PROJECT MANUAL

NCDOT – DIVISION 14

Volume 1

Clay County – Office Assembly and Maintenance Shop

SCO ID # 14-11007-01-A

PROJECT ADDRESS: 225 TUSQUITTEE STREET
HAYESVILLE, NORTH CAROLINA

CLARK PATTERSON LEE PROJECT NO.: 13283.01

DOCUMENT DATE: FEBRUARY 10, 2016

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NCDOT – DIVISION 14

CLAY COUNTY – OFFICE ASSEMBLY AND MAINTENANCE SHOP

HAYESVILLE, NORTH CAROLINA

CLARK PATTERSON LEE PROJECT NUMBER 13283.01
February 10, 2016

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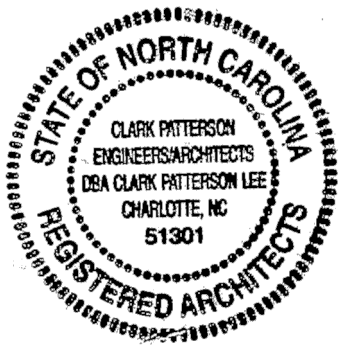
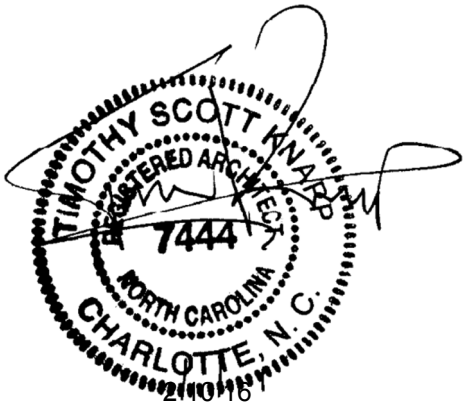
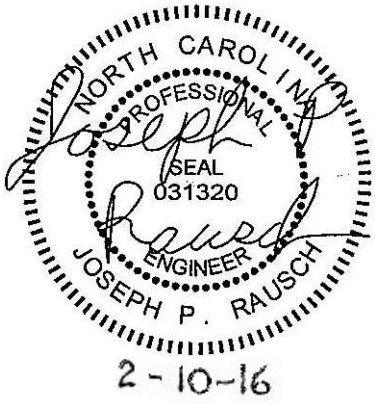
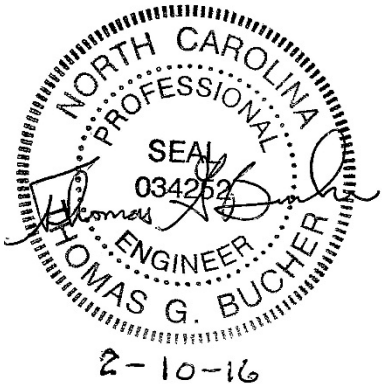
NC DOT – DIVISION 14
CLAY COUNTY ASSEMBLY / MAINTENANCE BUILDING

SCO #14-11007-01-PACKAGE A
CPL PROJECT NUMBER: 13283.01

February 10, 2016

CERTIFICATIONS PAGE

Architect/Engineer's Certification: The undersigned certifies that, to the best of his or her knowledge, information and belief, the design of this project conforms to all applicable provisions of the **State of North Carolina.**

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PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Specification Section is included for information only.
   1. For earthwork and related activities, the Contractor shall follow the specific requirements given in the appropriate Section of the Project Manual, and the specific requirements of the appropriate portion of the remaining Contract Documents.

B. Contractor shall read attached Subsurface Investigation Report in order to fully comprehend all known subsurface conditions.

C. Neither the Owner nor the Designer assumes responsibility for the accuracy of this information.

END OF SECTION 00 31 32

REPORT OF GEOTECHNICAL SITE EVALUATION

HAYESVILLE NCDOT FACILITIES, CLAY COUNTY

HAYESVILLE, NORTH CAROLINA

ECS PROJECT No. 31-2793

Prepared For

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Prepared By

JUNE 23, 2015

ECS CAROLINAS, LLP
"Setting the Standard for Service"
Geotechnical • Construction Materials • Environmental • Facilities
NC Registered Engineering Firm F-1078

June 22, 2015

Arsalan Sabouri
NC Department of Transportation
Facilities Management Division
1525 Mail Service Center
Raleigh, North Carolina 27699

Reference: Report of Geotechnical Site Evaluation
Hayesville NCDOT Facilities, Clay County
Hayesville, North Carolina
ECS Project No. 31-2793

Mr. Sabouri:

ECS Carolinas, LLP (ECS) has completed the subsurface exploration and geotechnical engineering evaluation for the above referenced project, as authorized by your acceptance of our Proposal Number 31-3902-P, dated February 25, 2015. This report contains the results of our subsurface exploration, as well as our recommendations concerning the geotechnical design and construction aspects of the project.

We appreciate the opportunity to provide geotechnical services to you at this time, and we look forward to continuing to assist you during the construction phase of this project. If you have any questions concerning the information and recommendations presented in this report, or if we can be of further assistance, please contact us.

Sincerely,

ECS CAROLINAS, LLP represented by:

NORTH CAROLINA PROFESSIONAL SEAL 31049 ENGINEER MATTHEW S. FOGLEMAN 6/22/2015

Montana K. Foulke, P.E.
Geotechnical Staff Project Manager

Matthew S. Fogleman, P.E.
Branch Manager/Vice President
NC License No. 31049

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1.0 EXECUTIVE SUMMARY

This report contains the results of our subsurface exploration and geotechnical engineering evaluation for the planned new maintenance and equipment building in Hayesville, North Carolina. The building will consist of a one story concrete masonry structure with a footprint of approximately 5,950 square feet. The project is still in the conceptual planning phase, and as such we have not been provided with detailed structural information, column loads, or foundation locations.

The soil borings encountered fill soils underlain by alluvial soils across the site to maximum depths of about 20 feet below ground surface. The soils generally consisted of sandy clay (CL) and sandy silt (ML). Underlying the alluvial soils, residual soils were encountered. The residual soil typically consisted of silty fine to medium sand (SM). Groundwater was encountered at depths ranging between about 6 to 9 feet below the existing ground surface in the borings.

The soils at the site appear generally suitable for support of the proposed building and pavements using conventional construction techniques. An alluvial cobble layer was encountered at approximately 9 ½ feet below existing grade. Excavation below this depth may be difficult using conventional earthmoving equipment. Given the prevalence of existing undocumented fill across the site, we recommend that the subgrade and the foundation bearing soils at this site be carefully monitored by ECS during construction. Careful and thorough proofrolling of the exposed subgrade, thorough monitoring and compaction testing of new fill, and frequent testing of the footing bearing soils should be considered critical. The proposed building can be supported on conventional shallow foundations bearing in properly evaluated and approved existing fill or new engineered fill.

The primary geotechnical consideration at this site is the prevalence of clayey alluvial soils, which can present challenges during earthwork. Based on the gradation and texture of the sampled alluvium, as well as the consistency of the alluvial soils measured in our test borings, the material at this site generally appears suitable for construction, and we do not anticipate that widespread undercuts will be required if the subgrade is kept protected. However, careful and thorough construction-phase testing should be considered critical due to the variable nature of the alluvial soils.

It is important to note the alluvial soils consisted of fine sandy clay, and these soils will likely be very moisture sensitive. Because the fine-grained alluvium is moderately plastic, we do not anticipate extreme moisture sensitivity as you would expect in high plastic silts and clays. However, proper management of surface runoff during construction will be critical to avoiding delays due to moisture conditioning of the soils. These practices include ensuring the surface of the site is kept properly graded to enhance drainage of surface water away from the proposed construction areas and soil stockpiles during the earthwork phase of this project. Additionally, stockpiled soils should be protected from inclement weather with tarps or plastic sheeting, and the exposed subgrades should be sealed with a smooth-drum roller at the end of the day's work to reduce the potential for infiltration of surface water into the soils. It should be the earthwork contractor's responsibility to maintain the site soils within a workable moisture content range to obtain the required in-place density and maintain a stable subgrade.

Provided the subgrade preparation and earthwork operations are completed in accordance with the recommendations of this report, we recommend a net allowable soil bearing pressure of up to 2,500 psf for design of shallow spread footings. Concrete slabs-on-grade can be designed

using a modulus of subgrade reaction (k) of 110 psi per inch. A seismic Site Class “D” is recommended for this site based upon the soil test boring data.

Specific information regarding the subsurface exploration procedures used, the site and subsurface conditions at the time of our exploration, and our conclusions and recommendations concerning the geotechnical design and construction aspects of the project are discussed in detail in the subsequent sections of this report. Please note this Executive Summary is an important part of this report but should be considered a “summary” only and should not be relied upon exclusive of the entire report. The subsequent sections of this report constitute our findings, conclusions, and recommendations in their entirety.

2.0 PROJECT INFORMATION

Our understanding of the project is based on our review of the RFP, review of the preliminary proposed site plan, and discussions with Clark Patterson Lee. The project site is located at 225 Tusquittee Street, Hayesville, Clay County, North Carolina. The proposed construction includes a new maintenance and equipment building. The building will consist of a one story concrete masonry structure with a footprint of approximately 5,950 square feet. The project is still in the conceptual planning phase, and as such we have not been provided with detailed structural information, column loads, or foundation locations.

Based on the Google Earth aerial imagery, the site appears to be relatively flat. We assume that only shallow leveling cuts and fills (less than 3 feet) would typically be required to establish final subgrade elevations within the building area. Based on conversations with Mr. Brian Plant/Clark Patterson Lee, we understand a retaining wall may be required. The location and height of the retaining wall are unknown.

3.0 EXPLORATION PROCEDURES

3.1 Soil Test Borings

Six mechanized soil test borings (Borings B-1 through B-6) were drilled within the proposed building footprint and parking areas at the approximate locations shown on the Boring Location Diagram in the Appendix. Two (2) borings were specifically performed within planned parking areas. Each boring was advanced to depths ranging between approximately 10 and 20 feet below the existing ground surface. The boring locations were selected by ECS with input from Clark Patterson Lee and established in the field by ECS personnel by estimating distances and angles from existing site features. The boring locations shown in the Appendix are for illustrative purposes only and should be considered approximate. The individual Boring Logs are provided in the Appendix for reference.

The mechanized soil borings were performed using a trailer-mounted, CME45c drill rig. Representative soil samples were obtained by means of the split-barrel sampling procedure in accordance with ASTM D 1586. In this procedure, a 2-inch O.D., split-barrel sampler is driven into the soil a distance of 18 inches by a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler through a 12-inch interval is termed the Standard Penetration Test value (N-value) and is indicated for each sample on the boring logs. This value can be used as a qualitative indication of the in-place relative density of noncohesive soils. In a less reliable way, it also indicates the consistency of cohesive soils. This indication is qualitative, since many factors can significantly affect the standard penetration resistance value and prevent a direct correlation between drill crews, drill rigs, drilling procedures, and hammer-rod-sampler assemblies. Split-spoon samples were obtained at approximately 2½ foot intervals within the upper 10 feet of the test borings and at approximately 5-foot intervals thereafter.

The drilling crew maintained a field log of the soils encountered in the borings. After recovery, each sample was removed from the sampler and visually classified. Representative portions of each sample were then sealed in airtight containers and returned to our laboratory in Asheville, North Carolina for visual examination by a geotechnical engineer and subsequent laboratory testing.

3.2 Laboratory Testing

Representative split-barrel soil samples obtained during our field exploration were selected and tested in our laboratory to check field classifications and to help determine pertinent index and engineering properties of the site soils. The geotechnical laboratory testing included:

- Visual classification of soil samples in general conformance with ASTM D 2487,
- Index property testing of select soils samples including:
    - Natural moisture content determinations (AASHTO T 265),
    - Atterberg limits testing (AASHTO T 89 and T 90), and
    - Percent passing the No. 200 sieve (AASHTO T 11)

The laboratory test results are included on the Laboratory Testing Summary provided in the Appendix. The moisture content and Atterberg limit test results are also presented on the individual Boring Logs.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 Site Observations

The site is located at 225 Tusquittee Street, Hayesville, Clay County, North Carolina. Based on our field reconnaissance, the site contains a maintenance office, a garage, various sized storage sheds, and fuel pumps situated on the northern side of the property. The proposed new maintenance and equipment building is located centrally between the abovementioned structures. The planned construction envelope is presently a gravel and asphalt parking lot and is relatively level. Hiwassee River is within approximately 1/3 mile northeast of the site.

4.2 Area Geology

The project site is located in the eastern Blue Ridge Physiographic Province of Western North Carolina. The eastern Blue Ridge consists of a variety of igneous and high-grade metamorphic rocks. The residual soils in this area are the product of in-place chemical weathering of rock. The typical residual soil profile consists of silty or clayey soils near the surface where soil weathering is more advanced, underlain by sandy silts and silty sands that generally become harder with depth to the top of parent bedrock. According to the 1985 Geologic Map of North Carolina, the bedrock at the site consists of metasedimentary rock and mica schist.

In this geology, alluvial soils (sediments deposited in a riparian setting) are typically present within floodplain areas along creeks, rivers, and other natural drainage areas. The subject site is situated southwest of Hiwassee River. Alluvial materials were encountered across the site. Alluvial soils are typically fine grained soils characterized as having relatively low strength and high in-situ moisture content and are deposited in low-lying areas associated with former or existing drainage features. The thickness of the alluvial deposits can be highly variable. Often the alluvial deposits are underlain by an alluvial cobble layer that was once the riverbed.

The boundary between soil and rock in this geology is not sharply defined. A transitional zone termed “partially weathered rock” is normally found overlying the parent bedrock. Partially weathered rock is defined for engineering purposes as residual material with standard penetration test resistance exceeding 100 blows per foot. The transition between hard/dense residual soils and partially weathered rock can occur at irregular depths due to variations in the degree of weathering. The variable weathering can also cause rock fragments and boulders to remain within the residual soil matrix.

4.3 Subsurface Conditions

Four (4) of the borings, B-1, B-2, B-5, and B-6, were located in areas with approximately 1 to 2 inches of asphalt with 6 to 8 inches of ABC stone at the ground surface. Two borings, B-3 and B-4 initially encountered approximately 4 inches of topsoil. Underlying the surficial material, each boring initially encountered material identified as fill soil to depths ranging between about 7 to 9 ½ feet below the existing ground surface. The fill soils typically consisted of sandy clay (CL) and sandy silt (ML). Standard Penetration Test N-values obtained within the fill ranged from 4 to 15 blows per foot (bpf), with typical N-values of 10 bpf.

Underlying the fill material, each boring initially encountered material identified as alluvial soil to depths ranging between about 7 feet below the existing ground surface to termination depth in borings with the exception of B-2. The alluvial soils typically consisted of sandy clay (CL) and sandy silt (ML). Standard Penetration Test N-values obtained within the fill ranged from 10 to

54 blows per foot (bpf), with typical N-values of 12 to 20 bpf. Residual soils sampled as silty sand (SM) were encountered from approximately 18 ½ feet below ground surface to termination depth in Boring B-2.

Boreholes were checked for water at the time of drilling. Groundwater was encountered at depths ranging between about 6 to 9 feet below the existing ground surface in the borings. Groundwater elevations should be expected to vary depending on seasonal fluctuations in precipitation, surface water absorption characteristics, and other factors.

The above paragraphs provide a general summary of the subsurface conditions encountered at the site at the time of our exploration. The Boring Logs included in the Appendix contain detailed information regarding the subsurface conditions encountered at each boring location. These Boring Logs represent our visual classification of the samples retrieved during the field exploration. The stratification lines on the Boring Logs designate approximate boundaries between various subsurface strata. The actual in-situ transitions are expected to be more gradual.

4.4 Laboratory Testing

The natural moisture contents of the tested soil samples ranged from 18.1 to 35.1 percent. The results of the Atterberg limits testing performed on representative split spoon samples indicated sandy clay (CL) with liquid limits ranging between 36 and 46 and plasticity indices ranging between 14 and 22. The percent material passing the No. 200 sieve ranged between 21.2 and 61.9 percent for samples tested.

The complete laboratory testing results are provided on the Laboratory Testing Summary in the Appendix. Natural moisture content and index test results are also provided on the individual Boring Logs.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the subsurface conditions encountered within the test borings and our experience with similar site conditions and construction, the soils at the site appear generally suitable for support of the proposed building and associated pavements using conventional construction techniques. The on-site soils are generally suitable for re-use as fill with strict moisture control. The building can be supported on conventional shallow foundations bearing on properly evaluated and approved existing fill or new engineered fill. The footings can be sized for a net allowable bearing pressure of up to 2,500 psf.

