/#sle.
- B. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

- A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.04 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave.

3.05 PLACING AND BONDING

- A. Lay hollow masonry units with face shell bedding on head and bed joints.
- B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- C. Remove excess mortar and mortar smears as work progresses.
- D. Interlock intersections and external corners.
- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- G. Isolate masonry partitions from vertical structural framing members with a control joint.

3.06 REINFORCEMENT AND ANCHORAGE - GENERAL

- A. Place masonry joint reinforcement as indicated on the drawings.

3.07 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 - 1. Extend flashings full width at such interruptions and at least 6 inches, minimum, into adjacent masonry or turn up flashing ends at least 8 inches, minimum, to form watertight pan at non-masonry construction.
 - 2. Remove or cover protrusions or sharp edges that could puncture flashings.
 - 3. Seal lapped ends and penetrations of flashing before covering with mortar.
- B. Extend metal flashings through exterior face of masonry and turn down 1/4 inch to form drip. Install joint sealer below drip edge to prevent moisture migration under flashing.
- C. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.08 LINTELS

- A. Install loose steel lintels over openings.
- B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
 - 1. Openings to 42 inches: Place two, No. 4 reinforcing bars 1 inch from bottom web.
 - 2. Openings from 42 inches to 78 inches: Place two, No. 5 reinforcing bars 1 inch from bottom web.
 - 3. Openings over 48 inches: Reinforce openings as detailed.
 - 4. Do not splice reinforcing bars.
 - 5. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
 - 6. Place and consolidate grout fill without displacing reinforcing.
 - 7. Allow masonry lintels to attain specified strength before removing temporary supports.

- C. Maintain minimum 8 inch bearing on each side of opening.

3.09 GROUTED COMPONENTS

- A. Lap splices minimum 48 bar diameters.
- B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- C. Place and consolidate grout fill without displacing reinforcing.
- D. At bearing locations, fill masonry cores with grout for a minimum 8 inches either side of opening.

3.10 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Size control joint in accordance with Section 07 9200 for sealant performance.

3.11 BUILT-IN WORK

- A. As work progresses, install built-in items shown on the drawings and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
 - 1. Fill adjacent masonry cores with grout minimum 8 inches from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.12 TOLERANCES

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.
- F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.13 CUTTING AND FITTING

- A. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.14 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
 - 1. Soiled surfaces shall include all surfaces left exposed to view.
- D. Use non-metallic tools in cleaning operations.

3.15 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

**SECTION 04 7200
CAST STONE MASONRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural cast stone.
- B. Units required are:
 - 1. Exterior wall units, including wall caps.

1.02 RELATED REQUIREMENTS

- A. Section 04 2000 - Unit Masonry: Installation of cast stone in conjunction with masonry.
- B. Section 07 1900 - Water Repellents: Water repellents applied to exterior masonry surfaces.
- C. Section 07 9200 - Joint Sealants: Sealing joints indicated to be left open for sealant.

1.03 REFERENCE STANDARDS

- A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary 2014 (Errata 2018).
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2020.
- D. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement 2019.
- E. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement 2019, with Editorial Revision (2020).
- F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2018a.
- G. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
- H. ASTM C150/C150M - Standard Specification for Portland Cement 2020.
- I. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019.
- J. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019.
- K. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete 2016.
- L. ASTM C1364 - Standard Specification for Architectural Cast Stone 2019.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.
- C. Product Data: Test results of cast stone components made previously by the manufacturer.
 - 1. Include one copy of ASTM C1364 for Architect's use.
- D. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
- E. Mortar Color Selection Samples.

1.05 QUALITY ASSURANCE

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.
- B. Number each piece individually to match shop drawings and schedule.
- C. Store cast stone components and installation materials in accordance with manufacturer's instructions.

- D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
- E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.
- F. Store mortar materials where contamination can be avoided.
- G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Architectural Cast Stone:
 - 1. Any current producer member of the Cast Stone Institute.

2.02 ARCHITECTURAL CAST STONE

- A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural limestone, complying with ASTM C1364.
 - 1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
 - 2. Freeze-Thaw Resistance: Demonstrated by field experience.
 - 3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.
 - 4. Color: Selected by Architect from manufacturer's full range.
 - 5. Remove cement film from exposed surfaces before packaging for shipment.
- B. Shapes: Provide shapes indicated on drawings.
 - 1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
 - 2. Unless otherwise indicated on drawings, provide:
 - a. Wash or slope of 1:12 on exterior horizontal surfaces.
 - b. Drips on projecting components, wherever possible.
 - c. Raised fillets at back of sills and at ends to be built in.
- C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.
 - 1. Pieces More than 12 inches in Any Dimension: Provide full length two-way reinforcement of cross-sectional area not less than 0.25 percent of unit cross-sectional area.

2.03 MATERIALS

- A. Portland Cement: ASTM C150/C150M.
 - 1. For Units: Type I or II, white or gray to match color selected by Architect.
 - 2. For Mortar: Type I or II, except Type III may be used in cold weather.
- B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.
- C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.
- D. Pigments: ASTM C979, inorganic iron oxides; do not use carbon black.
- E. Admixtures: ASTM C494/C494M.
- F. Water: Potable.
- G. Reinforcing Bars: ASTM A615/A615M deformed bars, galvanized.
 - 1. Galvanized in accordance with ASTM A767/A767M, Class I.
- H. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.
- I. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
- J. Shelf Angles and Similar Structural Items: Hot-dip galvanized steel per ASTM A123/A123M, of shapes and sizes as required for conditions.
- K. Mortar: Portland cement-lime, ASTM C 270 Type N ; do not use masonry cement.

- L. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.
- B. Do not begin installation until unacceptable conditions have been corrected.

3.02 INSTALLATION

- A. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 2000.
- B. Mechanically anchor cast stone units indicated; set remainder in mortar.
- C. Setting:
 - 1. Drench cast stone components with clear, running water immediately before installation.
 - 2. Set units in a full bed of mortar unless otherwise indicated.
 - 3. Fill vertical joints with mortar.
 - 4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

3.03 CLEANING

- A. Clean completed exposed cast stone after mortar is thoroughly set and cured.
 - 1. Wet surfaces with water before applying cleaner.
 - 2. Apply cleaner to cast stone in accordance with manufacturer's instructions.
 - 3. Remove cleaner promptly by rinsing thoroughly with clear water.
 - 4. Do not use acidic cleaners.

3.04 PROTECTION

- A. Protect completed work from damage.
- B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION

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**SECTION 04 7210
MANUFACTURED STONE MASONRY CLADDING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured stone masonry and trim.
- B. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealers: Materials and execution methods for sealing soft joints in masonry work.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- B. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- C. ASTM C270 - Standard Specification for Mortar for Unit Masonry.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product data on all masonry products and accessories used in the installation of the stone cladding.
- C. Shop Drawings: Include elevations, dimensions, cross sections, reinforcement, exposed face sizes, arrangement of joints, anchoring methods, anchors, and fastener types.
- D. Samples: Submit a minimum of two samples 4x4 inch in size, illustrating color range and texture of surface finish for masonry and cap.
- E. When applicable provide mortar color selection samples.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry components secured to shipping pallets and protected from damage and discoloration.
- B. Store masonry components and installation materials in accordance with manufacturer's instructions.
- C. Store masonry components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
- D. Protect masonry components during handling and installation to prevent chipping, cracking, or other damage.
- E. Store mortar materials where contamination can be avoided.
- F. Schedule and coordinate production and delivery of masonry components to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Manufactured Stone Masonry, Manufactured by Boral Stone Products.
 - 1. Products: As scheduled on the drawings.
- B. Approved Manufactured Stone Masonry cladding Manufacturers:
 - 1. Boral Stone Products LLC, One Owens Corning Parkway, Toledo, OH 43659, Tel: (800) 255-1727, Fax: (419) 325-3995, www.culturedstone.com.
 - 2. Dutch Quality Stone, 18012 Dover Road, Mt. Eaton, OH 44659, Tel: (877)-359-7866, Fax: (330) 359-5990, www.dutchqualitystone.com.
 - 3. Eldorado Stone, 1370 Grand Ave. Bldg B, San Marcos, CA 92078, Tel: (800) 925-1491, www.eldoradostone.com.
 - 4. GenStone, 8392 Continental Divide Road, Suite 104, Littleton, CO 80127, Tel: (800) 425-0788, Fax: (303) 854-0238, www.genstoneproducts.com.

5. ArnoldStone, 4418 Sunbelt Dr., Addison, TX 75001, Tel: (972) 248-1953, www.arnoldstone.com.
6. Cap Stone: Stone texture, color as selected, sloped top and drip edge; same manufacturer as cultured stone.
7. Substitutions: See Section 01 6000 - Product Requirements.

2.02 RELATED MATERIALS

- A. Wall Sheathing: Dens Glass Sheathing (Installed on proper structural studs spaced at 24 inch on center maximum) by USG or equivalent; Coordinate supply and installation of sheathing with the General Contractor.
- B. Weather Barrier:
 1. Tyvek Stucco Wrap System with all manufacturers recommends accessories including flashings, tapes, and drainage accessories or equivalent.
- C. Thin Cladding/Veneer Rain Screen System: Perforated 0.024inch thick high impact polystyrene strip formed with 3/16 inch deep corrugations and 16 inch with an 18 inch spunbonded polypropylene fabric (Flux, water flow rate, 200 gal/SF/min; ASTM D 4491-99a) on one side with a 2 inch skirt on one edge. MTI Sure Cavity as manufactured by Masonry Technology Incorporated. www.mtidry.com or approved equivalent. Include system weeps, weep screeds, weep screed deflectors, moisture diverter, and other system accessories to create a complete system. Coordinate accessories with related work.
- D. Metal Lath: 2.5 lb galvanized expanded metal lath.
- E. Fasteners: As recommended by stone masonry manufacturer.
- F. Mortar and Grout: Provide packaged dry pre-blended mortar and grout products by Spec Mix or equivalent; Type N or Type S. In lieu of pre-blended products use mortar mixed using components and proportions following manufactured stone masonry manufacturer's installation instructions. Comply with ASTM C 270; When applicable color mortar with iron oxide pigments.
- G. Weep screed: As required for installation over framed construction.
- H. Flashing Tapes: Protecto Wrap Triple Guard Energy Sill Sealer, 5 1/2 inch, or equivalent
- I. Sealant: As indicated in Section 07 9200 - Joint Sealers.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine construction to receive manufactured cast stone masonry components. Notify Architect if construction is not acceptable.
- B. Do not begin installation until unacceptable conditions have been corrected.
- C. Commencement of work by installer is acceptance of substrate conditions.

3.02 INSTALLATION

- A. Protect the Work of this section during and after installation from weather conditions that inhibit proper installation.
- B. Install manufactured cast stone masonry and accessories in accordance with manufacturer's installation instructions and standard details.
- C. Thin cladding/veneer rain screen system installation:
 1. Install MTI Sure Cavity over weather barrier with spunbond fabric to exterior of building. two inch fabric skirt should be folded back under bottom of first course of Sure Cavity to create a bug screen. Overlap two inch skirt over top of each course below.
 2. Install lath over Sure Cavity using recommended fastening patterns.
 3. Install all flashings and accessories recommended by rain screen system manufacturer and additional accessory items indicated on the drawings.
 4. Apply stone cladding in accordance with manufactures recommendations.