Given the prevalence of existing undocumented fill across the site, we recommend that the subgrade and the foundation bearing soils at this site be carefully monitored by ECS during construction. Careful and thorough proofrolling of the exposed subgrade, thorough monitoring and compaction testing of new fill, and frequent testing of the footing bearing soils should be considered critical.

The primary geotechnical consideration at this site is the prevalence of clayey alluvial soils, which can present challenges during earthwork. Based on the gradation and texture of the sampled alluvium, as well as the consistency of the alluvial soils measured in our testing borings, the material at this site generally appears suitable for construction, and we do not anticipate that widespread undercuts will be required if the subgrade is kept protected. However, careful and thorough construction-phase testing should be considered critical due to the variable nature of the alluvial soils.

It is important to note the alluvial soils consisted of fine sandy clay and sandy silt, and will be moisture sensitive. Because the fine-grained alluvium is moderately plastic, we do not anticipate extreme moisture sensitivity as you would expect in high plastic silts and clays. However, proper management of soil runoff during construction will be critical to avoiding delays due to moisture conditioning of the soils. These practices include ensuring the surface of the site is kept properly graded to enhance drainage of surface water away from the proposed construction areas and soil stockpiles during the earthwork phase of this project. Additionally, stockpiled soils should be protected from inclement weather with tarps or plastic sheeting, and the exposed subgrades should be sealed with a smooth-drum roller at the end of the day's work to reduce the potential for infiltration of surface water into the soils. It should be the earthwork contractor's responsibility to maintain the site soils within a workable moisture content range to obtain the required in-place density and maintain a stable subgrade.

Our detailed recommendations are presented below.

5.1 Site and Subgrade Preparation

The first step in preparing the site for the proposed building should be to remove existing asphalt. The next step should be to remove soft, unsuitable, or deleterious material from the existing ground surface. Any existing utilities that traverse the areas of the planned construction site should be re-routed as necessary. These operations should extend at least 10 feet beyond the planned limits of the construction, where practical. Existing aggregate base course materials, if present, may remain in-place to help protect the subgrade during the construction activities but should not be considered reusable for new pavements.

After removal of existing deleterious surface and subsurface materials, and prior to placement of fill, the exposed subgrade soils should be carefully examined by an experienced geotechnical

engineer to help identify any localized loose, yielding, or otherwise unsuitable materials. After examining the exposed subgrades, loose and yielding areas can be identified by proofrolling with an approved piece of equipment, such as a loaded dump truck, having an axle weight of at least 10 tons. Subgrade soils which perform successfully under the proofroll can be left in place. However, due to the moisture-sensitivity of these alluvial clayey soils, the exposed subgrade can deteriorate quickly and significantly during site preparation if exposed to inclement weather, and additional undercutting/stabilization after the initial proofroll may be required if the subgrade is left exposed. Proofrolling should be performed after a suitable period of dry weather to avoid degrading an otherwise acceptable subgrade. Areas which continue to rut or deflect excessively during the proofrolling should be stabilized as directed by the ECS Geotechnical Engineer. Stabilizing measures at this site would likely consist of undercutting and replacement with engineered fill, compacted densely-graded crushed stone, and/or the use of a geotextile. The most appropriate remedial measures to stabilize the unstable subgrade should be recommended by ECS at the time of proofrolling.

Undercut excavations, if necessary, shall not be left open during periods of inclement weather. The resulting undercut excavations should be backfilled with properly compacted engineered fill or densely-graded crushed stone as directed by ECS at the time of proofrolling until the design grades are achieved. Once the site grading has been completed, a sacrificial layer of densely-graded crushed stone may be considered across the building and pavement areas to protect the subgrades from the deteriorating effects of inclement weather and construction traffic.

The preparation of fill subgrades, as well as the proposed building or pavement subgrades, should be observed on a full-time basis by a representative of ECS. These observations should be performed by an experienced geotechnical engineer, or their representative, to make sure that all unsuitable materials have been removed and that the prepared subgrade is suitable for support of the proposed construction and/or fills.

5.2 Engineered Fill

Following site preparation, and after achieving a competent subgrade, the contractor can place and compact approved, controlled engineered fill to achieve the desired site grades. We assume that only shallow leveling cuts and fills (less than 3 feet) would typically be required to establish final subgrade elevations within the building area. Fill for support of the proposed construction and for backfill of utility lines within expanded building limits should consist of soils that are free of organic matter and debris and are approved for use by the Geotechnical Engineer. The fill materials should contain not more than 60 percent passing the No. 200 sieve and have a plasticity index less than 25 and a liquid limit less than 50. Fill soil should have a standard Proctor (AASHTO T 99) maximum dry density of at least 100 pounds per cubic foot (pcf).

Prior to the commencement of fill operations and/or utilization of any off-site borrow materials, the contractor should provide representative samples of the soil to the geotechnical engineer. The geotechnical engineer will determine the material's suitability for use as an engineered fill and develop moisture-density relationships in accordance with the recommendations provided herein. Samples should be provided to the geotechnical engineer at least 2 to 3 days prior to their use in the field to allow for the appropriate laboratory testing to be performed.

Engineered fill placed within the building and pavement areas should be placed in lifts not exceeding 8 inches in loose lift thickness and moisture conditioned to within their working range of optimum moisture content, and compacted to a minimum of 98 percent of their standard

Proctor maximum dry density, as determined in accordance with AASHTO T 99. Similarly, confined areas of engineered fill, such as backfill behind walls or in utility trenches, should be placed in lifts not exceeding 4 to 6 inches and meet the same compaction criteria. The moisture content of the fill should be maintained in the soil's working range of optimum, which is typically plus or minus 3 percent.

The footprint of the proposed building area should be well defined during fill placement. Grade controls should also be maintained throughout the filling operations. Filling operations should be observed on a full-time basis by an experienced soils engineering technician to determine that the required degrees of compaction are being achieved. We recommend that a minimum of one compaction test per 1,500-square-foot area be performed for each lift of controlled fill. The elevation and location of the tests should be accurately identified at the time of fill placement. Areas which fail to achieve the required degree of compaction should be re-compacted and re-tested until the required compaction is achieved. Failing test areas may require moisture adjustments or other suitable remedial activities in order to achieve the required compaction

Fill materials should not be placed on frozen soils or frost-heaved soils and/or soils which have been recently subjected to precipitation. Borrow fill materials should not contain wet or frozen materials at the time of placement. Wet or frost-heaved soils should be removed prior to placement of engineered fill, granular sub-base materials, foundation or slab concrete, and asphalt pavement materials.

If problems are encountered during the site grading operations, or if the actual site conditions differ from those encountered during our subsurface exploration, the geotechnical engineer should be notified immediately.

5.3 Excavation and Groundwater Considerations

Based upon the boring data, areas of mass excavation or utility trenches that extend more than 9 ½ feet below current grade may encounter difficult excavation due to the presence of an alluvial cobble layer.

Groundwater was encountered at depths ranging between about 6 to 9 feet below the existing ground surface in the borings. Groundwater will be expected to rise somewhat during winter months. We would not anticipate typical seasonal fluctuations of the groundwater table to rise near the elevation of typical shallow foundation and utility excavations at this site.

Temporary excavations into alluvial and residual soils should have side slopes either braced or inclined no steeper than 1.5(H):1(V). Areas of mass excavation, trenches and pits should meet the requirements of the most current Occupational Safety and Health Administration (OSHA) 29 CFR Part 1926, "Occupational Safety and Health Standards-Excavations" and should be properly dewatered as necessary. Based on the boring results, the majority of the soils encountered during this exploration appear to be OSHA Type B and C soils for the purpose of temporary excavation support. Regardless, site safety shall be the sole responsibility of the contractor and his subcontractors.

5.4 Foundation Design

Provided proper site preparation and earthwork activities are performed as recommended in this report, the proposed structure can be supported on conventional shallow foundations bearing on properly evaluated and approved existing fill or new engineered fill. We recommend a

maximum net allowable soil bearing pressure of up to 2,500 psf be used for proportioning shallow foundations. The net allowable soil bearing pressure refers to that pressure which may be transmitted to the foundation bearing soils in excess of the final minimum surrounding overburden pressure. To reduce the possibility of foundation bearing failure and excessive settlement due to local shear or "punching" failures, we recommend that continuous footings have a minimum width of 18 inches and that isolated column footings have a minimum lateral dimension of 24 inches even though the allowable bearing pressure may not be fully developed in all cases. We recommend the bearing elevation for foundations be a minimum depth of 18 inches below the finished exterior grade to provide adequate frost protection.

The final footing elevation should be evaluated by ECS personnel during construction to verify that the bearing soils are capable of supporting the recommended net allowable bearing pressure and suitable for foundation construction. These evaluations should include visual observations, hand rod probing, and dynamic cone penetrometer (ASTM STP-399) testing in each column footing excavation and at intervals not greater than 25 feet in continuous footing excavations. The importance of these evaluations cannot be over-emphasized due to the presence of moisture-sensitive clayey soils throughout the site.

Due to the moisture-sensitive clayey alluvial soils encountered across the site, there may be the need for local undercuts or other remedial foundation subgrade repairs in areas where the bottom of footing subgrade is found to be soft or allowed to become wet. Remedial activities may include shallow undercutting, stabilization with geosynthetics, or some combination thereof. We do not recommend undercut excavations be backfilled with open-graded aggregate (such as No. 57 stone). Engineered fill or densely-graded crushed stone (ABC) should be used as backfill as directed by ECS at the time of construction.

Exposure to the environment may weaken the soils at the foundation bearing level if the foundation excavations remain exposed during periods of inclement weather. Therefore, foundation concrete should be placed the same day that proper excavation is achieved and the design bearing pressure verified. If the bearing soils are softened by surface water absorption or exposure to the environment, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the foundation excavation must remain open overnight, or if rainfall is apparent while the bearing soils are exposed, we recommend that a 2 to 3-inch thick "mud mat" of "lean" concrete be placed over the exposed bearing soils for protection before the placement of reinforcing steel.

The settlement of a structure is a function of the compressibility of the bearing materials, bearing pressure, actual structural loads, fill depths, and the bearing elevation of footings with respect to the final ground surface elevation. Provided the recommendations outlined in this report are strictly adhered to, we expect total post-construction settlements for the proposed building to be less than 1 inch, while the post-construction differential settlement between columns or along walls will be less than ½ inch. This evaluation is based on our engineering experience and the anticipated structural loadings for this type of building, and is intended to aid the structural engineer with his design.

5.5 Concrete Slab-On-Grade

The concrete slab-on-grade for the proposed building may be designed using a modulus of subgrade reaction (k) value of 110 pci. We recommend the slab-on-grade be underlain by a minimum of 4 inches of granular material having a maximum aggregate size of 1½ inches and no more than 2 percent fines (i.e., clean sand or washed stone). Prior to placing the granular

material, the floor subgrade soil should be properly compacted, proofrolled, and free of standing water, mud, and frozen soil. A properly designed and constructed capillary break layer can often eliminate the need for a moisture retarder and can assist in more uniform curing of concrete. If a vapor retarder is considered to provide additional moisture protection, special attention should be given to the surface curing of the slabs to minimize uneven drying of the slabs and associated cracking and/or slab curling. The use of a blotter or cushion layer above the vapor retarder can also be considered for project specific reasons. Please refer to ACI 302.1R04 *Guide for Concrete Floor and Slab Construction* and ASTM E 1643 *Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs* for additional guidance on this issue.

We recommend that the floor slab be isolated from the footings so differential settlement of the structures will not induce shear stresses on the floor slab. Also, in order to minimize the crack width of any shrinkage cracks that may develop near the surface of the slab, we recommend mesh reinforcement as a minimum be included in the design of the floor slab. For maximum effectiveness, temperature and shrinkage reinforcements in slabs on ground should be positioned in the upper third of the slab thickness. The Wire Reinforcement Institute recommends the mesh reinforcement be placed 2 inches below the slab surface or upper one-third of slab thickness, whichever is closer to the surface. Adequate construction joints, contraction joints and isolation joints should also be provided in the slabs to reduce the impacts of cracking and shrinkage. Please refer to ACI 302.1R04 *Guide for Concrete Floor and Slab Construction* for additional information regarding concrete slab joint design.

5.6 Pavement Considerations

The subgrades for all pavements should be prepared in accordance with the recommendations in the “Site and Subgrade Preparation” and “Engineered Fill” sections of this report. An important consideration with the design and construction of pavements is surface and subsurface drainage. Where standing water develops, either on the pavement surface or within the base course layer, softening of the subgrades and other problems related to the deterioration of the pavement can be expected. Furthermore, good drainage should help reduce the possibility of the subgrade materials becoming saturated during the normal service period of the pavement.

We have not been provided with anticipated truck counts or traffic loading as a basis for pavement thickness design. Therefore, we present the standard minimum pavement sections in the chart below as a guide based on our past experience with similar projects and subsurface conditions. Final pavement sections should be designed based on actual anticipated traffic loading conditions.

The minimum pavement sections below have been developed using AASHTO design guidelines based on an assumed soaked CBR value of 3 and an anticipated design life of 20 years. These minimum pavement sections would be considered appropriate for traffic loadings of up to 10,000 ESALs for the light duty pavements and up to 100,000 ESALs for the heavy duty pavements. *Please note that actual or anticipated traffic loadings that are different than those assumed above may require thicker pavement sections.*

Material Designation	Light Duty Asphalt Pavement	Heavy Duty Asphalt Pavement	Portland Cement Concrete (PCC) Pavement
Asphalt (S 9.5B and/or I 19.0B)	2.5 inches	3.5 inches	-
Portland Cement Concrete	-	-	6.0 inches
Aggregate Base Course	6 inches	8 inches	4 inches (optional)

**ECS should be allowed to carefully review these recommendations and make appropriate revisions based upon the formulation of the final traffic design criteria for the project.*

The asphalt concrete surface course materials, asphalt concrete binder course materials, and underlying aggregate base course materials should conform to the latest edition of the North Carolina Department of Transportation Standard Specifications. Careful selection of the asphalt binder and surface course mixes should be made based upon the anticipated traffic conditions for the facilities.

Front-loading trash dumpsters frequently impose concentrated front-wheel loads on pavements during loading. This type of loading typically results in rutting and shoving of bituminous pavements and ultimately pavement failures and costly repairs. Therefore, we recommend that the pavements in trash pickup areas utilize the Portland Cement Concrete (PCC) pavement section. The recommended Portland Cement Concrete pavement section is also recommended within truck loading dock and ramp areas. Appropriate steel reinforcing and jointing should also be incorporated into the design of all PCC pavement.

5.7 Seismic Site Class Determination

The 2012 North Carolina Building Code (NCBC) requires that a seismic Site Class be assigned for the new building. The method for determining the Site Class is presented in Section 1613.5.2 of the NCBC. The seismic Site Class is typically determined by calculating a weighted average of the N-values or shear wave velocities recorded in test borings or in cone penetration test soundings to a depth of 100 feet. Based upon our boring data, we have calculated a weighted average N-value of 41 which corresponds to a seismic Site Class “D”.

5.8 Site Drainage

Due to the moisture-sensitive nature of the clayey alluvial soils, final site drainage will be very important for the proposed construction, and should be carefully evaluated. Positive drainage should be provided around the perimeter of the building structure both during and after construction to minimize the potential for moisture infiltration into the foundation and/or subgrade soils. We recommend that landscaped areas adjacent to these structures be sloped away from the construction and maintain a fall of at least 6 inches for the first 10 feet outward from the structures. Similarly, roof drains should drain a sufficient distance from the building perimeter or discharge directly into below-grade storm water piping. The parking lots, sidewalks, and other paved areas should also be sloped to divert surface water away from the proposed building.

5.9 Construction Considerations

Due to the fine-grained alluvial soils encountered across the site, which are moisture sensitive, it will be important to maintain good site drainage during earthwork operations to help maintain the integrity of the surface soils. The surface of the site should be kept properly graded and

sloped to enhance drainage of surface water away from the proposed construction areas and soil stockpiles during the earthwork phase of this project. We recommend that surface drainage be diverted away from the proposed building areas without significantly interrupting its flow. Other practices would involve protecting soil stockpiles from inclement weather with tarps or plastic sheeting, and sealing the exposed subgrades with a smooth-drum roller at the end of the day's work to reduce the potential for infiltration of surface water into the soils. In addition, construction equipment cannot be permitted to randomly run across the site, especially once the desired final grades have been established. Construction equipment should be limited to designated lanes and areas, especially during wet periods to minimize disturbance of the site subgrades. Once the grading has been completed, a sacrificial layer of well-graded crushed stone may be considered across the building pad and pavement areas to protect the subgrade from the deteriorating effects of inclement weather and construction traffic.