3.03 CLEANING

- A. Clean manufactured cast stone masonry in accordance with manufacturer's installation instructions.

3.04 PROTECTION

- A. Protect finished work from rain during and for a min of 48 hours following installation.
- B. Protect finished work from damage during remainder of construction period.
- C. Clean, repair, or replace damaged or mortar-splashed work to condition of new work.

END OF SECTION

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**SECTION 05 1200
STRUCTURAL STEEL FRAMING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural steel framing members.
- B. Structural steel support members.
- C. Grouting under base plates.

1.02 RELATED REQUIREMENTS

- A. Section 05 1213 - Architecturally-Exposed Structural Steel Framing: Additional requirements for structural steel members designated as architecturally-exposed structural steel (AESS).
- B. Section 05 3100 - Steel Decking: Support framing for small openings in deck.
- C. Section 05 5000 - Metal Fabrications: Steel fabrications affecting structural steel work.

1.03 REFERENCE STANDARDS

- A. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges 2016.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021.
- F. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts 2015.
- G. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts (Metric) 2007 (Reapproved 2013).
- H. ASTM A992/A992M - Standard Specification for Structural Steel Shapes 2020.
- I. ASTM E94/E94M - Standard Guide for Radiographic Examination Using Industrial Radiographic Film 2017.
- J. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments 2019.
- K. ASTM E165/E165M - Standard Test Method for Liquid Penetrant Examination for General Industry 2018.
- L. ASTM E709 - Standard Guide for Magnetic Particle Testing 2021.
- M. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength 2019, with Editorial Revision (2020).
- N. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions 2019.
- O. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2012.
- P. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
- Q. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections 2014, with Errata (2015).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
 - 2. Provide member and connection design and details not indicated within design documents. Indicate calculated and/or assumed design loads for member and connection design and details

3. Indicate cambers and loads.
4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
5. Indicate unit identification mark for each unique item.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel Angles and Plates: ASTM A36/A36M.
- B. Steel W Shapes and Tees: ASTM A992/A992M.
- C. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.
- D. Structural Bolts and Nuts: Carbon steel, ASTM A307, Grade A and galvanized in compliance with ASTM A153/A153M Class C.
- E. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563 or ASTM A563M nuts and ASTM F436/F436M washers.
 1. Provide these bolts only at locations if and where indicated on the drawings.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- G. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.
- H. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
 1. Color: Manufacturer's Standard.

2.02 FABRICATION

- A. Shop fabricate to greatest extent possible.
- B. Mark each item with its identification mark. Use a non-permanent method at units that will remain exposed; welding is not acceptable, it shall be ground smooth, filled, and primed by the supplier at no additional cost to the Owner.
- C. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- D. Fabricate connections for bolt, nut, and washer connectors.

2.03 FINISH

- A. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.

2.04 CONCRETE ANCHORING SYSTEMS

- A. Approved Manufacturers/Products:
 1. HILTI: www.us.hilti.com.
 2. MiTek: www.mitek-us.com.
 3. Powers: www.powers.com.
 4. Red Head: www.itwredhead.com.
 5. Simpson Strong-Tie: www.strongtie.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

- A. Erect structural steel in compliance with AISC 303.
- B. Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Field weld components indicated on shop drawings.

- D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts".
- E. Do not field cut or alter structural members without approval of Architect.
- F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- G. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.03 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

3.04 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
- B. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts," testing at least 50 percent of bolts at each connection.
- C. Welded Connections: Visually inspect all field-welded connections and test at least 100 percent of welds using one of the following:
 - 1. The following only apply to welds exceeding 5/16 inches.
 - 2. Radiographic testing performed in accordance with ASTM E94/E94M.
 - 3. Ultrasonic testing performed in accordance with ASTM E164.
 - 4. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
 - 5. Magnetic particle inspection performed in accordance with ASTM E709.

END OF SECTION

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SECTION 05 1213
ARCHITECTURALLY-EXPOSED STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Additional requirements for structural steel members designated as architecturally-exposed structural steel (AESS).

1.02 RELATED REQUIREMENTS

- A. Section 05 1200 - Structural Steel Framing: General requirements for structural steel members, including AESS framing specified in this section.
- B. Section 09 9113 - Exterior Painting: Finish coat requirements and coordination with primer and surface preparation specified in this section.

1.03 REFERENCE STANDARDS

- A. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges 2016.
- B. AISC 360 - Specification for Structural Steel Buildings 2016 (Revised 2021).
- C. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling 2019.
- D. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021.
- E. ASTM A1085/A1085M - Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS) 2015.
- F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2012.
- G. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
- H. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- I. SSPC-SP 6 - Commercial Blast Cleaning 2007.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product data for each type of product specified. Submit paint systems in accordance with Section 09 9113.
- C. Shop Drawings: Detailing for fabrication of AESS components.
 - 1. Provide erection documents clearly indicating which members are AESS members and the AESS category of each part.
 - 2. Include details that clearly identify AESS requirements found in this specification. Provide connections for AESS consistent with concepts shown on drawings.
 - 3. Indicate welds by AWS A2.4 symbols, distinguishing between shop and field welds, and show size, length and type of each weld. Identify grinding, finish and profile of welds as defined by the designated AESS category.
 - 4. Indicate orientation of hollow structural section (HSS) seams and mill marks (where applicable).
 - 5. Indicate type, size, finish and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tensioned shear/bearing connections. Indicate orientation of bolt heads.
 - 6. Indicate which surfaces or edges are exposed and what class of surface preparation is being used.
 - 7. Indicate special tolerances and erection requirements as noted on drawings or defined by the designated AESS category.
 - 8. Indicate vent or drainage holes for HSS members.
- D. AESS Samples: Provide samples of specific AESS characteristics. Samples may be small size samples or components of conventional structural steel demonstrating specific AESS characteristics.
- E. Qualification data for fabricator and erector to demonstrate their capabilities and experience.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: In addition to those qualifications listed in Section 05 1200, engage an AISC Certified Fabricator, experienced in fabricating AESS similar to that indicated for this project with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying the work.
- B. Erector Qualifications: In addition to those qualifications listed in Section 05 1200, engage an AISC Certified Erector, experienced in erecting AESS work similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance.
- C. Comply with applicable provisions of AISC 303, Section 10 for the designated AESS category.

1.06 MOCK-UP

- A. Provide mock-ups for AESS C of nature and extent indicated in Contract Documents.
- B. Notify Architect one week in advance of dates and times when mock-ups will be available for review.
- C. Demonstrate applicable AESS characteristics for specified category of AESS on elements and joints in mock-up.
- D. Obtain Architect's written approval of mock-ups before starting fabrication.
- E. Retain and maintain mock-ups during construction in an undisturbed condition as a standard for judging completed work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handle finished pieces in accordance with Section 10 of AISC 303, using nylon-type slings, or chains with softeners, or wire ropes with softeners such that they are not damaged.
- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. Use special care in handling to prevent twisting or warping of AESS members.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Comply with Section 05 1200, except as amended in this section for aesthetic purposes.
- B. Comply with AISC 303, Section 10 for specific AESS C category designated on drawings.

2.02 FABRICATION

- A. Fabricate and assemble AESS in shop to greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by Architect. Detail AESS assemblies to minimize field handling and expedite erection.
- B. Permissible tolerances for member depth, width, out of square, and camber and sweep to be as specified in ASTM A6/A6M, ASTM A500/A500M, and ASTM A1085/A1085M.
- C. Use special care in handling and shipping of AESS both before and after shop painting to minimize damage to any shop finish. Use nylon-type slings or softeners when using chains or wire rope slings.
- D. Bolted Connections:
 - 1. Make in accordance with Section 05 1200. Provide bolt type and finish as noted herein.
- E. Welded Connections:
 - 1. Comply with AWS D1.1/D1.1M and Section 05 1200.
 - 2. Assemble and weld built-up sections by methods that will maintain alignment of members without warp exceeding tolerances of this section.
- F. Fabricate AESS in accordance with categories defined in AISC 303, as follows:
 - 1. AESS 3: Feature elements viewed at a distance less than 20 feet (feature elements in close view).
 - 2. AESS 4: Showcase elements with special surface and edge treatment beyond fabrication (showcase elements).
 - 3. AESS C: Custom elements; fabricate to requirements of AESS 1 and the following characteristics:

2.03 PAINT SYSTEM

- A. Compatibility: All components/procedures of AESS paint system to comply with coating system specified, submitted, and approved per Sections 09 9113. As a minimum, identify required surface preparation, primer, intermediate coat (if applicable), and finish coat. Primer, intermediate coating, and finish coating to be from a single manufacturer combined in a system documented by manufacturer with adequate guidance for fabricator to procure and execute.
- B. Primer: As specified in Sections 09 9113. Primer to comply with all federal standards for VOC, lead and chromate levels.
- C. Finish Coating: Field apply intermediate and top coats per Sections 09 9113.

2.04 SHOP PRIMING

- A. Surface Preparation:
 - 1. Provide surface preparations to meet SSPC-SP 6.
 - 2. Coordinate required surface profile with approved paint submittal prior to beginning surface preparation.
 - 3. Prior to blasting, remove any grease and oil using solvent cleaning to meet SSPC-SP 1.
 - 4. Remove weld spatter, slivers and similar surface discontinuities.
 - 5. Ease sharp corners resulting from shearing, flame cutting or grinding.

2.05 SOURCE QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Structural Requirements:
 - 1. Comply with quality control requirements per AISC 360, Chapter N and AISC 303, Section 10. Refer to Section 05 1200 for additional requirements.
 - 2. Quality assurance agency to review work for compliance with requirements of AISC 360, Chapter N and AISC 303, Section 10.
- C. AESS 3,4, and C Acceptance: Architect to observe AESS in the shop at a viewing distance consistent with final installation and determine acceptability based on approved mock-up. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Erector to check all AESS members upon delivery for twist, kinks, gouges or other imperfections which may result in rejection of appearance of member. Coordinate remedial action with fabricator prior to erecting steel.

3.02 PREPARATION

- A. Provide connections for temporary shoring, bracing and supports only where noted on approved fabrication documents. Temporary connections not shown are to be made at locations not exposed to view in final structure or as approved by Architect.
- B. Handle, lift and align pieces using nylon straps or chains with softeners required to maintain appearance of AESS through process of erection.

3.03 ERECTION

- A. AESS 1 and 2: Basic elements; feature elements not in close view:
 - 1. Employ special care to handle and erect AESS. Erect finished pieces using nylon straps or chains with softeners such that they are not damaged.
 - 2. Place weld tabs for temporary bracing and safety cabling at points concealed from view in completed structure or where approved by Architect during pre-installation meeting. Obtain Architect approval of methods for removing temporary devices and finishing AESS members prior to erection.
 - 3. AESS Erection Tolerances: Erect to standard frame tolerances for structural steel per Chapter 7 of AISC 303.
 - 4. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
 - 5. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
 - 6. Remove all backing and run out tabs.

7. When temporary braces or fixtures are required to facilitate erection, take care to avoid any blemishes, holes or unsightly surfaces resulting from use or removal of such temporary elements.
 8. Bolted Connections: Align bolt heads on same side of connection as indicated on approved fabrication or erection documents.
 9. Welded Connections: Comply with AWS D1.1/D1.1M and Section 05 1200. Appearance and quality of welds to be consistent. Employ methods that will maintain alignment of members without warp exceeding tolerance of this section.
 10. Remove weld spatter exposed to view.
 11. Grind off projections larger than 1/16 inch at field butt and plug welds.
 12. Continuous Welds: Where continuous welding is noted on drawings, provide continuous welds of a uniform size and profile.
 13. Do not enlarge holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts. Replace connection plates that are misaligned where holes cannot be aligned with acceptable final appearance.
 14. Splice members only where indicated.
 15. Obtain permission for any torch cutting or field fabrication from Architect. Finish sections thermally cut during erection to a surface appearance consistent with mock-up.
- B. AECS C: Custom elements:
1. Erect to requirements of AECS 1 and 2 and as follows:

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Structural Requirements:
1. Comply with quality control requirements per AISC 360, Chapter N and AISC 303, Section 10. Refer to Section 05 1200 for additional requirements.
 2. Quality assurance agency to review work for compliance with requirements of AISC 360, Chapter N and AISC 303, Section 10.
- C. AECS 3,4, and C Acceptance: Architect to observe AECS in place and determine acceptability based on qualification data and submittals as well as on approved mock-up. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.

3.05 CLEANING

- A. Touch-up Painting: Complete cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint to blend with adjacent surfaces of AECS. Perform touch-up work in accordance with manufacturer's instructions and as specified in Section 09 9113, 09 9123, and 09 9600.

END OF SECTION

SECTION 05 3100 STEEL DECKING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Composite floor deck.
- B. Supplementary framing for openings up to and including 18 inches.
- C. Bearing plates and angles.

1.02 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- B. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2021.
- C. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
- D. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel 2018.
- E. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, and Roof Decks 2007.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittals procedures.
- B. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.
- C. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.

1.04 QUALITY ASSURANCE

- A. Design deck layout, spans, fastening, and joints under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located; include engineer's stamp for connections.
- B. Installer Qualifications: Company specializing in performing the work of this Section with minimum five years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Cut plastic wrap to encourage ventilation.
- B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Steel Deck:
 - 1. Nucor-Vulcraft Group: www.vulcraft.com.
 - 2. Canam Steel Corporation: www.canam-steeljoists.ws.
 - 3. New Millennium: www.newmill.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 STEEL DECK

- A. All Deck Types: Select and design metal deck in accordance with SDI Design Manual.
 - 1. Calculate to structural working stress design and structural properties specified.
 - 2. Maximum Vertical Deflection of Floor Deck: 1/360 of span.
- B. Composite Floor Deck: Fluted steel sheet embossed to interlock with concrete:
 - 1. Ungalvanized Steel Sheet: ASTM A1008/A1008M, Designation SS.
 - a. Grade as required to meet performance criteria.
 - 2. Primer: Shop coat of manufacturer's standard primer paint over cleaned and phosphatized substrate.
 - 3. Minimum Base Metal Thickness: 22 gage, 0.0299 inch.
 - 4. Nominal Height: As indicated on the drawings.

5. Profile: VL or VLI; SDI NR.
6. Formed Sheet Width: 36 inch.
7. Side Joints: Lapped welded or mechanically fastened.
8. End Joints: Lapped welded or mechanically fastened.

2.03 ACCESSORY MATERIALS

- A. Bearing Plates and Angles: ASTM A36/A36M steel unfinished.
- B. Welding Materials: AWS D1.1/D1.1M.
- C. Fasteners: Galvanized hardened steel, self tapping.
- D. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.
- E. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
 1. Color: Manufacturer's Standard.

2.04 FABRICATED DECK ACCESSORIES

- A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 22 gage, 0.0299 inch thick sheet steel; of profile and size as indicated; finished same as deck.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions prior to beginning work.

3.02 INSTALLATION

- A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.
- B. On steel supports provide minimum 1-1/2 inch bearing.
- C. Fasten deck to steel support members at ends and intermediate supports at 12 inches on center maximum (unless where indicated on the drawings), parallel with the deck flute and at each transverse flute using methods specified.
 1. Welding: Use fusion welds through weld washers.
- D. Clinch lock seam side laps.
- E. At welded male/female side laps weld at 18 inches on center maximum.
- F. Weld deck in accordance with AWS D1.3/D1.3M.
- G. At deck openings from 6 inches to 18 inches in size, provide 2 by 2 by 1/4 inch steel angle reinforcement. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.
- H. Where deck (other than cellular deck electrical raceway) changes direction, install 6 inch minimum wide sheet steel cover plates, of same thickness as deck. Fusion weld 12 inches on center maximum.
- I. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION

**SECTION 05 5000
METAL FABRICATIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel items.

1.02 RELATED REQUIREMENTS

- A. Section 09 9113 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2020.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021.
- F. ASTM A 992/A 992M - Standard Specification for Structural Steel Shapes; 2006a.
- G. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2012.
- H. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
- I. SSPC-SP 2 - Hand Tool Cleaning 2018.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on all finishing products, including VOC content.
- C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Indicate unit identification mark and location for each unique item.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel W Shapes and Tees: ASTM A 992/A 992M.
- B. Steel Sections, Angles, and Plates: ASTM A 36/A 36M.
- C. Steel Tubing: ASTM A500/A500M Grade B cold-formed structural tubing.
- D. Pipe: ASTM A 53/A 53M Grade B Schedule 40, black finish.
- E. Bolts, Nuts, and Washers: ASTM A307, Grade A, galvanized to ASTM A153/A153M where connecting galvanized components.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- G. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
 - 1. Color: Manufacturer's Standard.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Mark each item with its identification mark. Use a non-permanent method at units that will remain exposed; welding is not acceptable, it shall be ground smooth, filled, and primed by the supplier at no additional cost to the Owner.
- C. Fabricate items with joints tightly fitted and secured.

- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

- A. Lintels: As detailed; prime paint finish.
- B. Other items indicated on the drawings.

2.04 FINISHES - STEEL

- A. Prime paint steel items.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2 minimum.
 - 1. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
 - 2. Prime Painting: One coat.
 - a. Provide primer products indicated for surfaces to be primed and painted, Refer to Section 09 9113 - Exterior Painting.

2.05 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

2.06 CONCRETE ANCHORING SYSTEMS

- A. Approved Manufacturers/Products:
 - 1. HILTI: www.us.hilti.com.
 - 2. MiTek: www.mitek-us.com.
 - 3. Powers: www.powers.com.
 - 4. Red Head: www.itwredhead.com.
 - 5. Simpson Strong-Tie: www.strongtie.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Perform field welding in accordance with AWS D1.1/D1.1M.
- D. Obtain approval prior to site cutting or making adjustments not scheduled.
- E. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

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**SECTION 07 1900
WATER REPELLENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water repellents applied to exterior stone and concrete surfaces.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a meeting at least one week prior to starting work; require attendance of affected installers; invite Architect and Owner.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention; cautionary procedures required during application.
- D. Manufacturer's qualification statement.
- E. Installer's qualification statement.
- F. Manufacturer's Field Reports: Report whether manufacturer's "best practices" are being followed; if not, state corrective recommendations.
- G. Manufacturer shall stand behind installed system for period of 10 years from Date of Substantial Completion against all the conditions indicated below. When notified in writing from Owner, Manufacturer shall, promptly and without inconvenience and cost to Owner correct said deficiencies.
 - 1. Loss of water repellency: As stated by product below.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years of documented experience
- C. Obtain approval to perform installation from specified product's sales manager 5 days prior to start of the Work of this section. Obtain approval of test patch. Pay required registration fees.

1.05 FIELD CONDITIONS

- A. Protect liquid materials from freezing.
- B. Do not apply water repellent when ambient temperature is lower than 50 degrees F or higher than 100 degrees F.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Water Repellent: Non-glossy, colorless, penetrating, water-vapor-permeable, non-yellowing sealer, that dries invisibly leaving appearance of substrate unchanged.
 - 1. Applications: Vertical surfaces.
 - 2. Number of Coats: One.
 - 3. Maintains dry appearance when wetted.
 - 4. Products: Silane, siloxane, silane-siloxane blend, or siliconate that reacts chemically with concrete and masonry; minimum 40 percent nonvolatile content by weight.
 - a. Evonik Industries; Protectosil Chem-Trete 40 VOC
 - 1) Application Type: Use at **exterior concrete flatwork**; flatwork location are indicated on the civil drawings.
 - 2) Warranty: Loss of water repellency: Brick Masonry: 1.0 mil/20 minutes or greater (80 mph wind driven rain equivalent).
 - b. Evonik Industries; Protectosil Chem-Trete 40 D
 - 1) Application Type: Use at **stone**.
 - 2) Warranty: Loss of water repellency: No more than 0.5 mil/20 minutes (80 mph wind driven rain equivalent).

- c. Substitutions: Not permitted.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify joint sealants are installed and cured.
- B. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of water repellent.

3.02 PREPARATION

- A. Protection of Adjacent Work:
 - 1. Protect adjacent landscaping, property, and vehicles from drips and overspray.
 - 2. Protect adjacent surfaces not intended to receive water repellent.
- B. Prepare surfaces to be coated as recommended by water repellent manufacturer for best results.
- C. Do not start work until masonry mortar and concrete substrate is cured a minimum of product manufacturers recommended number of days.

3.03 APPLICATION

- A. Apply water repellent in accordance with manufacturer's instructions, using procedures and application methods recommended as producing the best results.
- B. Apply one coat minimum to building surfaces and two coats at exterior slabs. Refer to civil documents for the locations where water repellent is to be installed at exterior slabs.
- C. Remove water repellent from unintended surfaces immediately by a method instructed by water repellent manufacturer.
- D. Provide manufacturer's field service representative to inspect preparation and application work continuously during entire application period to ensure that manufacturer's "best practices" for preparation and application are being followed.

END OF SECTION

SECTION 07 9200 JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- B. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- C. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2018.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- E. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least five years of documented experience.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Base Manufacturer: Tremco Global Sealants: www.tremcosealants.com.
- B. Other Acceptable Manufacturers:
 - 1. Master Builders Solutions by BASF: www.master-builders-solutions.basf.us/en-us.
 - 2. Bostik Inc: www.bostik-us.com.
 - 3. Manus Products, Inc.: www.manus.net.
 - 4. Pecora Corporation: www.pecora.com.
 - 5. PSI, Polymeric Systems, Inc.: www.polymericsystems.com.
 - 6. Red Devil: www.reddevil.com.
 - 7. Sherwin-Williams Company: www.sherwin-williams.com.