The key to minimizing disturbance problems with the soils is to have proper control of the earthwork operations. Specifically, it should be the earthwork contractor's responsibility to maintain the site soils within a workable moisture content range to obtain the required in-place density and maintain a stable subgrade. Scarifying and drying operations should be included in the contractor's price and not be considered an extra to the contract.

6.0 CLOSING

Our evaluation of foundation support conditions has been based on our understanding of the site and project information and the data obtained in our exploration. The general subsurface conditions utilized in our foundation evaluation have been based on interpolation of subsurface data between the borings. In evaluating the boring data, we have examined previous correlations between penetration resistance values and foundation bearing pressures observed in soil conditions similar to those at your site. If the project information is incorrect or if the structure location (horizontal or vertical) and/or dimensions are changed, please contact us so that our recommendations can be reviewed. The client should provide ECS the final design and construction documents to help confirm that our geotechnical recommendations have been correctly interpreted. The discovery of any site or subsurface conditions during construction which deviate from the data outlined in this exploration should be reported to us for our evaluation. The assessment of site environmental conditions for the presence of pollutants in the soil and groundwater of the site was beyond the scope of this geotechnical exploration. ECS has not performed a Phase I environmental site assessment at this location.

APPENDIX

Boring Location Diagram

Unified Soil Classification System

Reference Notes for Boring Logs

Boring Logs B-1 through B-6

Laboratory Testing Summary

Liquid and Plastic Limits Test Reports

		Scale: 1 inch = 100ft	6/9/2015
Boring Location			

ECS

BORING LOCATION DIAGRAM

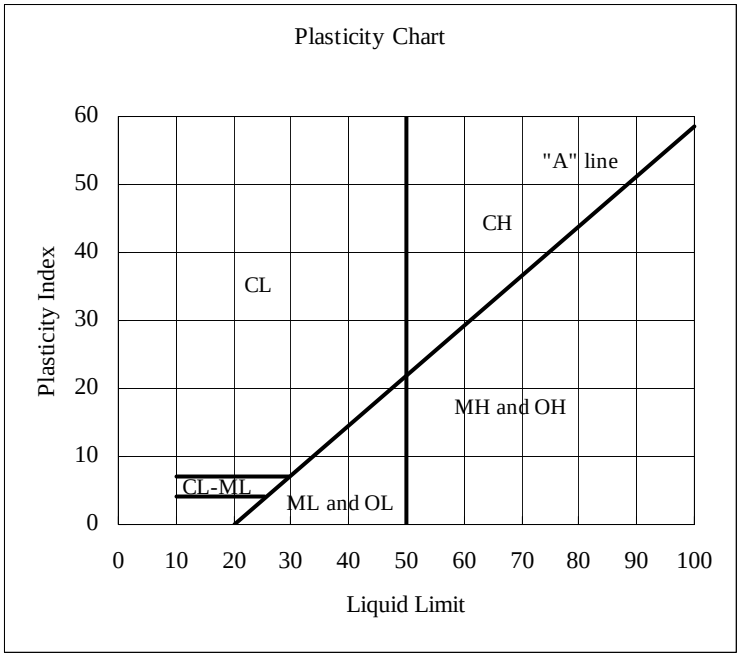
Asheville office
1900 Hendersonville Road
Suite 10
Asheville NC 28803

N
W E
S

ECS PROJECT NO.31:2793
NCDOT Hayesville Equipment Shop - Geotech
225 Tusquittee Street
Hayesville NC 28904

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

Major Divisions			Group Symbols		Typical Names	Laboratory Classification Criteria		
Coarse-grained soils (More than half of material is larger than No. 200 Sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 percent GW, GP, SW, SP; More than 12 percent GM, GC, SM, SC; 5 to 12 percent Borderline cases requiring dual symbols [b]	$C_u = D_{60}/D_{10}$ greater than 4; $C_c = (D_{30})^2/(D_{10}xD_{60})$ between 1 and 3	
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW	
		Gravels with fines (Appreciable amount of fines)	GM [a]	d	Silty gravels, gravel-sand mixtures		Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
				u				
			GC		Clayey gravels, gravel-sand-clay mixtures		Atterberg limits below "A" line or P.I. less than 7	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines		$C_u = D_{60}/D_{10}$ greater than 6; $C_c = (D_{30})^2/(D_{10}xD_{60})$ between 1 and 3	
			SP		Poorly graded sands, gravelly sands, little or no fines		Not meeting all gradation requirements for SW	
		Sands with fines (Appreciable amount of fines)	SM [a]	d	Silty sands, sand-silt mixtures		Atterberg limits above "A" line or P.I. less than 4	Limits plotting in CL-ML zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
				u				
			SC		Clayey sands, sand-clay mixtures		Atterberg limits above "A" line with P.I. greater than 7	
Fine-grained soils (More than half material is smaller than No. 200 Sieve)	Silts and clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity			
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
			OL		Organic silts and organic silty clays of low plasticity			
	Silts and clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts			
			CH		Inorganic clays of high plasticity, fat clays			
			OH		Organic clays of medium to high plasticity, organic silts			
	Highly Organic soils		Pt		Peat and other highly organic soils			



[a] Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.

[b] Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC,well-graded gravel-sand mixture with clay binder. (From Table 2.16 - Winterkorn and Fang, 1975)

REFERENCE NOTES FOR BORING LOGS

I. Drilling Sampling Symbols

SS	Split Spoon Sampler	ST	Shelby Tube Sampler
RC	Rock Core, NX, BX, AX	PM	Pressuremeter
DC	Dutch Cone Penetrometer	RD	Rock Bit Drilling
BS	Bulk Sample of Cuttings	PA	Power Auger (no sample)
HSA	Hollow Stem Auger	WS	Wash sample
REC	Rock Sample Recovery %	RQD	Rock Quality Designation %

II. Correlation of Penetration Resistances to Soil Properties

Standard Penetration (blows/ft) refers to the blows per foot of a 140 lb. hammer falling 30 inches on a 2-inch OD split-spoon sampler, as specified in ASTM D 1586. The blow count is commonly referred to as the N-value.

A. Non-Cohesive Soils (Silt, Sand, Gravel and Combinations)

Density		*Relative Properties*	
Under 4 blows/ft	Very Loose	Adjective Form	12% to 49%
5 to 10 blows/ft	Loose	With	5% to 12%
11 to 30 blows/ft	Medium Dense		
31 to 50 blows/ft	Dense		
Over 51 blows/ft	Very Dense		

Particle Size Identification		
Boulders		8 inches or larger
Cobbles		3 to 8 inches
Gravel	Coarse	1 to 3 inches
	Medium	½ to 1 inch
	Fine	¼ to ½ inch
Sand	Coarse	2.00 mm to ¼ inch (dia. of lead pencil)
	Medium	0.42 to 2.00 mm (dia. of broom straw)
	Fine	0.074 to 0.42 mm (dia. of human hair)
Silt and Clay		0.0 to 0.074 mm (particles cannot be seen)

B. Cohesive Soils (Clay, Silt, and Combinations)

Blows/ft	*Consistency*	*Unconfined Comp. Strength Q_p (tsf)*	*Degree of Plasticity*	*Plasticity Index*
Under 2	Very Soft	Under 0.25	None to slight	0 – 4
3 to 4	Soft	0.25-0.49	Slight	5 – 7
5 to 8	Medium Stiff	0.50-0.99	Medium	8 – 22
9 to 15	Stiff	1.00-1.99	High to Very High	Over 22
16 to 30	Very Stiff	2.00-3.00		
31 to 50	Hard	4.00–8.00		
Over 51	Very Hard	Over 8.00		

III. Water Level Measurement Symbols

WL	Water Level	BCR	Before Casing Removal	DCI	Dry Cave-In
WS	While Sampling	ACR	After Casing Removal	WCI	Wet Cave-In
WD	While Drilling	▽	Est. Groundwater Level	⊽	Est. Seasonal High GWT

The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in a granular soil. In clay and plastic silts, the accurate determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally applied.

CLIENT	JOB #	BORING #	SHEET
NCDOT	2793	B-1	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
NCDOT Hayesville Equipment Shop - Geotech	

SITE LOCATION

225 Tusquittee Street, Hayesville, Clay County, NC

NORTHING	EASTING	STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% - — - REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

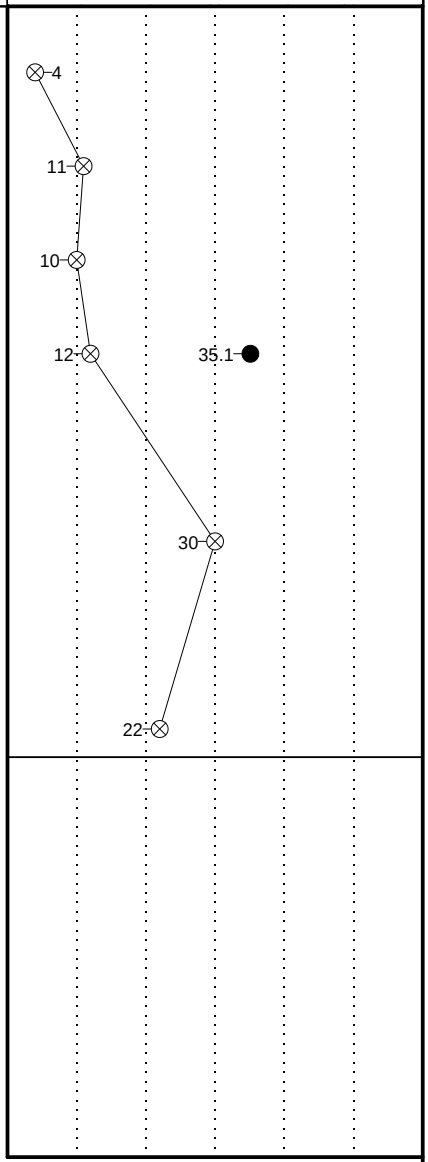
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING ▶ LOSS OF CIRCULATION

SURFACE ELEVATION

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Asphalt Depth [2"], ABC Stone Depth [8"]			
	S-1	SS	18	18	(ML FILL) FINE TO MEDIUM SANDY SILT, Light Brown, Moist, Soft			3 2 2
	S-2	SS	18	6	(CL FILL) FINE SANDY CLAY, Reddish Yellow, Moist, Stiff			12 4 7
5	S-3	SS	18	15				4 4 6
	S-4	SS	18	18	(SM FILL) SILTY FINE TO MEDIUM SAND WITH GRAVEL, Dark Brown, Moist, Medium Dense (CL) ALLUVIAL FINE SANDY CLAY, Reddish Yellow, Wet to Saturated, Stiff	▼		5 5 7
10								
	S-5	SS	18	18	(SM) ALLUVIAL SILTY MEDIUM TO COARSE SAND WITH GRAVEL, Light Reddish Brown, Saturated, Medium Dense			17 16 14
15								
	S-6	SS	18	0				12 10 12
20					END OF BORING @ 20.0'			
25								
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

▽ WL WS ☐ WD ☐	BORING STARTED 05/19/15	CAVE IN DEPTH @ 12'
▽ WL(BCR) ▼ WL(ACR) 9	BORING COMPLETED 05/19/15	HAMMER TYPE Manual
▽ WL	RIG 45C Tk. FOREMAN BJ	DRILLING METHOD HSA

CLIENT	JOB #	BORING #	SHEET
NCDOT	2793	B-2	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
NCDOT Hayesville Equipment Shop - Geotech	

SITE LOCATION

225 Tusquittee Street, Hayesville, Clay County, NC

NORTHING	EASTING	STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ——

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

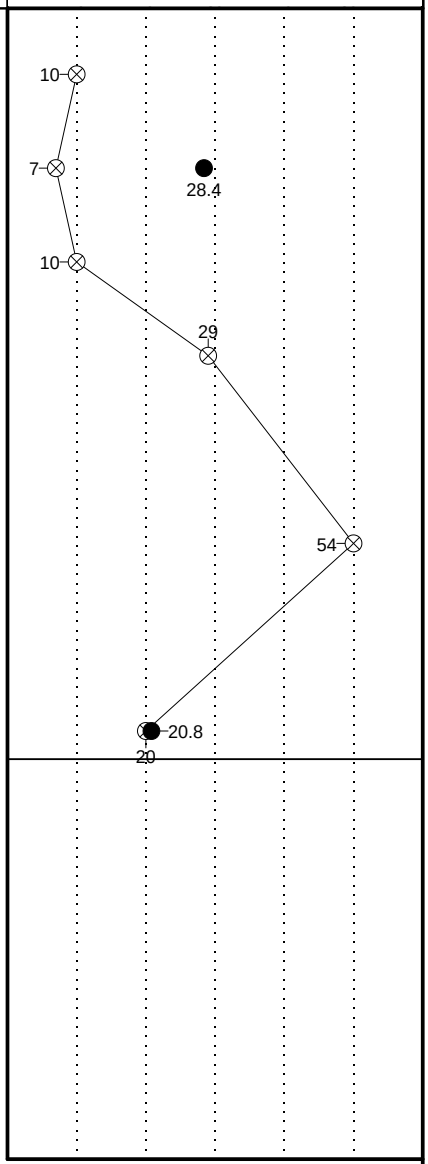
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING ▰ LOSS OF CIRCULATION

SURFACE ELEVATION

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Asphalt Depth [1"], ABC Stone Depth [6"]			
	S-1	SS	18	13	(ML FILL) FINE SANDY SILT, Dark Brown to Black, Moist, Stiff			6 6 4
	S-2	SS	18	11	(CL FILL) FINE SANDY CLAY, Yellowish Brown, Moist, Medium Stiff			4 3 4
5	S-3	SS	18	15	(SM FILL) SILTY FINE TO MEDIUM SAND WITH GRAVEL, Dark Brown, Moist, Medium Dense	▼		4 5 5
	S-4	SS	18	13	(CL) FINE SANDY CLAY, Yellow, Wet to Saturated, Very Stiff			3 12 17
10	S-5	SS	18	9				19 26 28
15					(SM) ALLUVIAL SILTY MEDIUM TO COARSE SAND WITH GRAVEL, Light Reddish Brown, Saturated, Medium Dense			
	S-6	SS	18	5	(SM) SILTY FINE TO MEDIUM SAND, Contains Mica, Gray, Saturated, Medium Dense			14 9 11
20					END OF BORING @ 20.0'			
25								
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

▽ WL WS ☐ WD ☐	BORING STARTED 05/19/15	CAVE IN DEPTH @ 10.5'
▽ WL(BCR) ▼ WL(ACR) 6.5	BORING COMPLETED 05/19/15	HAMMER TYPE Manual
▽ WL	RIG 45C Tk. FOREMAN BJ	DRILLING METHOD HSA

CLIENT	JOB #	BORING #	SHEET
NCDOT	2793	B-3	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
NCDOT Hayesville Equipment Shop - Geotech	