8. Sika Corporation US: usa.sika.com.
9. W.R.Meadows: www.wrmeadows.com.
10. Substitutions: See Section 01 6000 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints indicated below.
 2. Do not seal the following types of joints.
 - a. Intentional weepholes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
 1. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.

2.03 JOINT SEALANTS - GENERAL

- A. Colors: Color shall be selected by the Architect from manufacturer's full range unless specifically indicated to be a specific color.

2.04 NONSAG JOINT SEALANTS

- A. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multicomponent; not expected to withstand continuous water immersion or traffic.
 1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Manufacturers:
 - a. Dymonic FC or Dymeric 240 FC manufactured by Tremco Commercial Sealants.
 - b. Sonolastic NP1 or NP2 manufactured by Master Builders Solutions by BASF.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.05 SELF-LEVELING SEALANTS

- A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
 1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Manufacturers:
 - a. THC-901, Vulkem 445SSL (also Dymonic FC, or Dymeric 240 FC) manufactured by Tremco Commercial Sealants.
 - b. MasterSeal SL 1, SL 2 (also NP 1, or NP 2 manufactured by Master Builders Solutions by BASF.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.06 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
 2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type C - Closed Cell Polyethylene.
 3. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Install bond breaker backing tape where backer rod cannot be used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- H. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION

- A. Protect sealants until cured.

END OF SECTION

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**SECTION 09 9113
EXTERIOR PAINTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Exposed surfaces of primed and unprimed metal items unless specifically indicated to not be painted.
 - 2. Mechanical and Electrical:
 - a. On the roof and outdoors, paint equipment that is exposed to weather or to view, including factory-finished materials.
 - b. Shop-primed items.
 - c. Paint metals that are not resistant to corrosion.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Floors, unless specifically indicated.
 - 6. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco.
 - 7. Glass.
 - 8. Concealed pipes, ducts, and conduits.

1.02 DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this section.

1.03 REFERENCE STANDARDS

- A. SDDOT 2015 Standard Specification
 - 1. Section 411 - Shop Painting
- B. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- D. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- E. SSPC-SP 6 - Commercial Blast Cleaning 2007.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.
 - 5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.

1. Where sheen is specified, submit samples in only that sheen.
 2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
 3. Allow 15 days for approval process, after receipt of complete samples by Architect.
 4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as factory finished items, have been approved.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
 3. Label each container with color in addition to the manufacturer's label.
 4. Do not provide or leave extra paint materials for the Owner.
 5. Do provide product info, color names, and installation locations for all products and colors. Information shall be included in the Operation and Maintenance Manual.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
- B. Paints:
1. Base Manufacturer: Sherwin Williams: www.sherwin-williams.com.
 2. Other Manufacturers: Approved products shall meet performance and physical characteristics of base manufacturer (basis of design) product including published ratio of solids by volume, plus or minus two percent.
- C. Other Acceptable Manufacturers: Submit product information for each line of paint for Architect's approval. Substitutions of Base Manufacturer's products may not be accepted during the shop drawing process.
1. PPG Paints: www.ppgpaints.com/#sle.
 2. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.

- a. Sprayed finish; is preferred on all metal surfaces; is required on the following surfaces:
 - 1) Metal doors and frames; prior to hardware installation.
2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
3. Provide commercial grade paint systems by approved paint manufacturer for substrates not specifically covered under paint systems.
 - a. Consult with Architect/Engineer/Designer for approval of additional products and systems. Provide quantifiable product information.
4. Supply each paint material in quantity required to complete entire project's work from a single production run.
5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- E. Colors: As indicated in Color Schedule.
 1. Where indicated or scheduled colors do not match the paint product lines indicated below it is anticipated that colors will be color matched; product lines below are intended to set a level of standard for the product lines used for each application.
 2. Locations Not Indicated: Selection to be made by Architect after award of contract.
 3. Extend colors to surface edges; colors may change at any edge as directed by Architect.
- F. Coats: The number of coats specified, are based on manufacturer's recommendations. Provide for additional coats, as necessary, for complete coverage and true color. Additional coats due to a lack of coverage shall be provided at no additional cost to the Owner. No exceptions.
- G. Coverage: Do not stretch products beyond their recommended coverage rate nor install fewer coats than specified regardless of appearance after previous coats are applied. Thin product application may show surface imperfections or inconsistencies that would otherwise not be visible. Additional coats due to a lack of proper coverage shall be provided at no additional cost to the Owner. No exceptions.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint Product: **HI-Solids Polyurethane (Two-Component)**
 1. Primer: Macropoxy 646 (Two Component).
 2. Number of Paint Coats Over Primer: One.
 3. Types of Substrates:
 - a. Steel.
 4. Sheen: Semi-Gloss.
 5. Location Types:
 - a. Steel.

2.04 PAINT SYSTEMS - EXTERIOR

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask and/or protect all surfaces, appurtenances not affiliated with coating process, including but not limited to electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 - 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- E. Painting shall be free from paint runs; no exceptions.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

3.06 COLOR SCHEDULE

END OF SECTION

SECTION 26 0010
BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES:

- A. Basic Electrical Requirements specifically applicable to Division 26 Sections, in addition to Division 01 - General Requirements.

1.02 SCOPE OF WORK:

- A. The Electrical Contract Installation shall include a complete Electrical Installation for the project. All conduit, fixtures and equipment herein specified, mentioned or shown on Drawings, shall be furnished and installed in place, connected up and ready for normal operation except for such items as are specifically mentioned to be furnished by others.

1.03 WORK INCLUDED:

- A. The Electrical Contract shall include all work under the listed Sections of the Specifications Index and all related Electrical work as shown on the Drawings for the project.
- B. A Complete table of Electrical Reference Symbols is shown on the plans.
- C. Under this Contract the Electrical Contractor shall furnish the Owner with two 3-ring binders of all pertinent systems related documents. Submit manuals to the Engineer for his review. The Engineer will then turn books over to the Owner. The books shall contain the following items:
 - 1. Shop drawings on all major equipment.
 - 2. Operating Instructions for all major equipment.
 - 3. Maintenance Instructions for all major equipment.
 - 4. Wiring diagrams for all equipment.
 - 5. Control drawings for any systems not furnished under other contracts.
- D. The Electrical contractor is responsible for own equipment, such as cranes, lifts, etc. in order to provide a complete installation of Electrical systems.
- E. The Electrical Contractor is responsible for contacting the utility company and coordinating the power connection for the building service. Include all costs in bid.
- F. Coordinate utility service outages and reconnections with Utility Company and Owner.
- G. Branch feeders, branch wiring, receptacles, special outlets, switches, light fixtures, dimmers, contactors, starters, timers, etc., as shown on the plans or required for operation of the electrical system.
- H. Repair of all damage done to the premises as a result of the installation and removal of all debris or surplus material left by those engaged in the work.

1.04 SPECIFICATIONS COMPLIANCE

- A. The requirements of these specifications shall be complied with in every respect. Therefore, it shall be absolutely mandatory that the job foreman, all lead electricians, subcontractors and their foreman have completely studied these specifications, be completely knowledgeable as to their entire contents, and maintain a copy at the job-site. Failure to comply with this requirement will be reason to presume the electrician or subcontractor is not in responsible charge of his work due to ignorance of job requirements, and will be reason for the owner to require dismissal and replacement with approved personnel. Every foreman and lead mechanic shall be provided with a complete copy of this specification.

1.05 INCONSISTENCIES

- A. If there is an inconsistency in the quality and/or quantity of Work required by the Contract Documents, either the greater quality and/or quantity of Work indicated shall be provided in accordance with the Engineer/Architect's interpretation without change in the contract sum.

1.06 CODES, FEES AND LATERAL COSTS:

- A. The Electrical Installation shall meet all applicable local, state and federal codes and standards. All permits necessary for a complete electrical installation shall be paid for by this Contractor.
- B. Except in those municipalities which provide state-approved electrical inspection, all installation of electrical equipment wiring shall be inspected by the State Board of Electricity. Allowance shall be made in the bid and contract for the cost of such inspection.

- C. Fees for such inspection will be charged in accordance with the rules and regulations of the State Board of Electricity. Evidence of payment of fees shall be provided by the Contractor with his Request for Payment.

1.07 REGULATORY REQUIREMENTS:

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed by Underwriters Laboratories, Inc. or other testing firm acceptable to authority having jurisdiction.

1.08 SUBMITTALS:

- A. Submit under provisions of Division 01.
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- C. The contractor shall submit four (4) copies of shop drawings on all equipment and materials to the engineer for approval. The contractor shall not use any equipment or materials that does not have the engineer's stamped approval.
- D. Mark dimensions and values in units to match those specified.

1.09 PROJECT/SITE CONDITIONS:

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

1.10 SEQUENCING AND SCHEDULING:

- A. Construct Work in sequence under provisions of Division 1.

1.11 PRE-CONSTRUCTION COORDINATION AND VERIFICATION:

- A. This Contractor shall coordinate his work with other Contractors on this job. Any conflict which cannot be resolved shall be settled by the Architect/Engineer.
- B. Field verification of scale dimensions on plans is directed since actual locations, distances and levels will be governed by actual field conditions.
- C. The Contractors shall check architectural, structural, plumbing, heating, ventilating and electrical plans to avert possible installation conflicts. Should drastic changes from original plans be necessary to resolve such conflicts this Contractor shall notify the Architect/Engineer and secure written approval and agreement on necessary adjustments before the installation is started.
- D. Discrepancies shown on different plans or between plans and actual field conditions or between plans and specifications shall promptly be brought to the attention of the Architect/Engineer for a decision.
- E. The Contractor shall consider and review the complete set of documents, etc., Architectural, Structural, Mechanical, Electrical, etc., (Drawings and Specifications) as his complete set. He will be responsible for any and all electrical work shown or stated (to be by him), to include this work in his bid and install such items even though they are not specifically shown or stated on the Electrical section of the plans and specifications.
- F. The drawings are indicative of the work to be installed, but do not show all bends, fittings, boxes and specialties required to complete the installation.
- G. All conduits, wires, outlets boxes, switches, receptacles, devices and fixtures shall be included in the work.
- H. Where it is stated that the contractor shall "provide" a device or piece of equipment, it shall mean that such a device or equipments are finished and installed.

1.12 SCAFFOLDING:

- A. Furnish and erect all scaffolding, ladders, etc., required in the installation of wiring, equipment and fixtures.

1.13 GUARANTEE:

- A. This Contractor shall be responsible for the proper installation and working of everything in this contract and shall guarantee to remedy free of charge any defects in workmanship and materials that may appear to give or gives rise to trouble of any kind for a period of one year from the time of final acceptance of his work by the Owner.

PART 2 NOT USED

PART 3 EXECUTION

3.01 EQUIPMENT CONNECTIONS:

- A. Provide necessary power wiring for equipment furnished by others. Verify requirements with the Contractors responsible to supply each piece of equipment. Provide heavy duty disconnect switches as indicated.

3.02 AS-BUILT DRAWINGS:

- A. Contractor shall keep an accurate record of all deviations from contract drawings and specifications. He shall neatly and correctly enter in colored crayon any deviations on drawings affected, and shall keep drawings available for inspection. Extra set of drawings will be furnished for this purpose.
- B. At the completion of the job, and before final acceptance, the Contractor shall provide a complete set of as-built drawings. The Contractor shall show locations for all major electrical devices, including panelboards and all major runs of conduit, the circuiting of each fixture, outlet, etc., shall be shown. Certify to the accuracy of each print, by signature thereon, and deliver same to Architect.

END OF SECTION

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SECTION 26 0519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Wiring connectors.
- C. Electrical tape.
- D. Heat shrink tubing.
- E. Oxide inhibiting compound.
- F. Wire pulling lubricant.
- G. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire 2013 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft 2011 (Reapproved 2017).
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes 2010, with Editorial Revision (2020).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation 2004 (Reapproved 2020).
- E. ASTM B800 - Standard Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes - Annealed and Intermediate Tempers 2005 (Reapproved 2021).
- F. ASTM B801 - Standard Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy Wire for Subsequent Covering of Insulation 2018.
- G. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape 2017.
- H. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes 2013.
- I. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- J. NECA 104 - Recommended Practice for Installing Aluminum Building Wire and Cable 2012.
- K. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy 2009.
- L. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.
- M. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- N. UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.
- O. UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.
- P. UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.
- Q. UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.
- R. UL 486D - Sealed Wire Connector Systems Current Edition, Including All Revisions.
- S. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate the installation of direct burial cable with other trades to avoid conflicts with piping or other potential conflicts.
 - 3. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Underground feeder and branch-circuit cable is not permitted.
- E. Service entrance cable is not permitted.
- F. Armored cable is not permitted.
- G. Metal-clad cable is not permitted.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductor Material:
 - 1. Provide copper conductors except where aluminum conductors are specifically indicated or permitted for substitution. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
 - a. Where aluminum conductors are substituted for copper, comply with the following:
 - 1) Size aluminum conductors to provide, when compared to copper sizes indicated, equivalent or greater ampacity and equivalent or less voltage drop.

- 2) Increase size of raceways, boxes, wiring gutters, enclosures, etc. as required to accommodate aluminum conductors.
 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 3. Tinned Copper Conductors: Comply with ASTM B33.
 4. Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.
- H. Minimum Conductor Size:
1. Branch Circuits: 12 AWG.
 - a. Exceptions:
 - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
 - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
 2. Control Circuits: 14 AWG.
- I. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 2. Color Coding Method: Integrally colored insulation.
 - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
 3. Color Code:
 - a. 240/120 V, 1 Phase, 3 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Neutral/Grounded: White.
 - b. Equipment Ground, All Systems: Green.
 - c. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Description: Single conductor insulated wire.
- B. Conductor Stranding:
 1. Feeders and Branch Circuits:
 - a. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation:
 1. Copper Building Wire: Type THHN/THWN-2, except as indicated below.
 - a. Size 4 AWG and Larger: Type XHHW-2.
 - b. Installed Underground: Type XHHW-2.

2.04 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Wiring Connectors for Splices and Taps:
 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- C. Wiring Connectors for Terminations:
 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.

3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
6. Aluminum Conductors: Use compression connectors for all connections.
- D. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- E. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
- F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- G. Mechanical Connectors: Provide bolted type.
- H. Compression Connectors: Provide circumferential type or hex type crimp configuration.

2.05 ACCESSORIES

- A. Electrical Tape:
 1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
 3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
 4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
 5. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
- C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
- D. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
- E. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage wire and cable has been completed.
- B. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- C. Verify that field measurements are as indicated.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:
 1. Unless dimensioned, circuit routing indicated is diagrammatic.

2. When circuit destination is indicated without specific routing, determine exact routing required.
 3. Arrange circuiting to minimize splices.
 4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
 5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 6. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is permitted, under the following conditions:
 - a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
 - b. Increase size of conductors as required to account for ampacity derating.
 - c. Size raceways, boxes, etc. to accommodate conductors.
 7. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install aluminum conductors in accordance with NECA 104.
- E. Installation in Raceway:
1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 2. Pull all conductors and cables together into raceway at same time.
 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- H. Install conductors with a minimum of 12 inches of slack at each outlet.
- I. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- J. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- K. Make wiring connections using specified wiring connectors.
1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 3. Do not remove conductor strands to facilitate insertion into connector.
 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminants. Do not use wire brush on plated connector surfaces.
 5. Connections for Aluminum Conductors: Fill connectors with oxide inhibiting compound where not pre-filled by manufacturer.
 6. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 7. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

- L. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
 - 1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
 - 2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
 - 3. Wet Locations: Use heat shrink tubing.
- M. Insulate ends of spare conductors using vinyl insulating electrical tape.
- N. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- O. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground rod electrodes.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings 2017.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 467 - Grounding and Bonding Equipment Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- D. Grounding Electrode System:
 - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
 - 2. Ground Rod Electrode(s):
 - a. Provide two electrodes unless otherwise indicated or required.
 - b. Space electrodes not less than 10 feet from each other and any other ground electrode.

- c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
- 3. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
- E. Service-Supplied System Grounding:
 - 1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
 - 2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.
- F. Bonding and Equipment Grounding:
 - 1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 - 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
 - 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 - 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 - 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 - 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
 - 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
 - 1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
 - 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 - 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 - 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Rod Electrodes:
 - 1. Comply with NEMA GR 1.
 - 2. Material: Copper-bonded (copper-clad) steel.
 - 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.

- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.
- D. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70.
 - 1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.
- D. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- C. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

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**SECTION 26 0529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 0533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- C. Section 26 0533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

1.05 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with applicable building code.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
 - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.

3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Anchors and Fasteners:
 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 4. Hollow Masonry: Use toggle bolts.
 5. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 6. Sheet Metal: Use sheet metal screws.
 7. Wood: Use wood screws.
 8. Plastic and lead anchors are not permitted.
 9. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that mounting surfaces are ready to receive support and attachment components.
- B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- D. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- E. Equipment Support and Attachment:
 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 2. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 3. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch high concrete pad constructed in accordance with Section 03 3000.
 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- F. Secure fasteners according to manufacturer's recommended torque settings.
- G. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.

- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.
- E. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
 - 1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
 - 2. Obtain permission from Architect before drilling or cutting structural members.
- F. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- G. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- H. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch off wall.
- I. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION

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**SECTION 26 0533.13
CONDUIT FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Intermediate metal conduit (IMC).
- C. Liquidtight flexible metal conduit (LFMC).
- D. Rigid polyvinyl chloride (PVC) conduit.
- E. Conduit fittings.
- F. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
 - 1. Includes additional requirements for fittings for grounding and bonding.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2015.
- B. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC) 2018.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2013.
- E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- F. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit 2018.
- G. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.
- H. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2016.
- I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
- K. UL 360 - Liquid-Tight Flexible Steel Conduit Current Edition, Including All Revisions.
- L. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
- M. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
 - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:

1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, implies all applications are acceptable. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
 1. Under Slab on Grade: Use galvanized steel rigid metal conduit or rigid PVC conduit.
 2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit or rigid PVC conduit.
 3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
 4. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.
- D. Exposed, Exterior: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal conduit.
- E. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or Schedule 40 PVC.
- F. Corrosive Locations Above Ground: Use aluminum rigid metal conduit.

2.02 CONDUIT REQUIREMENTS

- A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Minimum Conduit Size, Unless Otherwise Indicated:
 1. Underground, Exterior: 1 inch (27 mm) trade size.
- D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 2. Republic Conduit: www.republic-conduit.com/#sle.
 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
 1. Manufacturers:

- a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

- A. Manufacturers:
 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 2. Republic Conduit: www.republic-conduit.com/#sle.
 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- C. Fittings:
 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Material: Use steel or malleable iron.
 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Manufacturers:
 1. AFC Cable Systems, Inc: www.afcweb.com/#sle.
 2. Electri-Flex Company: www.electriflex.com/#sle.
 3. International Metal Hose: www.metalhose.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- C. Fittings:
 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Material: Use steel or malleable iron.

2.06 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- B. Fittings:
 1. Manufacturer: Same as manufacturer of conduit to be connected.
 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.07 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil.
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.

- E. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- F. Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. When conduit destination is indicated without specific routing, determine exact routing required.
 - 3. Conceal all conduits unless specifically indicated to be exposed.
 - 4. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
 - 5. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
 - 6. Group parallel conduits in the same area together on a common rack.
- G. Conduit Support:
 - 1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
 - 3. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
 - 4. Use conduit clamp to support single conduit from beam clamp or threaded rod.
 - 5. Use of wire for support of conduits is not permitted.
- H. Connections and Terminations:
 - 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 - 3. Use suitable adapters where required to transition from one type of conduit to another.
 - 4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 - 5. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- I. Underground Installation:
 - 1. Minimum Cover, Unless Otherwise Indicated or Required:
 - a. Underground, Exterior: 24 inches.
 - b. Under Slab on Grade: 12 inches to bottom of slab.
 - 2. Provide underground warning tape in accordance with Section 26 0553 along entire conduit length for service entrance where not concrete-encased.
- J. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

K. Provide grounding and bonding in accordance with Section 26 0526.

3.03 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

END OF SECTION

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SECTION 26 0533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C. Underground boxes/enclosures.

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports for Electrical Systems.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports 2013 (R2020).
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. SCTE 77 - Specification for Underground Enclosure Integrity 2017.
- F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- H. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.
- I. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.
- J. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 2. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
 - 3. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
 - 4. Coordinate the work with other trades to preserve insulation integrity.
 - 5. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
 - 6. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Products: Provide products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:
 - 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 - 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 - 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 - 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
 - 1. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 - 2. Use nonmetallic boxes where exposed rigid PVC conduit is used.
 - 3. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 - 4. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
 - 1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 - 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 - 3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
 - 4. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
- D. Underground Boxes/Enclosures:
 - 1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
 - 2. Size: As indicated on drawings.
 - 3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches.
 - 4. Applications:
 - a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 8 load rating.
 - b. Parking Lots, in Areas Subject Only To Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 15 load rating.
 - c. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
 - 5. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
 - a. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- E. Box Locations:
 - 1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 3100 as required where approved by the Architect.
 - 2. Unless dimensioned, box locations indicated are approximate.
- F. Box Supports:
 - 1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
- G. Install boxes plumb and level.
- H. Install boxes as required to preserve insulation integrity.
- I. Underground Boxes/Enclosures:
 - 1. Install enclosure on gravel base, minimum 6 inches deep.
 - 2. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.
- J. Close unused box openings.
- K. Provide grounding and bonding in accordance with Section 26 0526.