SITE LOCATION

225 Tusquittee Street, Hayesville, Clay County, NC

NORTHING	EASTING	STATION

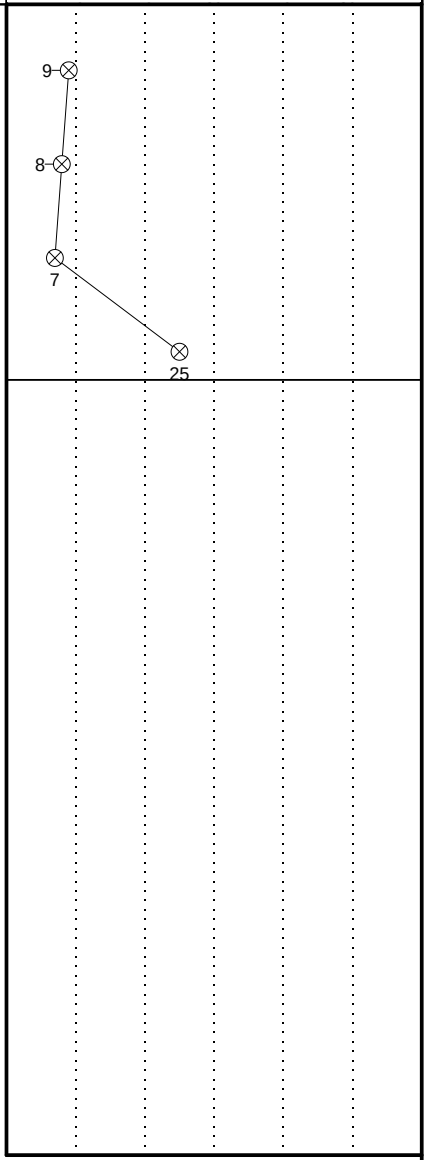
CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% - — - REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL (ENGLISH UNITS)	WATER LEVELS ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [3"]		
	S-1	SS	18	6	(ML FILL) FINE SANDY SILT, Dark Brown, Moist, Stiff		5 5 4
	S-2	SS	18	9	(CL FILL) SANDY LEAN CLAY, White, Moist to Wet, Medium Stiff		2 3 5
5	S-3	SS	18	8		▼	3 3 4
	S-4	SS	18	14			5 11 14
10					(SM) ALLUVIAL SILTY MEDIUM TO COARSE SAND WITH GRAVEL, Light Reddish Brown, Saturated, Medium Dense		
					END OF BORING @ 10.0'		
15							
20							
25							
30							



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

▽ WL WS ☐ WD ☐	BORING STARTED 05/26/15	CAVE IN DEPTH @ 8'
▽ WL(BCR) ▼ WL(ACR) 6	BORING COMPLETED 05/26/15	HAMMER TYPE Manual
▽ WL	RIG 45C Tk. FOREMAN BJ	DRILLING METHOD HSA

CLIENT	JOB #	BORING #	SHEET
NCDOT	2793	B-4	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
NCDOT Hayesville Equipment Shop - Geotech	

SITE LOCATION

225 Tusquittee Street, Hayesville, Clay County, NC

NORTHING	EASTING	STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% - — - REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

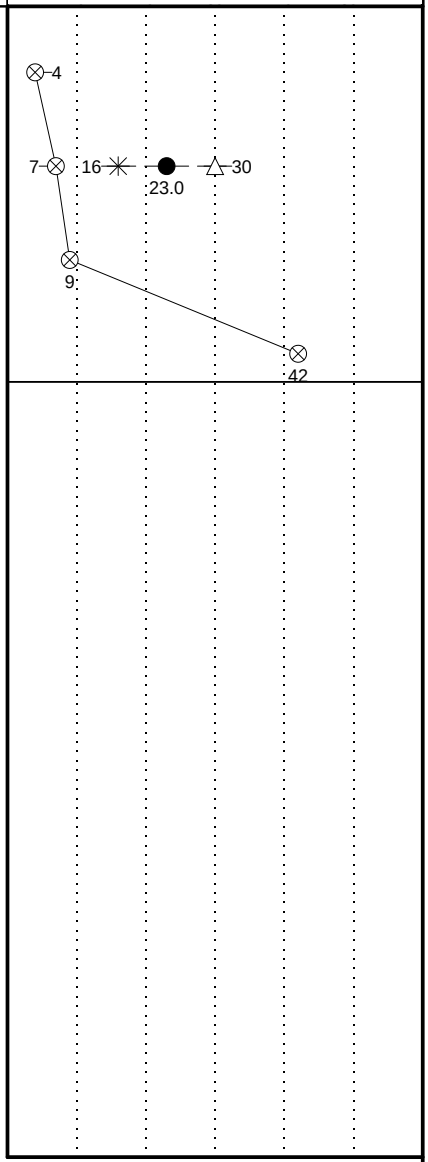
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING ▰ LOSS OF CIRCULATION

SURFACE ELEVATION

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [4"]			
	S-1	SS	18	0	(CL FILL) FINE SANDY CLAY, Dark Brown, Moist, Soft			3 2 2
	S-2	SS	18	9	(CL FILL) SANDY LEAN CLAY, White, Moist to Wet, Medium Stiff			3 2 5
5	S-3	SS	18	11		▽		4 4 5
	S-4	SS	18	15				12 19 23
10					(SM) ALLUVIAL SILTY MEDIUM TO COARSE SAND WITH GRAVEL, Light Reddish Brown, Saturated, Medium Dense			
					END OF BORING @ 10.0'			
15								
20								
25								
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

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▽ WL(BCR) ▼ WL(ACR) 6	BORING COMPLETED 05/26/15	HAMMER TYPE Manual
▽ WL	RIG 45C Tk. FOREMAN BJ	DRILLING METHOD HSA

CLIENT	JOB #	BORING #	SHEET
NCDOT	2793	B-5	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
NCDOT Hayesville Equipment Shop - Geotech	

SITE LOCATION

225 Tusquittee Street, Hayesville, Clay County, NC

NORTHING	EASTING	STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% - — - REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

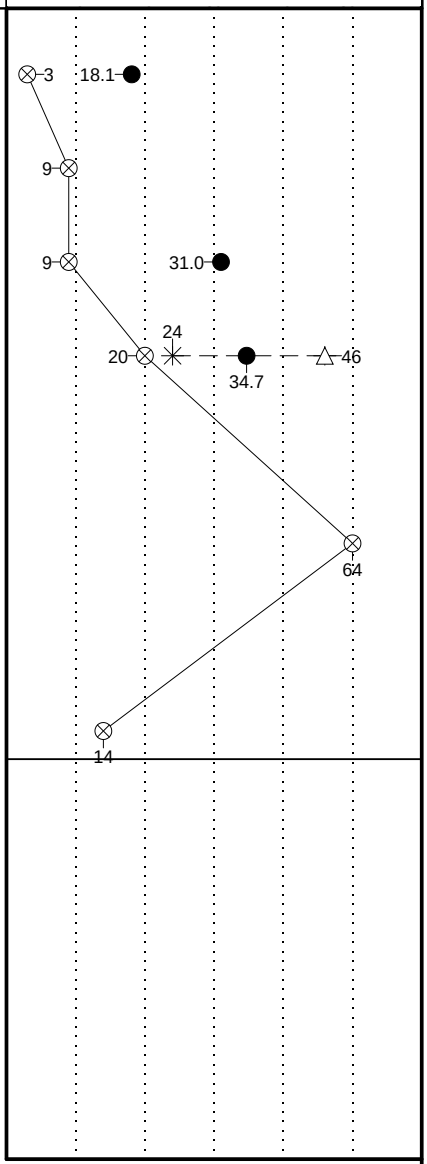
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING ▰ LOSS OF CIRCULATION

SURFACE ELEVATION

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Asphalt Depth [1"], ABC Stone Depth [4"]			
	S-1	SS	18	18	(ML FILL) FINE SANDY SILT, Dark Brown to Black, Moist, Soft			2 1 2
	S-2	SS	18	8	(CL FILL) FINE SANDY CLAY, Yellowish Brown, Moist, Stiff			11 3 6
5	S-3	SS	18	18	(CL) FINE SANDY CLAY, Yellow, Wet to Saturated, Very Stiff	▽		6 5 4
	S-4	SS	18	18				3 3 17
10	S-5	SS	18	12				15 26 38
15					(SM) ALLUVIAL SILTY MEDIUM TO COARSE SAND WITH GRAVEL, Light Reddish Brown, Saturated, Medium Dense			
	S-6	SS	18	18				5 6 8
20					END OF BORING @ 20.0'			
25								
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

▽ WL WS ☐ WD ☐	BORING STARTED 05/19/15	CAVE IN DEPTH @ 11'
▽ WL(BCR) ▼ WL(ACR) 6.0	BORING COMPLETED 05/19/15	HAMMER TYPE Manual
▽ WL	RIG 45C Tk. FOREMAN BJ	DRILLING METHOD HSA

CLIENT	JOB #	BORING #	SHEET
NCDOT	2793	B-6	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
NCDOT Hayesville Equipment Shop - Geotech	

SITE LOCATION

225 Tusquittee Street, Hayesville, Clay County, NC

NORTHING	EASTING	STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% - — - REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

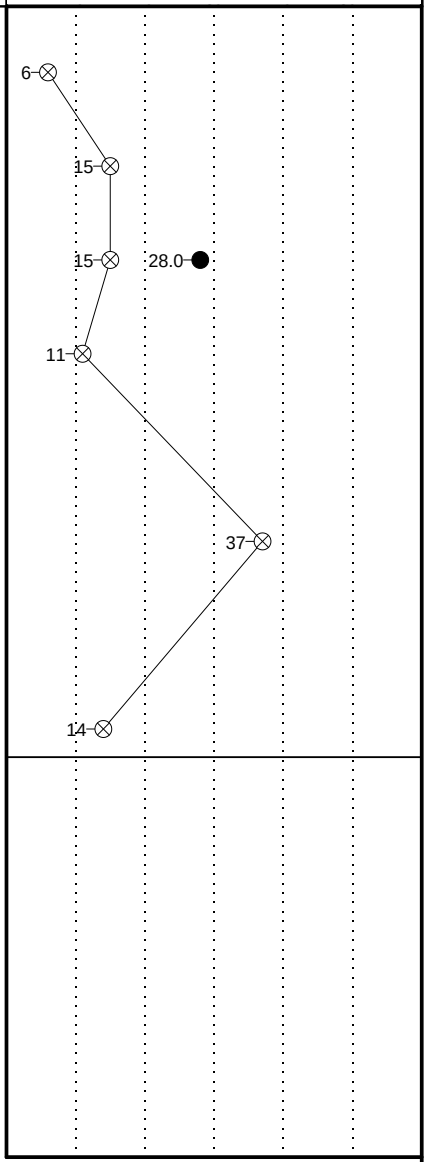
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING ▰ LOSS OF CIRCULATION

SURFACE ELEVATION

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Asphalt Depth [2"], ABC Stone Depth [8"]			
	S-1	SS	18	14	(ML FILL) FINE TO MEDIUM SANDY SILT, Light Brown, Moist, Medium Stiff			4 3 3
	S-2	SS	18	5				7 3 12
5					(ML FILL) FINE SANDY SILT, Dark Brown and Red, Moist, Stiff			
	S-3	SS	18	9		▽		5 6 9
	S-4	SS	18	13	(CL) ALLUVIAL MEDIUM SANDY CLAY, Yellowish Brown, Wet to Saturated, Stiff			3 4 7
10								
	S-5	SS	18	9	(SM) ALLUVIAL SILTY MEDIUM TO COARSE SAND WITH GRAVEL, Light Reddish Brown, Saturated, Medium Dense to Dense			13 16 21
15								
	S-6	SS	18	3				15 8 6
20					END OF BORING @ 20.0'			
25								
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

▽ WL WS ☐ WD ☐	BORING STARTED 05/26/15	CAVE IN DEPTH @ 7.0'
▽ WL(BCR) ▼ WL(ACR) 7	BORING COMPLETED 05/26/15	HAMMER TYPE Auto
▽ WL	RIG 45C Tk. FOREMAN BJ	DRILLING METHOD HSA

Laboratory Testing Summary

Sample Source	Sample Number	Depth (feet)	MC[1] (%)	Soil Type[2]	Atterberg Limits[3]			Percent Passing No. 200 Sieve[4]	Moisture - Density (Corr.)[5]		CBR Value[6]	Other
					LL	PL	PI		Maximum Density (pcf)	Optimum Moisture (%)		
B-1												
	S-4	8.50 - 10.00	35.1	CL				56.0				
B-2												
	S-2	3.50 - 5.00	28.4	CL FILL				56.9				
	S-6	18.50 - 20.00	20.8	SM				21.2				
B-4												
	S-2	3.50 - 5.00	23.0	CL FILL	30	16	14	52.3				
B-5												
	S-1	1.00 - 2.50	18.1	ML FILL								
	S-3	6.00 - 7.50	31.0	CL FILL								
	S-4	8.50 - 10.00	34.7	CL	46	24	22	57.2				
B-6												
	S-3	6.00 - 7.50	28.0	ML FILL				61.9				

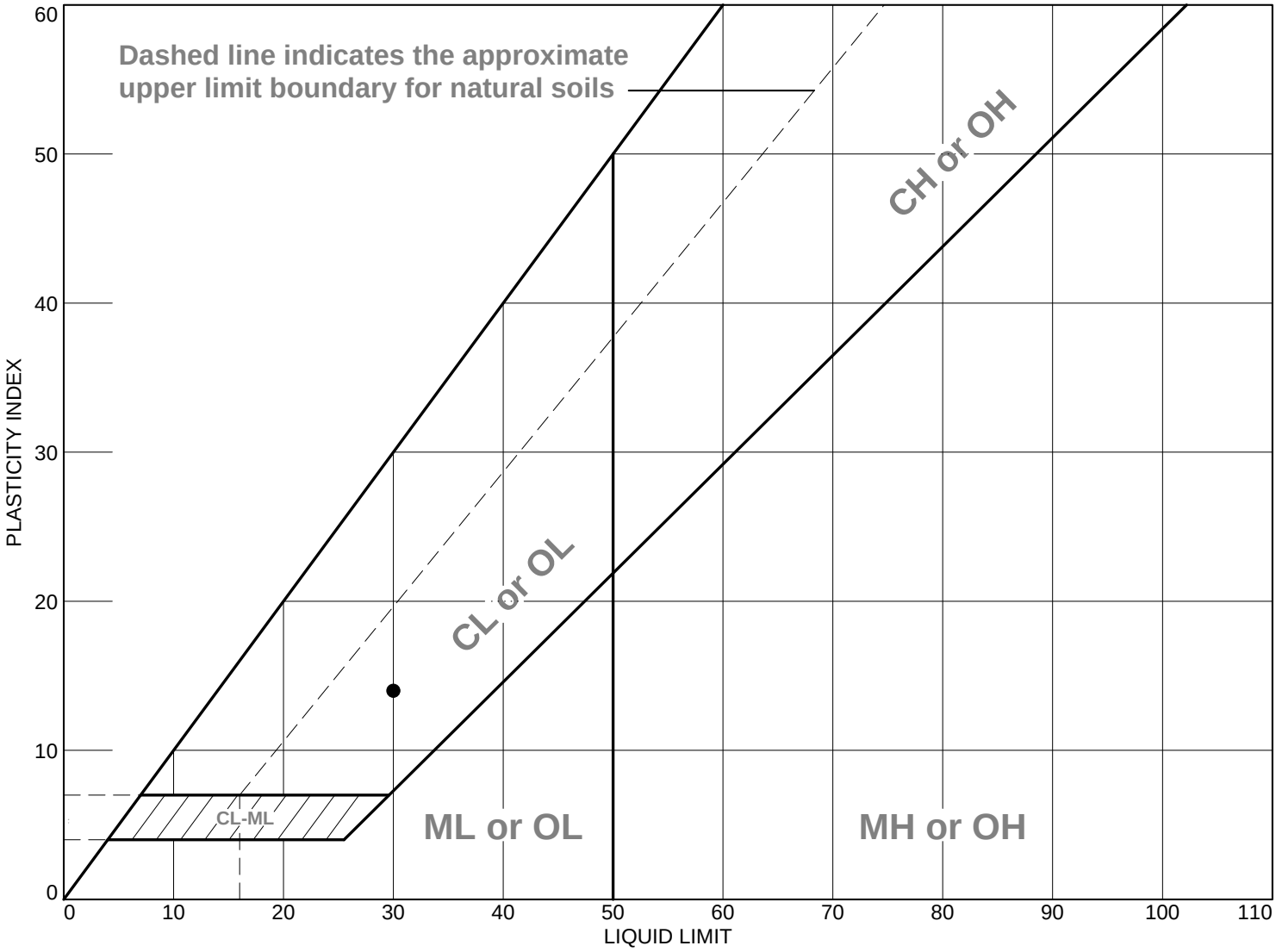
Notes: 1. ASTM D 2216, 2. ASTM D 2487, 3. ASTM D 4318, 4. ASTM D 1140, 5. See test reports for test method, 6. See test reports for test method

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content (ASTM D 2974)

Project No. 2793
Project Name: NCDOT Hayesville Equipment Shop - Geotech
PM: Montana K. Foulke
PE: Matthew S. Fogleman
Printed On: Tuesday, June 09, 2015

ECS CAROLINAS, LLP
1900 Hendersonville Road, Suite 10
Asheville, NC 28803
Phone: (828) 665-2307
Fax: (828) 665-8128

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	(CL FILL) FINE SANDY CLAY, Dark Brown, Moist, Loose	30	16	14		52.3	CL FILL