3.03 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

END OF SECTION

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SECTION 26 2416 PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Lighting and appliance panelboards.
- B. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA 407 - Standard for Installing and Maintaining Panelboards 2015.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- D. NEMA PB 1 - Panelboards 2011.
- E. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less 2013.
- F. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- J. UL 67 - Panelboards Current Edition, Including All Revisions.
- K. UL 869A - Reference Standard for Service Equipment Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
 - 1. Include characteristic trip curves for each type and rating of overcurrent protective device upon request.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
 2. Include wiring diagrams showing all factory and field connections.
- D. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Panelboard Keys: Two of each different key.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Eaton Corporation: www.eaton.com/#sle.
- B. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.
- C. Siemens Industry, Inc: www.usa.siemens.com.
- D. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
1. Altitude: Less than 6,600 feet.
 2. Ambient Temperature:
- C. Short Circuit Current Rating:
1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
 2. Listed series ratings are not acceptable.
- D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
 2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 - 3. Fronts:
 - 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- K. Load centers are not acceptable.

2.03 OVERCURRENT PROTECTIVE DEVICES

2.04 SOURCE QUALITY CONTROL

- A. Factory test panelboards according to NEMA PB 1.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 0529.
- F. Install panelboards plumb.
- G. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- H. Provide grounding and bonding in accordance with Section 26 0526.
- I. Install all field-installed branch devices, components, and accessories.
- J. Provide filler plates to cover unused spaces in panelboards.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Test GFCI circuit breakers to verify proper operation.
- D. Test AFCI circuit breakers to verify proper operation.
- E. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.

- C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 2726 WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Receptacles.

1.02 RELATED REQUIREMENTS

- A. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for 2017h.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2010.
- D. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2015).
- E. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2016.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 498 - Attachment Plugs and Receptacles Current Edition, Including All Revisions.
- H. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 - 3. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices Installed in Wet or Damp Locations: Gray with specified weatherproof cover.

2.03 RECEPTACLES

- A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 - 2. NEMA configurations specified are according to NEMA WD 6.
- B. GFCI Receptacles:
 - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.

2. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
3. Tamper Resistant and Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of wiring devices provided under this section.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- K. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- L. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each wiring device for damage and defects.
- C. Test each receptacle to verify operation and proper polarity.
- D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- E. Correct wiring deficiencies and replace damaged or defective wiring devices.

END OF SECTION

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**SECTION 26 5600
EXTERIOR LIGHTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior luminaires.

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports for Electrical Systems.
- B. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. AASHTO LTS - Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signal 2013 (Revised 2019).
- B. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006.
- C. ANSI C136.10 - American National Standard for Roadway and Area Lighting Equipment - Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing 2010.
- D. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products 2008.
- E. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules 2015, with Errata (2017).
- F. IES RP-8 - Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting 2018.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- H. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems 2006.
- I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 1598 - Luminaires Current Edition, Including All Revisions.
- K. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
 - 2. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Coordination: Furnish bolt templates and pole mounting accessories to installer of pole foundations.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.

- D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Any deviation from what is called out in the Light Fixture Schedule requires prior approval from the Engineer.
 - 1. Provide Cut Sheets and Photometrics.
- C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
- H. LED Tape Lighting Systems: Provide all power supplies, drivers, cables, connectors, channels, covers, mounting accessories, and interfaces as necessary to complete installation.
 - 1. LED Tape - General Requirements:
 - a. Listed.
 - b. Designed for field cutting in accordance with listing.

2.03 BALLASTS AND DRIVERS

- A. Ballasts/Drivers - General Requirements:
 - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
- B. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.

2. Control Compatibility: Fully compatible with the dimming controls to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires in accordance with NECA/IESNA 501.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- G. Install accessories furnished with each luminaire.
- H. Bond products and metal accessories to branch circuit equipment grounding conductor.
- I. Provide concrete bases for lighting poles at locations indicated, in accordance with Section 03 3000.
- J. Install lamps in each luminaire.
- K. Bond luminaires, metal accessories, and metal poles to branch circuit equipment grounding conductor. Provide supplementary grounding electrode at each pole.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Perform field inspection, testing, and adjusting in accordance with Section 01 4000.
- D. Operate each luminaire after installation and connection to verify proper operation.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.
- F. Measure illumination levels to verify conformance with performance requirements. Take measurements during night sky, without moon or with heavy overcast clouds effectively obscuring moon.

3.04 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Aim and adjust luminaires to provide illumination levels and distribution indicated on Drawings.

3.05 CLEANING

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosure.
- D. Clean photometric control surfaces as recommended by manufacturer.

E. Clean finishes and touch up damage.

3.06 CLOSEOUT ACTIVITIES

3.07 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

3.08 SCHEDULE - SEE DRAWINGS

END OF SECTION

**SECTION 31 0505
SELECTIVE DEMOLITION FOR SITE WORK**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Work to provide all labor, materials, tools, and equipment necessary or incidental to remove and dispose of those Site Work obstructions indicated in Contract Documents including salvaging of designated materials, abandonment and removal of existing utilities and utility structures, and filling of resulting trenches, holes, and depressions. Work includes, but is not limited to:
 - 1. Sawing, removal, and disposal of concrete wall and railing.
 - 2. Removal and disposal of existing fences and gates.
 - 3. Removal of all other Site Work obstructions indicated for salvage, relocation, or recycling in Contract Documents.
 - 4. Removal, salvage, and reinstallation of existing obstructions not indicated in Contract Documents, but required by Work. Obstruction items include, but are not limited to signage, mailboxes, fences, and drainage piping. Restore or replace items to condition equal to or better than existing unless otherwise indicated.
 - 5. Protection of items adjacent to obstructions indicated for salvage, relocation, or recycling in Contract Documents.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Provide Work under unit price method per Proposal and the following:
 - 1. Measure concrete wall, and other lineal items to be removed, salvaged, or abandoned by length in linear feet (LF) along longitudinal centerline of structure, parallel to base or foundation supporting structure, and from end to end of removed structure. This bid item includes any site safety and protection, excavation, concrete saw cutting of existing wall, rebar removal, hauling and disposal of materials, and any other working needed to complete the wall removal as incidental to the remove concrete retaining wall bid item.
 - 2. Measure other portions of completed Work items to be removed, salvaged, or abandoned within roadway work contract. All other items not listed in that contract shall be incidental.
 - 3. Payment for accepted quantities of remove, salvage, or abandon items at Contract price per unit of measure will be compensation in full for all costs of removing material or specified portions thereof, for disposing of materials removed, and salvaging of parts thereof as may be specified, reinstalling railing end brackets and finishing/mounting hardware, for backfilling of depressions and other restoration work required, and for utility abandonment procedures and performance of all other work of a special nature that may be specified or imposed by laws, ordinances, and regulations.
 - 4. Salvage items damaged due to Contractor's negligence will result in Architect deducting from any moneys due or becoming due Contractor an amount equal to 100% of current delivered price of new material of same type and size as that damaged and equal to quality of materials so damaged or will require that Contractor furnish to Owner new material of same type and size as that damaged. Remedy option shall be up to Owner's discretion. Damaged material shall become property of Contractor.
 - 5. Payment for backfilling depressions resulting from removal of structures will not be made, but shall be considered incidental to removal of structure.
 - 6. Measurement and payment for removal and disposal of materials will be made only for those Items of removal work specifically included for payment as such in Proposal and as listed on Drawings. Removal of any unforeseen obstruction requiring in opinion of Architect equipment or handling substantially different from that employed in excavation operations, will be reviewed during construction.

1.03 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: Ability of a product or material to be recovered at end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from Project Site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: Process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse a construction waste material in some manner on Project Site.
- K. Salvage: To remove a material from Project Site in acceptable condition for reuse.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: Act of keeping different types of waste materials separate beginning from first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- B. SDDOT Specification Section 110 - Removal of Structures and Obstructions; 2015.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate compliance with regulatory requirements, including but not limited to Federal, State, and local requirements pertaining to legal disposal of all construction and demolition waste materials.
- B. Coordinate compliance with applicable codes and regulations for safety of adjacent structures and public.
- C. Coordinate haul routes.
- D. Obtain required permits for Work.
- E. Use of explosives is prohibited.

1.06 SUBMITTALS

- A. Disposal Plan: Provide information and documentation substantiating proper disposal arrangements and operations.
- B. Record Documents: Include information pertaining to additional existing utilities encountered, and abandoned utilities locations.

PART 2 PRODUCTS

2.01 MATERIALS

PART 3 EXECUTION

3.01 PREPARATION

- A. Do not begin demolition work until receipt of Notice to Proceed.
- B. Coordinate Work with utility companies; notify before starting Work and comply with requirements; obtain required permits.
- C. Drawings indicating existing construction and utilities are based on casual field observation and existing record documents only.

1. Verify that construction and utility arrangements are as indicated on Drawings.
 2. Report discrepancies to Architect before disturbing existing installation.
 3. Commencement of demolition work constitutes acceptance of existing conditions.
- D. Do not begin demolition work until built items to be salvaged or relocated have been removed.
- E. Do not begin demolition work until vegetation to be relocated has been removed and specified measures have been taken to protect vegetation to remain.
- F. Protect existing utilities, structures, and elements to remain.
1. Provide bracing and shoring.
 2. Prevent movement or settlement.
 3. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 4. Stop Work immediately if adjacent utilities, structures, or elements appear to be in danger.
 5. Patch as specified for patching new work.
- G. Provide and maintain temporary barriers and security devices.
- H. Use physical barriers to prevent access to areas that could be hazardous to workers or public.
- I. Do not close or obstruct roadways or sidewalks without permit.
- J. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

3.02 CONSTRUCTION

- A. Conduct operations from the roadway side of the way, in such a way that no equipment, materials, or other items are positioned in the adjacent/abutting water way. Unless Contractor works with appropriate Federal, State, and Local agencies to permit the stream/waterway bottom for use.
- B. Contractor is responsible for protection of the existing levee structure portion to remain. Any damages/repairs required from construction activities will be the responsibility of the Contractor. Any repairs to be made must be completed via a method acceptable to the Owner and governing Agencies.
- C. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
- D. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
- E. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
- F. Saw cut bituminous and concrete surfaces as indicated on Drawings and as directed by Architect prior to starting demolition work to establish a neat line for extending new Work. The saw cut shall be clean, flat, and on the planned line/grade as necessary to complete the subsequent construction on top of wall.
- G. Remove existing items as indicated and as required to accomplish new Work.
1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
 2. Remove items indicated on Drawings.
- H. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution. Control any dust bearing water from runoff to nearby water bodies.
- I. Generate least amount of trash and waste possible. Perform demolition in a manner that maximizes salvage and recycling of materials.
1. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.
- J. Stockpile items designated for salvage at location approved by Architect. Remove, dismantle, and clean materials as required by Contract Documents prior to stockpiling.
- K. Stop Work and notify Architect and Owner if hazardous materials are discovered during removal operations. Hazardous materials include, but are not limited to regulated asbestos containing materials, lead, PCB's, mercury, and petroleum based fuel products.

- L. Fill excavations, holes, and depressions left following selective demolition Work using suitable fill material with top surface neat in appearance and smooth enough to not constitute a hazard to public.

3.03 CLEANING

- A. Remove debris, junk, trash, and unused materials from Site.
- B. Remove items designated for salvage from Site that are determined by Architect following removal to be in a condition not worth salvaging. This is only applicable to removed items not damaged due to negligence of Contractor.
- C. Unacceptable methods of trash/waste disposal include:
 - 1. Burning on Site.
 - 2. Burying on Site.
 - 3. Other illegal dumping or burying.
- D. Leave Site in clean condition, ready for subsequent Work.
- E. Clean up spillage and wind-blown debris from public and private lands.
- F. Assume full responsibility for acceptable disposition of removal materials and for damages resulting from disposal operations.

END OF SECTION

SECTION 31 6333

MICRO-PILES

PART 1 GENERAL

1.1. RELATED REQUIREMENTS

- A. Section 03 3000 – Cast-in-Place Concrete: Requirements for concrete and concrete reinforcement
- B. Division 05 – Structural Steel

1.2. SCOPE OF WORK

- A. This specification, along with the drawings, covers the furnishing of all designs, materials, products, accessories, tools, equipment, services, transportation, labor and supervision, and manufacturing techniques required for testing and installation of micro-piles and pile-top attachments.
- B. The successful Specialty Foundation Micro-pile Contractor, from here forth called the Specialty Contractor, shall select the size, pile top attachment, bond length, and micro-pile diameter. The Specialty Contractor shall install a micro-pile system that will provide the load capacities and allowable deflections indicated on the drawings. The micro-pile load capacities and deflections shall be verified by testing as required and specified herein.
- C. Micro-piles are defined as small diameter, typically less than twelve (12) inches, grouted in-place, drilled piles, incorporating steel reinforcement to resist all, or a substantial portion, of the applied load.

1.3. QUALIFICATIONS OF THE SPECIALTY CONTRACTOR

- A. The Specialty Contractor shall have at least five years' experience in all aspects of micro-pile design and construction, and shall furnish all necessary plant, materials, skilled labor, and supervision to carry out the contract.
- B. Due to the difficulty associated with installing micro-piles in, the Specialty Contractor will have the following minimum experience over the past five years:
 - 1. Installed 5,000 LF of Micro-piles,
 - 2. Completed Five Projects, and
 - 3. Installed at Least 100 Micro-piles.
- C. The Specialty Contractor shall provide the Engineer a complete list documenting the minimum experience listed above.
- D. The superintendent shall have completed at least five micro-pile projects.
- E. The Specialty Contractor shall not sublet the whole or any part of this contract without the express permission in writing of the Engineer.

1.4. DEFINITIONS

- A. Bond Zone – Rock or soil interface with pile where caging is not present, and force is transferred from pile to rock or soil.
- B. Tremie – Placing grout in a wet hole.

1.5. ALLOWABLE TOLERANCES

- A. Centerline of piling shall not be more than 3 inches from indicated plan position.
- B. Pile alignment shall be within 2% of design alignment.
- C. Top elevation of pile shall be no more than 1 inch above design vertical elevation, and no more than 2 inches below the design vertical elevation.

1.6. DESIGN CRITERIA

- A. The micro-piles shall be designed to meet the specified loading as shown on contract drawings. The calculations and drawings required from the Specialty Contractor shall be submitted to the Engineer for review and acceptance in accordance with Section 1.10.
- B. Steel pipe used for external encasement for micro-piling shall incorporate an additional 1/16-inch thickness of sacrificial steel for corrosion protection. It is usually impractical to provide

a corrosion resistant coating, as it tends to be gouged and abraded during installation procedures.

- C. The overall length of a micro-pile will be selected such that the required capacity is developed by skin friction between grout and ground over a suitable length in suitable material.
- D. The allowable stresses at working load shall not exceed the following values:
1. Compression Loads
 - a. The allowable stress on the cement grout shall be thirty-three (33) percent of the twenty-eight-day unconfined compressive strength (UCS).
 - b. The allowable stress on the steel reinforcing, including permanent steel casing, shall be forty (40) percent of the minimum specified yield strength.
 - c. The maximum allowable stress on the steel shall be 32,000 pounds/square inch. (This is provided for strain compatibility at ultimate load.)
 2. Tension Loads
 - a. The allowable stress on the steel reinforcing shall be sixty (60) percent of the minimum specified yield strength.
 - b. The allowable stress on the cement grout shall be zero.
- E. The ultimate structural capacity shall be determined by the following equations.
1. Compression

$$P_{uc} = (0.85 \cdot f_c \cdot A_{grout} + f_{y_{casing}} \cdot A_{casing} + f_{y_{bar}} \cdot A_{bar})$$

where: f_c = UCS of grout

A_{grout}	=	area of grout
$f_{y_{casing}}$	=	yield strength of casing up to 80 ksi
A_{casing}	=	area of steel casing (at threaded joints if applicable)
$f_{y_{bar}}$	=	yield strength of rebar up to 80 ksi
A_{bar}	=	area of rebar

The maximum useable strength of the steel of 80 ksi is based on the typical ultimate concrete strain of 0.003 (29000 ksi * 0.003 = 87 ksi). Eighty (80) ksi is also the maximum steel strength used in ACI 318.

2. Tension

$$P_{ut} = (f_{y_{casing}} \cdot A_{casing} + f_{y_{bar}} \cdot A_{bar})$$

where: $f_{y_{casing}}$	=	yield strength of casing
A_{casing}	=	area of steel casing (at threaded joints if applicable)
$f_{y_{bar}}$	=	yield strength of rebar
A_{bar}	=	area of rebar

- F. Lateral Load and Bending: Where lateral loads are provided on the plans, the bending moment from these lateral loads shall be determined using LPile or equal. The soil parameters (c, ϕ , γ , and k) for use with LPile or equal are provided in the geotechnical reports.
- G. The micro-pile top attachment shall effectively distribute the design load (DL) to the concrete footing, grade beam, and/or pile cap such that the concrete bearing stress does not exceed ACI Building Code and the bending stress in the steel plates does not exceed AISC Allowable stresses for steel members.
- H. The geotechnical capacity shall not rely on bond above the competent bedrock bond zone.

1.7. GROUND CONDITIONS

- A. The test borings as shown on the boring location plan and logs of borings are believed to be representative of the conditions likely to be encountered on the site and are to be used as the basis for micro-pile design.
- B. If a manmade obstruction is encountered during installation of a pile that prevents the advancing of the hole, the hole shall be abandoned and filled with grout. A new pile shall be

drilled at locations to be determined by the Engineer.

1.8. REFERENCED CODES AND STANDARDS

- A. The following publications form a part of this specification to the extent indicated by the references. The latest publication as of the issue of this specification shall govern, unless indicated otherwise.
 - 1. American Society for Testing and Materials (ASTM).
 - A36 Specification for Structural Steel
 - A252 Specification for Welded and Seamless Steel Pipe Piles
 - A615 Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement
 - A722 Specification for Uncoated High Strength Bar for Pre-stressing Concrete
 - C33 Specification for Concrete Aggregates
 - C144 Specification for Aggregate for Masonry Mortar
 - C150 Specification for Portland Cement
 - C494 Specification for Chemical Admixtures for Concrete
 - D1143 Standard Test Method for Piles Under Static Axial Compressive Load (Quick Test Method for Individual Piles, Section 5.6)
 - D3689 Standard Test Method for Individual Piles Under Static Axial Tension Load
 - D3966 Standard Test Method for Piles Under Lateral Loads
 - 2. American Association of State Highway and Transportation Officials (AASHTO)
 - T26 Quality of Water to be Used in Concrete

1.9. PRE-CONSTRUCTION SUBMITTALS

- A. The Specialty Contractor shall prepare working drawings and relevant structural design calculations for the micro-pile system for submittal to the Engineer for review. The submittal shall be stamped by a Licensed Professional Engineer in the State where the work is to be performed. The Specialty Contractor shall allow the Engineer two (2) weeks to review the working drawing submittal after a complete set has been received. Work shall not begin until the appropriate submittals have been received reviewed and returned in writing by the Engineer.
- B. The working drawings and design calculations submittal(s) shall include the following.
 - 1. Micro-pile details for each pile type (load showing):
 - a. Micro-pile Design Load
 - b. Type and Size of Permanent Casing and Reinforcing Steel
 - c. Minimum Total Bond Length
 - d. Total Micro-pile Length
 - e. Micro-pile Top Attachment
 - 2. Micro-pile numbering system for records.
 - 3. Grout mix designs, and the procedure for placing the grout. Include documentation indicating proposed mix design has been successfully used for similar installations. Include air entrainment if environment requires usage. Previous mix data shall include all admixtures proposed for this project.
 - 4. Detailed description of the construction procedure and sequence.
 - 5. Detailed plans for the method proposed for the testing of the micro-piles prior to beginning the tests. This shall include all necessary drawings and details to clearly describe the method.

1.10. CONSTRUCTION RECORDS SUBMITTALS

- A. The Specialty Contractor shall submit the following information during construction.
 - 1. Certified mill test reports, properly marked, for the reinforcing steel showing the ultimate strength, yield strength, elongation, and material properties.
 - 2. Test results for permanent casing per Section 2.5

3. Calibration reports for each test jack, pressure gauge and master pressure gauge to be used. The calibration tests shall have been performed within 180 calendar days of the date submitted.

1.11. INSTALLATION RECORDS

- A. The Specialty Contractor shall prepare and submit to the Engineer installation records for each pile installed. The records shall be submitted within 24 hours after installation is completed for the pile. The records shall include the following minimum information.
 1. Pile Drilling Duration
 2. Final Tip Elevation
 3. Total Micro-pile Length
 4. Description of Unusual Installation Behavior or Conditions
 5. Grout Quantities Pumped
 6. Pile Materials and Dimensions

1.12. TESTING RECORDS

- A. The Specialty Contractor shall prepare and submit to the Engineer all submittals required in Section 3.4, Pile Load Tests. The records shall be submitted within 24 hours after each pile load test is complete.

2. PART 2 PRODUCTS AND MATERIALS

2.1. WATER

- A. Water for mixing grout will be potable or shall be tested for use with the cement and results submitted for approval with information required in Section 1.10.

2.2. ADMIXTURES

- A. Admixtures shall conform to the requirements of ASTM C 494. Admixtures which control bleed, improve flow ability, reduce water content and retard set may be used in the grout subject to the review and acceptance of the Engineer. Expansive admixtures shall only be added to the grout used for filling sealed encapsulations. Accelerators will not be permitted. Admixtures shall be compatible with the grout and mixed in accordance with the manufacturer's recommendations. Their use will only be permitted after appropriate field tests on fluid and set grout properties.

2.3. CEMENT

- A. All cement shall be Portland cement conforming to ASTM C 150, Type I, Type II, or Type III, and shall be the product of one manufacturer.

2.4. REINFORCEMENT

- A. All reinforcing steel shall be deformed bars in accordance with ASTM A 615, Grade 60, or Grade 75, or ASTM A722 Grade 150.
- B. Bar couplers, if required, shall develop the ultimate tensile strength of the bars without evidence of any failure.