Project No. 2793 **Client:** NCDOT

Project: NCDOT Hayesville Equipment Shop - Geotech

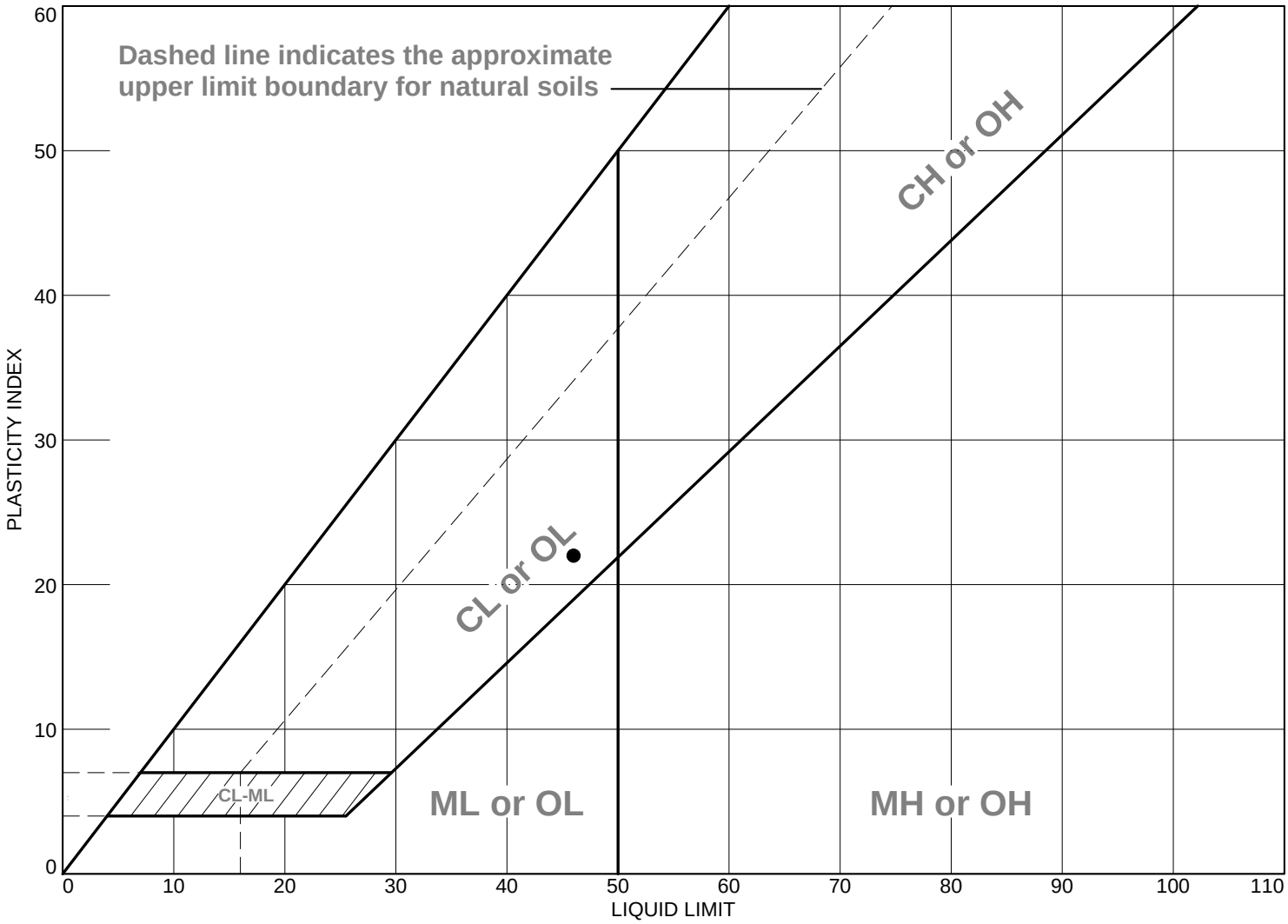
● **Source of Sample:** B-4 **Depth:** 3.50-5.00 **Sample Number:** S-2

Remarks:

ECS CAROLINAS, LLP
1900 Hendersonville Road, Suite 10
Asheville, NC 28803
Phone: (828) 665-2307
Fax: (828) 665-8128

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	(CL) FINE SANDY CLAY, Yellow, Wet to Saturated, Medium Dense to Very Dense	46	24	22		57.2	CL

Project No. 2793 **Client:** NCDOT

Project: NCDOT Hayesville Equipment Shop - Geotech

● **Source of Sample:** B-5 **Depth:** 8.50-10.00 **Sample Number:** S-4

Remarks:

ECS CAROLINAS, LLP
1900 Hendersonville Road, Suite 10
Asheville, NC 28803
Phone: (828) 665-2307
Fax: (828) 665-8128

Figure

Tested By: DK **Checked By:** MKF

SECTION 00 73 00

SUPPLEMENTARY GENERAL CONDITIONS

The General Conditions of the Contract for Construction, Instructions to Bidder and General Conditions of the Contract Articles 1 through 54 inclusive, is part of this Contract and is incorporated as fully as is herein set forth.

Supplementary General Conditions.

The following supplements modify, delete and/or add to the General Conditions. Where any portion of the General Conditions is modified or any paragraph, subparagraph or clause thereof is modified or deleted by these Supplementary Conditions, the unaltered provisions of the General Conditions shall remain in effect.

Modifications to the General Conditions.

Acritical 23.A. Add the following subparagraph. The time of completion for construction shall be 360 consecutive calendar days from the said date.

Article 23 B. Add the following subparagraph. For each day in excess thereof, liquidated damages shall be a cost of $500.00 per day.

END OF SECTION 00 73 00

ADVERTISEMENT FOR BIDS

Sealed proposals will be received until 1:00 pm on April 19, 2016, in the office of Mr. Adam Dockery, PE, 225 Tusquittee Street, Hayesville, NC 28904, for the construction of a 6,000 SF Maintenance Shop with Office Area at which time and place bids will be opened and read.

An open mandatory pre-bid meeting will be held for all interested bidders on March 22, 2016 at 2:00 pm at the project site 225 Tusquittee Street, Hayesville, NC 28904. Any Bidder that does not attend the mandatory pre-bid meeting will be disqualified. HUB vendors are encouraged to attend the pre bid meeting.

Complete plans and specifications for this project can be obtained from Clark Patterson Lee 6302 Fairview Road, Suite 102, Charlotte, NC 28210 during normal office hours after March 7, 2016.

Plan Deposit ($100.00) One Hundred Dollars.

The state reserves the unqualified right to reject any and all proposals.

N O T I C E T O B I D D E R S

Sealed proposals will be received by the Department of Transportation in Hayesville NC, in the office of Mr. Adam Dockery, PE, 225 Tusquittee Street, Hayesville, NC 28904 up to 1:00 pm April 19, 2016 and immediately thereafter publicly opened and read for the furnishing of labor, material and equipment entering into the construction of

NCDOT Division 14 Assembly Office and Maintenance Building

This scope of work consists of construction of a 6,000 Office and Maintenance Facility for NCDOT. The building consists of wood framing, CMU block, cement board siding/trim and architectural shingles and TPO roof systems, including MEP systems site work consisting of underground utilities and utility connections and rough grading. NCDOT will construct the parking lot after underground and rough grading is complete.

Bids will be received for a single prime contract. All proposals shall be lump sum.

Pre-Bid Meeting

An open mandatory pre-bid meeting will be held for all interested bidders on March 22, 2016 at 2:00 pm at the project site 225 Tusquittee Street, Hayesville, NC 28904. The meeting will address project specific questions, issues, bidding procedures and bid forms. Any Bidder that does not attend the mandatory pre-bid meeting will be disqualified. HUB vendors are encouraged to attend the pre bid meeting.

Complete plans, specifications and contract documents will be open for inspection in the offices of Clark Patterson Lee Office and in the plan rooms of the Associated General Contractors, Carolinas Branch, Asheville in the local North Carolina offices of McGraw-Hill Dodge Corporation, and in the Eastern Regional Office of Reed Construction Data in Norcross, GA and in Minority Plan Rooms in

Hispanic Contractors Association of the Carolinas (HCAC) in Winston-Salem, Charlotte and Raleigh Areas – 877-227-1680

Cherokee Business Development Center, PO Box 1200, Ginger Lynn Welch Complex, 810 Acquoni Road, Cherokee, NC 28719, Phone: 828-497 1666, FAX: 828-497-1665.

or may be obtained by those qualified as prime bidders, upon deposit of One Hundred dollars ($ 100.00) in cash or certified check. The full plan deposit will be returned to those bidders provided all documents are returned in good, usable condition within ten (10) days after the bid date.

NOTE: The bidder shall include with the bid proposal the form *Identification of Minority Business Participation* identifying the minority business participation it will use on the project and shall include either *Affidavit **A*** or *Affidavit **B*** as applicable. Forms and instructions are included within the Proposal Form in the bid documents. Failure to complete these forms is grounds for rejection of the bid. (GS143-128.2c Effective 1/1/2002.)

All contractors are hereby notified that they must have proper license as required under the state laws governing their respective trades.

General contractors are notified that Chapter 87, Article 1, General Statutes of North Carolina, will be observed in receiving and awarding general contracts. General contractors submitting bids on this project must have license classification for building.

NOTE--SINGLE PRIME CONTRACTS: Under GS 87-1, a contractor that superintends or manages construction of any building, highway, public utility, grading, structure or improvement shall be deemed a "general contractor" and shall be so licensed. Therefore a single prime project that involves other trades will require the single prime contractor to hold a proper General Contractors license. **EXCEPT**: On public buildings being bid single prime, where the total value of the general construction does not exceed 25% of the total construction value, contractors under GS87- Arts 2 and 4 (Plumbing, Mechanical & Electrical) may bid and contract directly with the Owner as the SINGLE PRIME CONTRACTOR and may subcontract to other properly licensed trades. GS87-1.1- Rules .0210

A performance bond and a payment bond will be required for one hundred percent (100%) of the contract price.

Payment will be made based on ninety-five percent (95%) of monthly estimates and final payment made upon completion and acceptance of work.

No bid may be withdrawn after the scheduled closing time for the receipt of bids for a period of 30 days.

The owner reserves the right to reject any or all bids and to waive informalities.

Designer:
Clark Patterson Lee
6302 Fairview Road, Suite 102
Charlotte NC 28210

1.800.274.9000

Owner:
State of North Carolina
Department of Transportation

INSTRUCTIONS TO BIDDERS

AND

GENERAL CONDITIONS OF THE CONTRACT

STANDARD FORM FOR CONSTRUCTION PROJECTS

STATE CONSTRUCTION OFFICE

NORTH CAROLINA

DEPARTMENT OF ADMINISTRATION

Form OC-15

This document is intended for use on State capital construction projects and shall not be used on any project that is not reviewed and approved by the State Construction Office. Extensive modification to the General Conditions by means of "Supplementary General Conditions" is strongly discouraged. State agencies and institutions may include special requirements in "Division 1 – General Requirements" of the specifications, where they do not conflict with the General Conditions.

Twenty Fourth Edition January 2013

INSTRUCTIONS TO BIDDERS

For a proposal to be considered it must be in accordance with the following instructions:

1. **PROPOSALS**

Proposals must be made in strict accordance with the Form of Proposal provided therefor, and all blank spaces for bids, alternates, and unit prices applicable to bidder's work shall be properly filled in. When requested alternates are not bid, the proposer shall so indicate by the words "No Bid". Any blanks shall also be interpreted as "No Bid".The bidder agrees that bid on Form of Proposal detached from specifications will be considered and will have the same force and effect as if attached thereto. Photocopied or faxed proposals will not be considered. Numbers shall be stated both in writing and in figures for the base bids and alternates. If figures and writing differ, the written number will supersede the figures.

Any modifications to the Form of Proposal (including alternates and/or unit prices) will disqualify the bid and may cause the bid to be rejected.

The bidder shall fill in the Form of Proposal as follows:

a. If the documents are executed by a sole owner, that fact shall be evidenced by the word "Owner" appearing after the name of the person executing them.

b. If the documents are executed by a partnership, that fact shall be evidenced by the word "Co-Partner" appearing after the name of the partner executing them.

c. If the documents are executed on the part of a corporation, they shall be executed by either the president or the vice president and attested by the secretary or assistant secretary in either case, and the title of the office of such persons shall appear after their signatures. The seal of the corporation shall be impressed on each signature page of the documents.

d. If the proposal is made by a joint venture, it shall be executed by each member of the joint venture in the above form for sole owner, partnership or corporation, whichever form is applicable.

e. All signatures shall be properly witnessed.

f. If the contractor's license of a bidder is held by a person other than an owner, partner or officer of a firm, then the licensee shall also sign and be a party to the proposal. The title "Licensee" shall appear under his/her signature.

Proposals should be addressed as indicated in the Advertisement for Bids and be delivered, enclosed in an opaque sealed envelope, marked "Proposal" and bearing the title of the work, name of the bidder, and the contractor's license number of the bidder. Bidders should clearly mark on the outside of the bid envelope which contract(s) they are bidding.

Bidder shall identify on the bid**,** the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit listing good faith efforts or an affidavit indicating work under contract will be self-performed, as required by G.S. 143-128.2(c) and G.S. 143-128.2(f). Failure to comply with these requirements is grounds for rejection of the bid.

For projects bid in the single-prime alternative, the names and license numbers of major subcontractors shall be listed on the proposal form.

It shall be the specific responsibility of the bidder to deliver his bid to the proper official at the selected place and prior to the announced time for the opening of bids. Later delivery of a bid for any reason, including delivery by any delivery service, shall disqualify the bid.

Unit prices quoted in the proposal shall include overhead and profit and shall be the full compensation for the contractor's cost involved in the work. See General Conditions, Article 19c-1.

2. EXAMINATION OF CONDITIONS

It is understood and mutually agreed that by submitting a bid the bidder acknowledges that he has carefully examined all documents pertaining to the work, the location, accessibility and general character of the site of the work and all existing buildings and structures within and adjacent to the site, and has satisfied himself as to the nature of the work, the condition of existing buildings and structures, the conformation of the ground, the character, quality and quantity of the material to be encountered, the character of the equipment, machinery, plant and any other facilities needed preliminary to and during prosecution of the work, the general and local conditions, the construction hazards, and all other matters, including, but not limited to, the labor situation which can in any way affect the work under the contract, and including all safety measures required by the Occupational Safety and Health Act of 1970 and all rules and regulations issued pursuant thereto. It is further mutually agreed that by submitting a proposal the bidder acknowledges that he has satisfied himself as to the feasibility and meaning of the plans, drawings, specifications and other contract documents for the construction of the work and that he accepts all the terms, conditions and stipulations contained therein; and that he is prepared to work in cooperation with other contractors performing work on the site.

Reference is made to contract documents for the identification of those surveys and investigation reports of subsurface or latent physical conditions at the site or otherwise affecting performance of the work which have been relied upon by the designer in preparing the documents. The owner will make copies of all such surveys and reports available to the bidder upon request.

Each bidder may, at his own expense, make such additional surveys and investigations as he may deem necessary to determine his bid price for the performance of the work. Any on-site investigation shall be done at the convenience of the owner. Any reasonable request for access to the site will be honored by the owner.

3. BULLETINS AND ADDENDA

Any addenda to specifications issued during the time of bidding are to be considered covered in the proposal and in closing a contract they will become a part thereof. It shall be the bidder’s responsibility to ascertain prior to bid time the addenda issued and to see that his bid includes any changes thereby required.

Should the bidder find discrepancies in, or omission from, the drawings or documents or should he be in doubt as to their meaning, he shall at once notify the designer who will send written instructions in the form of addenda to all bidders. Notification should be no later than seven (7) days prior to the date set for receipt of bids. Neither the owner nor the designer will be responsible for any oral instructions.

All addenda should be acknowledged by the bidder(s) on the Form of Proposal. However, even if not acknowledged, by submitting a bid, the bidder has certified that he has reviewed all issued addenda and has included all costs associated within his bid.

4. **BID SECURITY**

Each proposal shall be accompanied by a cash deposit or a certified check drawn on some bank or trust company insured by the Federal Deposit Insurance Corporation, or a bid bond in an amount equal to not less than five percent (5%) of the proposal, said deposit to be retained by the owner as liquidated damages in event of failure of the successful bidder to execute the contract within ten (10) days after the award or to give satisfactory surety as required by law (G.S. 143-129).

Bid bond shall be conditioned that the surety will, upon demand, forthwith make payment to the obligee upon said bond if the bidder fails to execute the contract. The owner may retain bid securities of any bidder(s) who may have a reasonable chance of award of contract for the full duration of time stated in the Notice to Bidders. Other bid securities may be released sooner, at the discretion of the owner. All bid securities (cash or certified checks) shall be returned to the bidders promptly after award of contracts, and no later then seven (7) days after expiration of the holding period stated in the Notice to Bidders. Standard Form of Bid Bond is included in these specifications and shall be used.

5. **RECEIPT OF BIDS**

Bids shall be received in strict accordance with requirements of the General Statutes of North Carolina. Bid security shall be required as prescribed by statute. Prior to the closing of the bid, the bidder will be permitted to change or withdraw his bid. Guidelines for opening of public construction bids are available from the State Construction Office.

6. **OPENING OF BIDS**

Upon opening, all bids shall be read aloud. Once bidding is closed, there shall not be any withdrawal of bids by any bidder and no bids may be returned by the designer to any bidder. After the opening of bids, no bid may be withdrawn, except under the provisions of General Statute 143-129.1, for a period of thirty days unless otherwise specified. Should the successful bidder default and fail to execute a contract, the contract may be awarded to the next lowest and responsible bidder. The owner reserves the unqualified right to reject any and all bids. Reasons for rejection may include, but shall not be limited to, the following:

a. If the Form of Proposal furnished to the bidder is not used or is altered.

b. If the bidder fails to insert a price for all bid items, alternate and unit prices requested.

c. If the bidder adds any provisions reserving the right to accept or reject any award.

d. If there are unauthorized additions or conditional bids, or irregularities of any kind which tend to make the proposal incomplete, indefinite or ambiguous as to its meaning.

e. If the bidder fails to complete the proposal form where information is requested so the bid may be properly evaluated by the owner.

f. If the unit prices contained in the bid schedule are unacceptable to the owner and the State Construction Office.

g. If the bidder fails to comply with other instructions stated herein.

7. **BID EVALUATION**

The award of the contract will be made to the lowest responsible bidder as soon as practical. The owner may award on the basis of the base bid and any alternates the owner chooses.

Before awarding a contract, the owner may require the apparent low bidder to qualify himself to be a responsible bidder by furnishing any or all of the following data:

a. The latest financial statement showing assets and liabilities of the company or other information satisfactory to the owner.

b. A listing of completed projects of similar size.

c. Permanent name and address of place of business.

d. The number of regular employees of the organization and length of time the organization has been in business under present name.

e. The name and home office address of the surety proposed and the name and address of the responsible local claim agent.

f. The names of members of the firms who hold appropriate trade licenses, together with license numbers.

g. If prequalified, contractor info will be reviewed and evaluated comparatively to submitted prequalification package.

Failure or refusal to furnish any of the above information, if requested, shall constitute a basis for disqualification of any bidder.

In determining the lowest responsible, responsive bidder, the owner shall take into consideration the bidder's compliance with the requirements of G.S. 143-128.2(c), the past performance of the bidder on construction contracts for the State with particular concern given to completion times, quality of work, cooperation with other contractors, and cooperation with the designer and owner. Failure of the low bidder to furnish affidavit and/or documentation as required by G.S. 143-128.2(c) shall constitute a basis for disqualification of the bid.

Should the owner adjudge that the apparent low bidder is not the lowest responsible, responsive bidder by virtue of the above information, said apparent low bidder will be so notified and his bid security shall be returned to him.

8. **PERFORMANCE BOND**

The successful bidder, upon award of contract, shall furnish a performance bond in an amount equal to 100 percent of the contract price. See Article 35, General Conditions.

9. **PAYMENT BOND**

The successful bidder, upon award of contract, shall furnish a payment bond in an amount equal to 100 percent of the contract price. See Article 35, General Conditions.

10. **PAYMENTS**

Payments to the successful bidders (contractors) will be made on the basis of monthly estimates. See Article 31, General Conditions.

11. **PRE-BID CONFERENCE**

Prior to the date set for receiving bids, the Designer may arrange and conduct a Pre-Bid Conference for all prospective bidders. The purpose of this conference is to review project requirements and to respond to questions from prospective bidders and their subcontractors or material suppliers related to the intent of bid documents. Attendance by prospective bidders shall be as required by the "Notice to Bidders".

12. **SUBSTITUTIONS**

In accordance with the provisions of G.S. 133-3, material, product, or equipment substitutions proposed by the bidders to those specified herein can only be considered during the bidding phase until ten (10) days prior to the receipt of bids when submitted to the Designer with sufficient data to confirm material, product, or equipment equality. Proposed substitutions submitted after this time will be considered only as potential change order.

Submittals for proposed substitutions shall include the following information:

a. Name, address, and telephone number of manufacturer and supplier as appropriate.

b. Trade name, model or catalog designation.

c. Product data including performance and test data, reference standards, and technical descriptions of material, product, or equipment. Include color samples and samples of available finishes as appropriate.

d. Detailed comparison with specified products including performance capabilities, warranties, and test results.

e. Other pertinent data including data requested by the Designer to confirm product equality.

If a proposed material, product, or equipment substitution is deemed equal by the Designer to those specified, all bidders of record will be notified by Addendum**.**

GENERAL CONDITIONS OF THE CONTRACT

The use or reproduction of this document or any part thereof is authorized for and limited to use on projects of the State of North Carolina, and is distributed by, through and at the discretion of the State Construction Office, Raleigh, North Carolina, for that distinct and sole purpose.

TABLE OF CONTENTS

ARTICLE 1 - DEFINITIONS

a. The **contract documents** consist of the Notice to Bidders; Instructions to Bidders; General Conditions of the Contract; special conditions if applicable; Supplementary General Conditions; the drawing and specifications, including all bulletins, addenda or other modifications of the drawings and specifications incorporated into the documents prior to their execution; the proposal; the contract; the performance bond; the payment bond; insurance certificates; the approval of the attorney general; and the certificate of the Office of State Budget and Management. All of these items together form the contract.

b. The **owner** is the State of North Carolina through the agency named in the contract.

c. The **designer(s)** are those referred to within this contract, or their authorized representatives. The Designer(s), as referred to herein, shall mean architect and/or engineer. They will be referred to hereinafter as if each were of the singular number, masculine gender.

d. The **contractor**, as referred to hereinafter, shall be deemed to be either of the several contracting parties called the "Party of the First Part" in either of the several contracts in connection with the total project. Where, in special instances hereinafter, a particular contractor is intended, an adjective precedes the word "contractor," as "general," "heating," etc. For the purposes of a single prime contract, the term Contractor shall be deemed to be the single contracting entity identified as the “Party of the First Part” in the single Construction Contract. Any references or adjectives that name or infer multiple prime contractors shall be interpreted to mean the single prime Contractor.

e. A **subcontractor**, as the term is used herein, shall be understood to be one who has entered into a direct contract with a contractor, and includes one who furnishes materials worked to a special design in accordance with plans and specifications covered by the contract, but does not include one who only sells or furnishes materials not requiring work so described or detailed.

f. **Written notice** shall be defined as notice in writing delivered in person to the contractor, or to a partner of the firm in the case of a partnership, or to a member of the contracting organization, or to an officer of the organization in the case of a corporation, or sent to the last known business address of the contracting organization by registered mail.

g. **Work**, as used herein as a noun, is intended to include materials, labor, and workmanship of the appropriate contractor.

h. The **project** is the total construction work to be performed under the contract documents by the several contractors.

i. **Project Expediter,** as used herein, is an entity stated in the contract documents, designated to effectively facilitate scheduling and coordination of work activities. See Article 14(f) for responsibilities of a Project Expediter. **For the purposes of a single prime contract, the single prime contractor shall be designated as the Project Expediter.**

j. **Change order**, as used herein, shall mean a written order to the contractor subsequent to the signing of the contract authorizing a change in the contract. The change order shall be signed by the contractor, designer and the owner, and approved by the State Construction Office, in that order (Article 19).

k. **Field Order,** as used herein, shall mean a written approval for the contractor to proceed with the work requested by owner prior to issuance of a formal Change Order. The field order shall be signed by the contractor, designer, owner, and State Construction Office.

l. **Time of completion**, as stated in the contract documents, is to be interpreted as consecutive calendar days measured from the date established in the written Notice to Proceed, or such other date as may be established herein (Article 23).

m. **Liquidated damages,** as stated in the contract documents [, is an amount reasonably estimated in advance to cover the consequential damages associated with the Owner's economic loss in not being able to use the Project for its intended purposes at the end of the contract's completion date as amended by change order, if any, by reason of failure of the contractor(s) to complete the work within the time specified. Liquidated damages does not include the Owner's extended contract administration costs (including but not limited to additional fees for architectural and engineering services, testing services, inspection services, commissioning services, etc.), such other damages directly resulting from delays caused solely by the contractor, or consequential damages that the Owner identified in the bid documents that may be impacted by any delay caused soley by the Contractor (e.g., if a multi-phased project-subsequent phases, delays in start other projects that are dependent on the completion of this Project, extension of leases and/or maintenance agreements for other facilities).

n. **Surety**, as used herein, shall mean the bonding company or corporate body which is bound with and for the contractor, and which engages to be responsible for the contractor and his acceptable performance of the work.

o. **Routine written communications between the Designer and the Contractor** are any communication other than a "request for information" provided in letter, memo, or transmittal format, sent by mail, courier, electronic mail, or facsimile. Such communications can not be identified as "request for information".

p. **Clarification or Request for information (RFI)** is a request from the Contractor seeking an interpretation or clarification by the Designer relative to the contract documents. The RFI, which shall be labeled (RFI), shall clearly and concisely set forth the issue or item requiring clarification or interpretation and why the response is needed. The RFI must set forth the Contractor's interpretation or understanding of the contract documents requirements in question, along with reasons for such an understanding.

q. **Approval** means written or imprinted acknowledgement that materials, equipment or methods of construction are acceptable for use in the work**.**

r. **Inspection** shall mean examination or observation of work completed or in progress to determine its compliance with contract documents.

s. **"Equal to" or "approved equal"** shall mean materials, products, equipment, assemblies, or installation methods considered equal by the bidder in all characteristics (physical, functional, and aesthetic) to those specified in the contract documents. Acceptance of equal is subject to approval of Designer and owner.

t. **"Substitution" or "substitute"** shall mean materials, products, equipment, assemblies, or installation methods deviating in at least one characteristic (physical, functional, or aesthetic) from those specified, but which in the opinion of the bidder would improve competition and/or enhance the finished installation. Acceptance of substitution is subject to the approval of the Designer and owner.

u. **Provide** shall mean furnish and install complete in place, new, clean, operational, and ready for use.

v. **Indicated and shown** shall mean provide as detailed, or called for, and reasonably implied in the contract documents.

w. **Special inspector** is one who inspects materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with the approved construction documents and referenced standards.

x. **Commissioning** is a quality assurance process that verifies and documents that building components and systems operate in accordance to the owner's project requirements and the project design documents.

y. **Designer Final Inspection** is the inspection performed by the design team to determine the completeness of the project in accordance with approved plans and specifications. This inspection occurs prior to SCO final inspection.

z. **SCO Final Inspection** is the inspection performed by the State Construction Office to determine the completeness of the project in accordance with NC Building Codes and approved plans and specifications.

aa. **Beneficial Occupancy** is requested by the owner and is occupancy or partial occupancy of the building after all life safety items have been completed as determined by the State Construction Office. Life safety items include but not limited to fire alarm, sprinkler, egress and exit lighting, fire rated walls, egress paths and security.

bb. Final Acceptance is the date in which the State Construction Office accepts the construction as totally complete. This includes the SCO Final Inspection and certification by the designer that all punch lists are completed.

ARTICLE 2 - INTENT AND EXECUTION OF DOCUMENTS

a. The drawings and specifications are complementary, one to the other, and that which is shown on the drawings or called for in the specifications shall be as binding as if it were both called for and shown. The intent of the drawings and specifications is to establish the scope of all labor, materials, transportation, equipment, and any and all other things necessary to provide a bid for a complete job. In case of discrepancy or disagreement in the contract documents, the order of precedence shall be: Form of Contract, specifications, large-scale detail drawings, small-scale drawings.

b. The wording of the specifications shall be interpreted in accordance with common usage of the language except that words having a commonly used technical or trade meaning shall be so interpreted in preference to other meanings.

c. The contractor shall execute each copy of the proposal, contract, performance bond and payment bond as follows:

1. If the documents are executed by a sole owner, that fact shall be evidenced by the word "Owner" appearing after the name of the person executing them.

2. If the documents are executed by a partnership, that fact shall be evidenced by the word "Co-Partner" appearing after the name of the partner executing them.

3. If the documents are executed on the part of a corporation, they shall be executed by either the president or the vice president and attested by the secretary or assistant secretary in either case, and the title of the office of such persons shall appear after their signatures. The seal of the corporation shall be impressed on each signature page of the documents.

4. If the documents are made by a joint venture, they shall be executed by each member of the joint venture in the above form for sole owner, partnership or corporation, whichever form is applicable to each particular member.

5. All signatures shall be properly witnessed.

6. If the contractor's license is held by a person other than an owner, partner or officer of a firm, then the licensee shall also sign and be a party to the contract. The title "Licensee" shall appear under his/her signature.

7. The bonds shall be executed by an attorney-in-fact. There shall be attached to each copy of the bond a certified copy of power of attorney properly executed and dated.

8. Each copy of the bonds shall be countersigned by an authorized individual agent of the bonding company licensed to do business in North Carolina. The title "Licensed Resident Agent" shall appear after the signature.

9. The seal of the bonding company shall be impressed on each signature page of the bonds.

10. The contractor's signature on the performance bond and the payment bond shall correspond with that on the contract. The date of performance and payment bond shall not be prior to the date of the contract.

ARTICLE 3 - CLARIFICATIONS AND DETAIL DRAWINGS

a. In such cases where the nature of the work requires clarification by the designer, such clarification shall be furnished by the designer with reasonable promptness by means of written instructions or detail drawings, or both. Clarifications and drawings shall be consistent with the intent of contract documents, and shall become a part thereof.

b. The contractor(s) and the designer shall prepare, if deemed necessary, a schedule fixing dates upon which foreseeable clarifications will be required. The schedule will be subject to addition or change in accordance with progress of the work. The designer shall furnish drawings or clarifications in accordance with that schedule. The contractor shall not proceed with the work without such detail drawings and/or written clarifications.

ARTICLE 4 - COPIES OF DRAWINGS AND SPECIFICATIONS

The designer or Owner shall furnish free of charge to the contractors electronic copies of plans and specifications. If requested by the contractor, paper copies of plans and specifications shall be furnished free of charge as follows:

a. General contractor - Up to twelve (12) sets of general contractor drawings and specifications, up to six (6) sets of which shall include drawings and specifications of all other contracts, plus a clean set of black line prints on white paper of all appropriate drawings, upon which the contractor shall clearly and legibly record all work-in-place that is at variance with the contract documents.

b. Each other contractor - Up to six (6) sets of the appropriate drawings and specifications, up to three (3) sets of which shall include drawings and specifications of all other contracts, plus a clean set of black line prints on white paper of all appropriate drawings, upon which the contractor shall clearly and legibly record all work-in-place that is at variance with the contract documents.

c. Additional sets shall be furnished at cost, including mailing, to the contractor upon request by the contractor. This cost shall be stated in the bidding documents.

d. For the purposes of a single-prime contract, the contractor shall receive up to 30 sets of drawings and specifications, plus a clean set of black line prints on white paper of all appropriate drawings, upon which the contractor shall clearly and legibly record all work-in-place that is at variance with the contract documents.