2.5. PIPE/CASING

- A. Permanent steel casing/pipe shall meet the Tensile Requirements of ASTM A252, Grade 3, except the yield strength shall be a minimum of 80,000 psi as used in the design submittal. New "Structural Grade" (a.k.a. "Mill Secondary") steel pipe without Mill Certification may be used meeting the following requirements.
 1. Tensile Requirements per above.
 2. Free from defects (dents, cracks, tears).
 3. Two coupon tests per truckload delivered to the fabricator.

2.6. PLATES AND SHAPES

- A. Structural steel plates and shapes for pile top attachments shall conform to ASTM A36 or A572 Grade 50.

2.7. CENTRALIZERS

- A. Centralizers shall be fabricated from plastic, steel, or material that is non-detrimental to the reinforcing steel. Wood shall not be used.

3. PART 3 EXECUTION

3.1. INSTALLATION

- A. The drilling equipment and methods shall be suitable for the conditions encountered. A fully cased hole is required where caving soil conditions are encountered. Drilling muds and auger-cast methods may be used at the Engineer's discretion.
- B. Centralizers shall be provided on central reinforcement. The upper most centralizer shall be located five (5) feet maximum from the top of the central reinforcement. Centralizers shall permit the free flow of grout without misalignment of the reinforcement.
- C. The central reinforcement steel with centralizers shall be lowered into the stabilized drill holes to the desired depth without difficulty. Partially inserted reinforcing bars shall not be driven or forced into the hole.
- D. The grout should be injected beginning at the lower end of the drilled borehole. The hole shall be filled with a 4,000 psi minimum compressive strength grout without voids from bottom to top of micro-pile.
- E. The Specialty Contractor shall check pile top elevations and adjust all installed micro-piles to the planned elevations.

3.2. GROUTING

- A. The Specialty Contractor shall have means and methods of measuring the grout quality and quantity during the grouting operations. The Specialty Contractor shall keep records showing the quantities and test data for inspection by the Engineer.
- B. The Specialty Contractor shall use a stable neat cement grout or a sand cement grout with a minimum 28-day unconfined compressive strength of 4,000 psi. Admixtures, if used, shall be mixed in accordance with manufacturer's recommendations. The Specialty Contractor is totally responsible for the appropriate mix design, including strength, slump, admixture requirements, etc.
- C. The grouting equipment shall produce a colloiddally mixed grout free of lumps and non-dispersed cement. The grouting equipment shall be sized to enable the grout to be pumped in one continuous operation. The mixer shall be capable of continuous agitation of the grout.
- D. Grout within the micro-piles shall be allowed to attain adequate strength prior to load testing.
- E. The Specialty Contractor will grout piles up to two (2) times the neat theoretical volume of the drill hole. Any grout required to fill the pile in excess of two times the neat volume will be charged additional as shown in Section 3.5.

3.3. CASING THREAD

- A. Casing steel shall be machine threaded to develop the required design strength of the pile section. Welded splices may be used at contractor's option.

3.4. VERIFICATION LOAD TESTS FOR PILE LOAD TESTS

- A. Pile load tests shall be performed to verify the load carrying capacity of the pile system and the construction procedures prior to installing production piles. Each test pile shall be loaded to 2 times working load or ultimate design load. The number of test piles shall be determined by the Engineer.
- B. The micro-pile load test results shall verify the Specialty Contractor's design and will be reviewed and accepted by the Engineer prior to beginning production micro-piles. The tests shall be performed at a location to be determined by the Engineer and/or Architect.
- C. The Specialty Contractor shall submit for review and acceptance the micro-pile load-testing program. The testing program submittal shall be provided two weeks prior to starting the load testing. This micro-pile verification load testing proposal shall indicate the minimum following information.
 - 1. Type and accuracy of apparatus for applying load.
 - 2. Type and accuracy of apparatus for measuring the pile deformation.

3. Type and capacity of reaction load system.
4. Hydraulic jack calibration report.
- D. The drilling and grouting methods, casing diameter, and depth of embedment of the test pile shall be identical to the production piles.
- E. The tested micro-piles shall be loaded to 200 percent of the compression and/or tension design load (DL). The jack shall be positioned at the beginning of the test such that the unloading and repositioning of the jack during the test will not be required. Piles shall be tested under compression loads prior to testing under tension loads.
- F. Axial pile load tests shall be made by loading the micro-pile in the following steps and recording the head movement at each step.

<u>Load</u>	<u>Hold Time (Minutes)</u>	<u>Load</u>	<u>Hold Time (Minutes)</u>
0	0		
10% DL	0	140% DL	2.5
10% DL	2.5	150% DL	0
20% DL	0	150% DL	2.5
20% DL	2.5	160% DL	0
30% DL	0	160% DL	2.5
30% DL	2.5	170% DL	0
40% DL	0	170% DL	2.5
40% DL	2.5	180% DL	0
50% DL	0	180% DL	2.5
50% DL	2.5	190% DL	0
60% DL	0	190% DL	2.5
60% DL	2.5	200% DL	0
70% DL	0	200% DL	1
70% DL	2.5	200% DL	2
80% DL	0	200% DL	3
80% DL	2.5	200% DL	4
90% DL	0	200% DL	5
90% DL	2.5	200% DL	6
100% DL	0	200% DL	10
100% DL	2.5	150% DL	0
110% DL	0	150% DL	5
110% DL	2.5	100% DL	0
120% DL	0	100% DL	5
120% DL	2.5	50% DL	0
130% DL	0	50% DL	5
130% DL	2.5	0	0
140% DL	0	0	5

- G. Measurement of pile movement shall be obtained at each increment. The load hold period shall start as soon as the test load is applied and the pile movement, with respect to a fixed reference, shall be measured and recorded at 1 minute 2, 3, 4, 5, and 10 minutes (load cycle maximum only).
- H. The pile shall sustain the compression and tension design loads (100% DL) with no more than ½ inches total vertical movement at the top of the pile, or another amount determined by Engineer for serviceability of structure. This shall be verified at the first 100% DL occurrence within the loading cycle. The slope of the load versus deflection curve shall be less than 0.05 inches/ton.
- I. The Specialty Contractor's engineer will give the Engineer written confirmation concerning micro-pile construction and the results of the load test within seven working days after the completion of the preproduction tests. This written confirmation will either confirm the bond lengths as shown in the drawings for micro-piles or reject the piles based upon the results of the verification tests.
- J. When a micro-pile fails, the Specialty Contractor shall modify the design, the construction procedure, or both. These modifications include, but are not limited to installing replacement

micro-piles, modifying the installation methods, increasing the bond length, or changing the micro-pile type. Any modification which requires changes to the structure shall have prior review and acceptance of the Engineer. Any modifications of design or construction procedures shall be at the Specialty Contractor's expense, except as may be allowed per "change condition" clause.

- K. Upon completion of testing, all test piles shall be removed to a depth of 5'-0" minimum below the top of floor elevation within the area of the test pile.

3.5. MEASUREMENT AND PAYMENT

- A. Base bid items shall consist of the following.
 - 1. Mobilization and Demobilization as necessary.
 - 2. Micro-pile load testing and re-testing as necessary.
 - 3. Micro-piles (assumed base bid lengths are to be determined based on the estimated top of rock bearing strata elevation provided within the Contract Documents). The design-build contractor shall include a contingency in their bid to account for installation difficulty and potential additional piles and/or added installation length to meet minimum capacities.
- B. The quantities accepted for payment will be paid for at the contract unit prices.
- C. The contract unit prices will be full and complete payment for providing all design, materials, labor, equipment, and incidentals to complete work.

END OF SECTION

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**STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION**

**SPECIAL PROVISION
FOR
SOUTH DAKOTA ELECTRONIC BID SYSTEM**

JULY 23, 2018

MAKE THE FOLLOWING CHANGES TO THE INDICATED SECTIONS:

Section 2.2 – Page 13 – Delete and replace with the following:

2.2 ELECTRONIC IDENTIFICATION - For contracts let using the South Dakota Electronic Bid System (SDEBS), a prospective bidder must obtain a company identification and password from the Department's website. Each company will receive one company identification and password. With a company identification and password, a prospective bidder will be able to access electronic files and the plan holders list.

In addition to a company identification and password, the prospective bidder must obtain a bidder identification and password for each individual authorized to prepare and submit a bid proposal on behalf of the company. To obtain a bidder identification and password, a prospective bidder must complete a bidding administrator authorization form (available on the Department's website), furnishing all required information and all appropriate signatures, and submit the form to the Department allowing 2 business days for the Department to set-up bidding administrator(s) and issue bidder identification(s) and password(s).

A bidding administrator will have privileges in the SDEBS to prepare bids, submit bids, and authorize additional company employees to prepare and submit bids. Additionally, a bidding administrator will be responsible for maintaining the list of authorized bidders for the company and will have the ability to add employees, remove employees, and set-up bidder identifications and passwords within the SDEBS. Bidding Administrator authorization will remain in full force and effect until written notice of termination of this authorization is sent by an Officer of the company and receive by the Department.

A bidder identification and password, coupled with a company identification previously assigned by the Department, will serve as authentication that an individual is a valid bidder for the company.

Section 2.3 – Page 13 – Delete the 1st sentence of the 2nd paragraph and replace with the following:

For contracts let using the SDEBS Letting process, the Department will not place restrictions on who may download the bidding package, except the ability to prepare and submit a bid proposal will require a bidder identification and password as described in Section 2.2.

Section 2.7 B. – Page 17 – Delete the 1st paragraph and replace with the following:

A bidder must prepare and submit a bid proposal using the SDEBS.

Section 3.2 A. – Page 22 – Delete and replace with the following:

A. The bid proposal is incomplete, or is not submitted through the Department's SDEBS or the form furnished by the Department, the form is altered, or part thereof is detached or incomplete;

Section 3.2 G. – Page 23 – Add “or,” to the end of this section.

Section 3.2 H. – Page 23 – Delete and replace with the following:

H. For SDEBS lettings, confirmation of receipt and incorporation of all addenda is not included in the bid proposal.

Section 3.2 I. – Page 23 – Delete this section

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**STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION**

**STANDARD TITLE VI / NONDISCRIMINATION ASSURANCES
APPENDIX A & E**

MARCH 1, 2016

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Federal Highway Administration, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.
3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.
4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the Federal Highway Administration to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or the Federal Highway Administration, as appropriate, and will set forth what efforts it has made to obtain the information.
5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to:
 - a. withholding payments to the contractor under the contract until the contractor complies; and/or
 - b. cancelling, terminating, or suspending a contract, in whole or in part.
6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or

is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

Pertinent Non-Discrimination Authorities:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures Non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of Limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

**STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION**

**SPECIAL PROVISION FOR
IMPLEMENTATION OF CLEAN AIR ACT
AND
FEDERAL WATER POLLUTION CONTROL ACT**

SEPTEMBER 1, 1997

By signing this bid, the bidder will be deemed to have stipulated as follows:

- a) That any facility to be utilized in the performance of this contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub. L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Pub. L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR, Part 15), is not listed on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.
- b) That the State Transportation Department shall be promptly notified prior to contract award of the receipt by the bidder of any communication from the Director, Office of Federal Activities, EPA, indicating that a facility to be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.

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