ARTICLE 5 - SHOP DRAWINGS, SUBMITTALS, SAMPLES, DATA

a. Within 15 consecutive calendar days after the notice to proceed, each prime contractor shall submit a schedule for submission of all shop drawings, product data, samples, and similar submittals through the Project Expediter to the Designer. This schedule shall indicate the items, relevant specification sections, other related submittal, data, and the date when these items will be furnished to the designer.

b. The Contractor(s) shall review, approve and submit to the Designer all Shop Drawings, Coordination Drawings, Product Data, Samples, Color Charts, and similar submittal data required or reasonably implied by the Contract Documents. Required Submittals shall bear the Contractor's stamp of approval, any exceptions to the Contract Documents shall be noted on the submittals, and copies of all submittals shall be of sufficient quantity for the Designer to retain up to three (3) copies of each submittal for his own use plus additional copies as may be required by the Contractor. Submittals shall be presented to the Designer in accordance with the schedule submitted in paragraph (a). so as to cause no delay in the activities of the Owner or of separate Contractors.

c. The Designer shall review required submittals promptly, noting desired corrections if any, and retaining three (3) copies (1 for the Designer, 1 for the owner and 1 for SCO) for his use. The remaining copies of each submittal shall be returned to the Contractor not later than twenty (20) days from the date of receipt by the Designer, for the Contractor's use or for corrections and resubmittal as noted by the Designer. When resubmittals are required, the submittal procedure shall be the same as for the original submittal**s.**

d. Approval of shop drawings/submittals by the Designer shall not be construed as relieving the Contractor from responsibility for compliance with the design or terms of the contract documents nor from responsibility of errors of any sort in the shop drawings, unless such lack of compliance or errors first have been called in writing to the attention of the Designer by the Contractor.

ARTICLE 6 - WORKING DRAWINGS AND SPECIFICATIONS AT THE JOB SITE

a. The contractor shall maintain, in readable condition at his job office, one complete set of working drawings and specifications for his work including all shop drawings. Such drawings and specifications shall be available for use by the designer, his authorized representative, owner or State Construction Office.

b. The contractor shall maintain at the job office, a day-to-day record of work-in-place that is at variance with the contract documents. Such variations shall be fully noted on project drawings by the contractor and submitted to the designer upon project completion and no later than 30 days after final acceptance of the project.

c. The contractor shall maintain at the job office a record of all required tests that have been performed, clearly indicating the scope of work inspected and the date of approval or rejection.

ARTICLE 7 - OWNERSHIP OF DRAWINGS AND SPECIFICATIONS

All drawings and specifications are instruments of service and remain the property of the owner. The use of these instruments on work other than this contract without permission of the owner is prohibited. All copies of drawings and specifications other than contract copies shall be returned to the owner upon request after completion of the work.

ARTICLE 8 - MATERIALS, EQUIPMENT, EMPLOYEES

a. The contractor shall, unless otherwise specified, supply and pay for all labor, transportation, materials, tools, apparatus, lights, power, heat, sanitary facilities, water, scaffolding and incidentals necessary for the completion of his work, and shall install, maintain and remove all equipment of the construction, other utensils or things, and be responsible for the safe, proper and lawful construction, maintenance and use of same, and shall construct in the best and most workmanlike manner, a complete job and everything incidental thereto, as shown on the plans, stated in the specifications, or reasonably implied therefrom, all in accordance with the contract documents.

b. All materials shall be new and of quality specified, except where reclaimed material is authorized herein and approved for use. Workmanship shall at all times be of a grade accepted as the best practice of the particular trade involved, and as stipulated in written standards of recognized organizations or institutes of the respective trades except as exceeded or qualified by the specifications.

c. Upon notice, the contractor shall furnish evidence as to quality of materials.

d. Products are generally specified by ASTM or other reference standard and/or by manufacturer's name and model number or trade name. When specified only by reference standard, the Contractor may select any product meeting this standard, by any manufacturer. When several products or manufacturers are specified as being equally acceptable, the Contractor has the option of using any product and manufacturer combination listed. However, the contractor shall be aware that the cited examples are used only to denote the quality standard of product desired and that they do not restrict bidders to a specific brand, make, manufacturer or specific name; that they are used only to set forth and convey to bidders the general style, type, character and quality of product desired; and that equivalent products will be acceptable. Request for substitution of materials, items, or equipment shall be submitted to the designer for approval or disapproval; such approval or disapproval shall be made by the designer prior to the opening of bids. Alternate materials may be requested after the award if it can clearly be demonstrated that it is an added benefit to the owner and the designer and owner approves.

e. The designer is the judge of equality for proposed substitution of products, materials or equipment.

g. If at any time during the construction and completion of the work covered by these contract documents, the language, conduct, or attire of any workman of the various crafts be adjudged a nuisance to the owner or designer, or if any workman be considered detrimental to the work, the contractor shall order such parties removed immediately from grounds.

ARTICLE 9 - ROYALTIES, LICENSES AND PATENTS

It is the intention of the contract documents that the work covered herein will not constitute in any way infringement of any patent whatsoever unless the fact of such patent is clearly evidenced herein. The contractor shall protect and save harmless the owner against suit on account of alleged or actual infringement. The contractor shall pay all royalties and/or license fees required on account of patented articles or processes, whether the patent rights are evidenced hereinafter.

ARTICLE 10 - PERMITS, INSPECTIONS, FEES, REGULATIONS

a. The contractor shall give all notices and comply with all laws, ordinances, codes, rules and regulations bearing on the conduct of the work under this contract. If the contractor observes that the drawings and specifications are at variance therewith, he shall promptly notify the designer in writing. See Instructions to Bidders, Paragraph 3, Bulletins and Addenda. Any necessary changes required after contract award shall be made by change order in accordance with Article 19. If the contractor performs any work knowing it to be contrary to such laws, ordinances, codes, rules and regulations, and without such notice to the designer, he shall bear all cost arising therefrom. Additional requirements implemented after bidding will be subject to equitable negotiations.

b. All work under this contract shall conform to the North Carolina State Building Code and other State, local and national codes as are applicable. The cost of all required inspections and permits shall be the responsibility of the contractor and included within the bid proposal. All water taps, meter barrels, vaults and impact fees shall be paid by the contractor unless otherwise noted.

d. Projects constructed by the State of North Carolina or by any agency or institution of the State are not subject to inspection by any county or municipal authorities and are not subject to county or municipal building codes. The contractor shall, however, cooperate with the county or municipal authorities by obtaining building permits. Permits shall be obtained at no cost.

e. Projects involving local funding (community colleges) are subject also to county and municipal building codes and inspection by local authorities. The contractor shall pay the cost of these permits and inspections.

ARTICLE 11 - PROTECTION OF WORK, PROPERTY AND THE PUBLIC

a. The contractors shall be jointly responsible for the entire site and the building or construction of the same and provide all the necessary protections, as required by the owner or designer, and by laws or ordinances governing such conditions. They shall be responsible for any damage to the owner's property, or of that of others on the job, by them, their personnel, or their subcontractors, and shall make good such damages. They shall be responsible for and pay for any damages caused to the owner. All contractors shall have access to the project at all times.

b. The contractor shall provide cover and protect all portions of the structure when the work is not in progress, provide and set all temporary roofs, covers for doorways, sash and windows, and all other materials necessary to protect all the work on the building, whether set by him, or any of the subcontractors. Any work damaged through the lack of proper protection or from any other cause, shall be repaired or replaced without extra cost to the owner.

c. No fires of any kind will be allowed inside or around the operations during the course of construction without special permission from the designer and owner.

d. The contractor shall protect all trees and shrubs designated to remain in the vicinity of the operations by building substantial boxes around same. He shall barricade all walks, roads, etc., as directed by the designer to keep the public away from the construction. All trenches, excavations or other hazards in the vicinity of the work shall be well barricaded and properly lighted at night.

e. The contractor shall provide all necessary safety measures for the protection of all persons on the job, including the requirements of the A.G.C. *Accident Prevention Manual in Construction*, as amended, and shall fully comply with all state laws or regulations and North Carolina State Building Code requirements to prevent accident or injury to persons on or about the location of the work. He shall clearly mark or post signs warning of hazards existing, and shall barricade excavations, elevator shafts, stairwells and similar hazards. He shall protect against damage or injury resulting from falling materials and he shall maintain all protective devices and signs throughout the progress of the work.

f. The contractor shall adhere to the rules, regulations and interpretations of the North Carolina Department of Labor relating to Occupational Safety and Health Standards for the Construction Industry (Title 29, Code of Federal Regulations, Part 1926, published in Volume 39, Number 122, Part II, June 24, 1974, *Federal Register*), and revisions thereto as adopted by General Statutes of North Carolina 95-126 through 155.

g. The contractor shall designate a responsible person of his organization as safety officer/inspector to inspect the project site for unsafe health and safety hazards, to report these hazards to the contractor for correction, and whose duties also include accident prevention on the project, and to provide other safety and health measures on the project site as required by the terms and conditions of the contract.The name of the safety inspector shall be made known to the designer and owner at the time of the preconstruction conference and in all cases prior to any work starting on the project.

h. In the event of emergency affecting the safety of life, the protection of work, or the safety of adjoining properties, the contractor is hereby authorized to act at his own discretion, without further authorization from anyone, to prevent such threatened injury or damage.

Any compensation claimed by the contractor on account of such action shall be determined as provided for under Article 19(b).

i. Any and all costs associated with correcting damage caused to adjacent properties of the construction site or staging area shall be borne by the contractor. These costs shall include but not be limited to flooding, mud, sand, stone, debris, and discharging of waste products.

ARTICLE 12 - SEDIMENTATION POLLUTION CONTROL ACT OF 1973

a. Any land-disturbing activity performed by the contractor(s) in connection with the project shall comply with all erosion control measures set forth in the contract documents and any additional measures which may be required in order to ensure that the project is in full compliance with the Sedimentation Pollution Control Act of 1973, as implemented by Title 15, North Carolina Administrative Code, Chapter 4, Sedimentation Control, Subchapters 4A, 4B and 4C, as amended (15 N.C.A.C. 4A, 4B and 4C).

b. Upon receipt of notice that a land-disturbing activity is in violation of said act, the contractor(s) shall be responsible for ensuring that all steps or actions necessary to bring the project in compliance with said act are promptly taken.

c. The contractor(s) shall be responsible for defending any legal actions instituted pursuant to N.C.G.S. 113A-64 against any party or persons described in this article.

d. To the fullest extent permitted by law, the contractor(s) shall indemnify and hold harmless the owner, the designer and the agents, consultants and employees of the owner and designer, from and against all claims, damages, civil penalties, losses and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from the performance of work or failure of performance of work, provided that any such claim, damage, civil penalty, loss or expense is attributable to a violation of the Sedimentation Pollution Control Act. Such obligation shall not be construed to negate, abridge or otherwise reduced any other right or obligation of indemnity which would otherwise exist as to any party or persons described in this article.

ARTICLE 13 - INSPECTION OF THE WORK

a. It is a condition of this contract that the work shall be subject to inspection during normal working hours and during any time work is in preparation and progress by the designer, designated official representatives of the owner, State Construction Office and those persons required by state law to test special work for official approval. The contractor shall therefore provide safe access to the work at all times for such inspections.

b. All instructions to the contractor will be made only by or through the designer or his designated project representative. Observations made by official representatives of the owner shall be conveyed to the designer for review and coordination prior to issuance to the contractor.

c. All work shall be inspected by designer, special inspector and/or State Construction Office prior to being covered by the contractor. Contractor shall give a minimum two weeks notice unless otherwise agreed to by all parties. If inspection fails, after the first reinspection all costs associated with additional reinspections shall be borne by the contractor.

d. Where special inspection or testing is required by virtue of any state laws, instructions of the designer, specifications or codes, the contractor shall give adequate notice to the designer of the time set for such inspection or test, if the inspection or test will be conducted by a party other than the designer. Such special tests or inspections will be made in the presence of the designer, or his authorized representative, and it shall be the contractor's responsibility to serve ample notice of such tests.

e. All laboratory tests shall be paid by the owner unless provided otherwise in the contract documents except the general contractor shall pay for laboratory tests to establish design mix for concrete, and for additional tests to prove compliance with contract documents where materials have tested deficient except when the testing laboratory did not follow the appropriate ASTM testing procedures.

f. Should any work be covered up or concealed prior to inspection and approval by the designer, special inspector, and/or State Construction Office such work shall be uncovered or exposed for inspection, if so requested by the designer in writing. Inspection of the work will be made upon notice from the contractor. All cost involved in uncovering, repairing, replacing, recovering and restoring to design condition, the work that has been covered or concealed will be paid by the contractor involved.

ARTICLE 14 - CONSTRUCTION SUPERVISION AND SCHEDULE

a. Throughout the progress of the work, each contractor shall keep at the job site**,** a competent superintendent and supervisory staff satisfactory to the designer and the owner. The superintendent and supervisory staff shall not be changed without the consent of the designer and owner unless said superintendent ceases to be employed by the contractor or ceases to be competent as determined by the contractor, designer or owner. The superintendent and other staff designated by the contractor in writing shall have authority to act on behalf of the contractor, and instructions, directions or notices given to him shall be as binding as if given to the contractor. However, directions, instructions, and notices shall be confirmed in writing.

b. The contractor shall examine and study the drawings and specifications and fully understand the project design, and shall provide constant and efficient supervision to the work. Should he discover any discrepancies of any sort in the drawings or specifications, he shall report them to the designer without delay. He will not be held responsible for discrepancies in the drawings and/or specifications, but shall be held responsible to report them should they become known to him.

c. All contractors shall be required to cooperate and consult with each other during the construction of this project. Prior to installation of work, all contractors shall jointly prepare coordination drawings, showing locations of various ductworks, piping, motors, pumps, and other mechanical or electrical equipment, in relation to the structure, walls and ceilings. These drawings shall be submitted to the designer through the Project Expediter for information only**.** Each contractor shall lay out and execute his work to cause the least delay to other contractors. Each contractor shall be financially responsible for any damage to other contractor's work and for undue delay caused to other contractors on the project.

d. The contractor is required to attend job site progress conferences as called by the designer. The contractor shall be represented at these job progress conferences by both home office and project personnel. These representatives shall have authority to act on behalf of the contractor. These meetings shall be open to subcontractors, material

suppliers and any others who can contribute toward maintaining required job progress. It shall be the principal purpose of these meetings, or conferences, to effect coordination, cooperation and assistance in every practical way toward the end of maintaining progress of the project on schedule and to complete the project within the specified contract time. Each contractor shall be prepared to assess progress of the work as required in his particular contract and to recommend remedial measures for correction of progress as may be appropriate. The designer or his authorized representative shall be the coordinator of the conferences and shall preside as chairman. The contractor shall turn over a copy of his daily reports to the Designer and Owner at the job site progress conference. Owner will determine daily report format.

e The contractor(s) shall, employ an engineer or a land surveyor licensed in the State of North Carolina to lay out the work and to establish a bench mark in a location where same will not be disturbed and where direct instruments sights may be taken.

f. The designer shall designate a Project Expediter on projects involving two or more prime contracts. The Project Expediter shall be designated in the Supplementary General Conditions. The Project Expediter shall have at a minimum the following responsibilities**.**

1. Prepare the project construction schedule and shall allow all prime contractors (multi-prime contract) and subcontractors (single-prime contract) performing general, plumbing, HVAC, and electrical work equal input into the preparation of the initial construction schedule.

2. Maintain a project progress schedule for all contractors.

3. Give adequate notice to all contractors to ensure efficient continuity of all phases of the work.

4. Notify the designer of any changes in the project schedule.

5. Recommend to the owner whether payment to a contractor shall be approved**.**

g. It shall be the responsibility of the Project Expediter to cooperate with and obtain from several prime contractors and subcontractors on the job, their respective work activities and integrate these activities into a project construction schedule in form of a detailed bar chart or Critical Path Method (CPM), schedule. Each prime contractor shall provide work activities within fourteen (14) days of request by the Project Expediter. A "work activity", for scheduling purposes, shall be any component or contractual requirement of the project requiring at least one (1) day, but not more than fourteen (14) days, to complete or fulfill**.** The project construction schedule shall graphically show all salient features of the work required to construct the project from start to finish and within the allotted time established in the contract. The time (in days) between the contractor's early completion and contractual completion dates is part of the project total float time; and shall be used as such, unless amended by a change order**.** On a multi-prime project, each prime contractor shall review the proposed construction schedule and approve same in writing**.** The Project Expediter shall submit the proposed construction schedule to the designer for comments. The complete Project construction schedule shall be of the type set forth in the Supplementary General Condition or subparagraph (1) or (2) below, as appropriate:

1. For a project with total contracts of $500,000 or less, a bar chart schedule will satisfy the above requirement. The schedule shall indicate the estimated starting and completion dates for each major element of the work.

2. For a project with total contracts over $500,000, a Critical Path Method (CPM) schedule shall be utilized to control the planning and scheduling of the Work. The CPM schedule shall be the responsibility of the Project Expediter and shall be paid for by the Project Expediter.

Bar Chart Schedule: Where a bar chart schedule is required, it shall be time-scaled in weekly increments, shall indicate the estimated starting and completion dates for each major element of the work by trade and by area, level, or zone, and shall schedule dates for all salient features, including but not limited to the placing of orders for materials, submission of shop drawings and other Submittals for approval, approval of shop drawings by designers, the manufacture and delivery of material, the testing and the installation of materials, supplies and equipment, and all Work activities to be performed by the Contractor. The Contractor shall allow sufficient time in his schedule for all commissioning, required inspections and completion of final punchlist(s). Each Work activity will be assigned a time estimate by the Contractor. One day shall be the smallest time unit used.

CPM Schedule: Where a CPM schedule is required, it shall be in time-scaled precedence format using the Project Expediter's logic and time estimates. The CPM schedule shall be drawn or plotted with activities grouped or zoned by Work area or subcontract as opposed to a random (or scattered) format. The CPM schedule shall be time-scaled on a weekly basis and shall be drawn or plotted at a level of detail and logic which will schedule all salient features of the work to be performed by the Contractor. The Contractor shall allow sufficient time in his schedule for all commissioning, required inspections and completion of final punchlist(s).. Each Work activity will be assigned a time estimate by the Contractor. One day shall be the smallest time unit used.

The CPM schedule will identify and describe each activity, state the duration of each activity, the calendar dates for the early and late start and the early and late finish of each activity, and clearly highlight all activities on the critical path. "Total float" and "free float" shall be indicated for all activities. Float time shall not be considered for the exclusive use or benefit of either the Owner or the Contractor, but must be allocated in the best interest of completing the Work within the Contract time. Extensions to the Contract time, when granted by Change Order, will be granted only when equitable time adjustment exceeds the Total Float in the activity or path of activities affected by the change. On contracts with a price over $2,500,000, the CPM schedule shall also show what part of the Contract Price is attributable to each activity on the schedule, the sum of which for all activities shall equal the total Contract Price.

Early Completion of Project: The Contractor may attempt to complete the project prior to the Contract Completion Date. However, such planned early completion shall be for the Contractor's convenience only and shall not create any additional rights of the Contractor or obligations of the Owner under this Contract, nor shall it change the Time

for Completion or the Contract Completion Date. The Contractor shall not be required to pay liquidated damages to the Owner because of its failure to complete by its planned earlier date. Likewise, the Owner shall not pay the Contractor any additional compensation for early completion nor will the Owner owe the Contractor any compensation should the Owner, its officers, employees, or agents cause the Contractor not to complete earlier than the date required by the Contract Documents.

h. The proposed project construction schedule shall be presented to the designer no later than fifteen (15) days after written notice to proceed. No application for payment will be processed until this schedule is accepted by the designer and owner.

i. The approved project construction schedule shall be distributed to all contractors and displayed at the job site by the Project Expediter.

j. The several contractors shall be responsible for their work activities and shall notify the Project Expediter of any necessary changes or adjustments to their work. The Project Expediter shall maintain the project construction schedule, making biweekly adjustments, updates, corrections, etc., that are necessary to finish the project within the Contract time, keeping all contractors and the designer fully informed. Copy of a bar chart schedule annotated to show the current progress shall be submitted by the Contractor(s) to the designer, along with monthly request for payment. For project requiring CPM schedule, the Contractor shall submit a biweekly report of the status of all activities. The bar chart schedule or status report shall show the actual Work completed to date in comparison with the original Work scheduled for all activities. If any activities of the work of several contractors are behind schedule, the contractor must indicate in writing, what measures will be taken to bring each such activity back on schedule and to ensure that the Contract Completion Date is not exceeded. A plan of action and recovery schedule shall be developed and submitted to the designer by the Project Expediter, when (1) the contractor's report indicates delays, that are in the opinion of the designer or the owner, of sufficient magnitude that the contractor's ability to complete the work by the scheduled completion is brought into question; (2) the updated construction schedule is thirty (30) days behind the planned or baseline schedule and no legitimate time extensions, as determined by the Designer, are in process; and (3) the contractor desires to make changes in the logic (sequencing of work) or the planned duration of future activities of the CPM schedule which, in the opinion of the designer or the owner, are of a major nature. The plan of action, when required shall be submitted to the Owner for review within two (2) business days of the Contractor receiving the Owner's written demand. The recovery schedule, when required, shall be submitted to the Owner within five (5) calendar days of the Contractor's receiving the Owner's written demand. Failure to provide an updated construction schedule or a recovery schedule may be grounds for rejection of payment applications or withholding of funds as set forth in Article 33.

k. The Project Expediter shall notify each contractor of such events or time frames that are critical to the progress of the job. Such notice shall be timely and reasonable. Should the progress be delayed due to the work of any of the several contractors, it shall be the duty of the Project Expediter to immediately notify the contractor(s) responsible for such delay, the designer, the State Construction Office and other prime contractors. The designer shall determine the contractor(s) who caused the delays and notify the bonding company of the responsible contractor(s) of the delays; and shall make a recommendation to the owner regarding further action.

l. Designation as Project Expediter entails an additional project control responsibility and does not alter in any way the responsibility of the contractor so designated, nor the

responsibility of the other contractors involved in the project. The project expeditor's Superintendent(s) shall be in attendance at the Project site at all times when work is in progress unless conditions are beyond the control of the Contractor or until termination of the Contract in accordance with the Contract Documents. It is understood that such Superintendent shall be acceptable to the Owner and Designer and shall be the one who will be continued in that capacity for the duration of the project unless he ceases to be on the Contractor's payroll or the Owner otherwise agrees. The Superintendent shall not be employed on any other project for or by the Contractor or by any other entity during the course of the Work. If the Superintendent is employed by the Contractor on another project without the Owner's approval, then the Owner may deduct from the Contractor's monthly general condition costs and amount representing the Superintendent's cost and shall deduct that amount for each month thereafter until the Contractor has the Superintendent back on the Owner's Project full-time.

ARTICLE 15 - SEPARATE CONTRACTS AND CONTRACTOR RELATIONSHIPS

a. Effective from January 1, 2002, Chapter 143, Article 8, was amended, to allow public contracts to be delivered by the following delivery methods: single-prime, dual (single-prime and separate-prime), construction manager at risk, and alternative contracting method as approved by the State Building Commission. The owner reserves the right to prepare separate specifications, receive separate bids, and award separate contracts for such other major items of work as may be in the best interest of the State. For the purposes of a single prime contract, refer to Article 1 – Definitions.

b. All contractors shall cooperate with each other in the execution of their work, and shall plan their work in such manner as to avoid conflicting schedules or delay of the work. See Article 14, Construction Supervision.

c. If any part of contractor's work depends upon the work of another contractor, defects which may affect that work shall be reported to the designer in order that prompt inspection may be made and the defects corrected. Commencement of work by a contractor where such condition exists will constitute acceptance of the other contractor's work as being satisfactory in all respects to receive the work commenced, except as to defects which may later develop. The designer shall be the judge as to the quality of work and shall settle all disputes on the matter between contractors.

d. Any mechanical or electrical work such as sleeves, inserts, chases, openings, penetrations, etc., which is located in the work of the general contractor shall be built in by the general contractor. The respective mechanical and electrical contractors shall set all sleeves, inserts and other devices that are to be incorporated into the structure in cooperation and under the supervision of the general contractor. The responsibility for the exact location of such items shall be that of the mechanical and/or electrical contractor.

e. The designer and the owner shall have access to the work whenever it is in preparation and progress and during normal working hours. The contractor shall provide facilities for such access so the designer may perform his functions under the contract documents.

f. Should a contractor cause damage to the work or property of another contractor, he shall be directly responsible, and upon notice, shall promptly settle the claim or otherwise resolve the dispute.

ARTICLE 16 - SUBCONTRACTS AND SUBCONTRACTORS

a. Within thirty (30) days after award of the contract, the contractor shall submit to the designer, owner and to the State Construction Office a list giving the names and addresses of subcontractors and equipment and material suppliers he proposes to use, together with the scope of their respective parts of the work. Should any subcontractor be disapproved by the designer or owner, the designer or owner shall submit his reasons for disapproval in writing to the State Construction Office for its consideration with a copy to the contractor. If the State Construction Office concurs with the designer's or owner's recommendation, the contractor shall submit a substitute for approval. The designer and owner shall act promptly in the approval of subcontractors, and when approval of the list is given, no changes of subcontractors will be permitted except for cause or reason considered justifiable by the designer or owner.

b. The designer will furnish to any subcontractor, upon request, evidence regarding amounts of money paid to the contractor on account of the subcontractor's work.

c. The contractor is and remains fully responsible for his own acts or omissions as well as those of any subcontractor or of any employee of either. The contractor agrees that no contractual relationship exists between the subcontractor and the owner in regard to the contract, and that the subcontractor acts on this work as an agent or employee of the contractor.

d. The owner reserves the right to limit the amount of portions of work to be subcontracted as hereinafter specified.

ARTICLE 17 - CONTRACTOR AND SUBCONTRACTOR RELATIONSHIPS

The contractor agrees that the terms of these contract documents shall apply equally to each subcontractor as to the contractor, and the contractor agrees to take such action as may be necessary to bind each subcontractor to these terms. The contractor further agrees to conform to the Code of Ethical Conduct as adopted by the Associated General Contractors of America, Inc., with respect to contractor-subcontractor relationships, and that payments to subcontractors shall be made in accordance with the provisions of G.S. 143-134.1 titled Interest on final payments due to prime contractors: payments to subcontractors.

a. On all public construction contracts which are let by a board or governing body of the state government or any political subdivision thereof, except contracts let by the Department of Transportation pursuant to G.S. 136-28.1, the balance due prime contractors shall be paid in full within 45 days after respective prime contracts of the project have been accepted by the owner, certified by the architect, engineer or designer to be completed in accordance with terms of the plans and specifications, or occupied by the owner and used for the purpose for which the project was constructed, whichever occurs first. Provided, however, that whenever the architect or consulting engineer in charge of the project determines that delay in completion of the project in accordance with terms of the plans and specifications is the fault of the contractor, the project may be occupied and used for the purposes for which it was constructed without payment of any interest on amounts withheld past the 45 day limit. No payment shall be delayed because of the failure of another prime contractor on such project to complete his contract. Should final payment to any prime contractor beyond the date such contracts have been certified to be completed by the designer or architect, accepted by the owner, or occupied by the owner and used for the purposes for which the project was constructed, be delayed by more than 45 days, said prime contractor shall be paid interest, beginning on the 46th day, at the rate of one percent (1%) per month or fraction thereof unless a lower rate is

agreed upon on such unpaid balance as may be due. In addition to the above final payment provisions, periodic payments due a prime contractor during construction shall be paid in accordance with the payment provisions of the contract documents or said prime contractor shall be paid interest on any such unpaid amount at the rate stipulated above for delayed final payments. Such interest shall begin on the date the payment is due and continue until the date on which payment is made. Such due date may be established by the terms of the contract. Funds for payment of such interest on state-owned projects shall be obtained from the current budget of the owning department, institution or agency. Where a conditional acceptance of a contract exists, and where the owner is retaining a reasonable sum pending correction of such conditions, interest on such reasonable sum shall not apply.

b. Within seven days of receipt by the prime contractor of each periodic or final payment, the prime contractor shall pay the subcontractor based on work completed or service provided under the subcontract. Should any periodic or final payment to the subcontractor be delayed by more than seven days after receipt of periodic or final payment by the prime contractor, the prime contractor shall pay the subcontractor interest, beginning on the eighth day, at the rate of one percent (1%) per month or fraction thereof on such unpaid balance as may be due.

c. The percentage of retainage on payments made by the prime contractor to the subcontractor shall not exceed the percentage of retainage on payments made by the owner to the prime contractor. Any percentage of retainage on payments made by the prime contractor to the subcontractor that exceeds the percentage of retainage on payments made by the owner to the prime contractor shall be subject to interest to be paid by the prime contractor to the subcontractor at the rate of one percent (1%) per month or fraction thereof.

d. Nothing in this section shall prevent the prime contractor at the time of application and certification to the owner from withholding application and certification to the owner for payment to the subcontractor for unsatisfactory job progress; defective construction not remedied; disputed work; third-party claims filed or reasonable evidence that claim will be filed; failure of subcontractor to make timely payments for labor, equipment and materials; damage to prime contractor or another subcontractor; reasonable evidence that subcontract cannot be completed for the unpaid balance of the subcontract sum; or a reasonable amount for retainage not to exceed the initial percentage retained by owner.

ARTICLE 18 - DESIGNER'S STATUS

a. The designer shall provide general administration of the performance of construction contracts, including liaison and necessary inspection of the work to ensure compliance with plans and specifications. He is the agent of the owner only for the purpose of constructing this work and to the extent stipulated in the contract documents. He has authority to direct work to be performed, to stop work, to order work removed, or to order corrections of faulty work, where any such action by the designer may be necessary to assure successful completion of the work.

b. The designer is the impartial interpreter of the contract documents, and, as such, he shall exercise his powers under the contract to enforce faithful performance by both the owner and the contractor, taking sides with neither.

c. Should the designer cease to be employed on the work for any reason whatsoever, then the owner shall employ a competent replacement who shall assume the status of the former designer.

d. The designer and his consultants will make inspections of the project. He will inspect the progress, the quality and the quantity of the work.

e. The designer and the owner shall have access to the work whenever it is in preparation and progress during normal working hours. The contractor shall provide facilities for such access so the designer and owner may perform their functions under the contract documents.

f. Based on the designer's inspections and evaluations of the project, the designer shall issue interpretations, directives and decisions as may be necessary to administer the project. His decisions relating to artistic effect and technical matters shall be final, provided such decisions are within the limitations of the contract.

ARTICLE 19 - CHANGES IN THE WORK

a. The owner may have changes made in the work covered by the contract. These changes will not invalidate and will not relieve or release the contractor from any guarantee given by him pertinent to the contract provisions. These changes will not affect the validity of the guarantee bond and will not relieve the surety or sureties of said bond. All extra work shall be executed under conditions of the original contract.

b. Except in an emergency endangering life or property, no change shall be made by the contractor except upon receipt of approved change order or written field order from the designer, countersigned by the owner and the state construction office authorizing such change. No claim for adjustments of the contract price shall be valid unless this procedure is followed.

A field order, transmitted by fax, electronically, or hand delivered, may be used where the change involved impacts the critical path of the work. A formal change order shall be issued as expeditiously as possible.

In the event of emergency endangering life or property, the contractor may be directed to proceed on a time and material basis whereupon the contractor shall proceed and keep accurately on such form as specified by the designer or owner, a correct account of costs together with all proper invoices, payrolls and supporting data. Upon completion of the work the change order will be prepared as outlined under either Method "c(1)" or Method "c(2)" or both.

c. In determining the values of changes, either additive or deductive, contractors are restricted to the use of the following methods:

1. Where the extra work involved is covered by unit prices quoted in the proposal, or subsequently agreed to by the Contractor, Designer, Owner and State Construction Office the value of the change shall be computed by application of unit prices based on quantities, estimated or actual as agreed of the items involved, except is such cases where a quantity exceeds the estimated quantity allowance in the contract by one hundred percent (100%) or more. In such cases, either party may elect to proceed under subparagraph c2 herein. If neither party elects to proceed under c2, then unit prices shall apply.

2. The contracting parties shall negotiate and agree upon the equitable value of the change prior to issuance of the change order, and the change order shall stipulate the corresponding lump sum adjustment to the contract price.

d. Under Paragraph “b” and Methods "c(2)" above, the allowances for overhead and profit combined shall be as follows: all contractors (the single contracting entity (prime), his subcontractors(1st tier subs), or their sub-subcontractors (2nd tier subs, 3rd tier subs, etc)) shall be allowed a maximum of 10% on work they each self-perform; the prime contractor shall be allowed a maximum of 5% on contracted work of his 1st tier sub; 1st tier, 2nd tier, 3rd tier, etc contractors shall be allowed a maximum of 2.5% on the contracted workof their subs. ; Under Method "c(1)", no additional allowances shall be made for overhead and profit. In the case of deductible change orders, under Method "c(2)" and Paragraph (b) above, the contractor shall include no less than five percent (5%***)*** profit, but no allowances for overhead.

e. The term "net cost" as used herein shall mean the difference between all proper cost additions and deductions. The "cost" as used herein shall be limited to the following:

1. The actual costs of materials and supplies incorporated or consumed as part of the work;

2. The actual costs of labor expended on the project site; labor expended in coordination, change order negotiation, record document maintenance, shop drawing revision or other tasks necessary to the administration of the project are considered overhead whether they take place in an office or on the project site.

3. The actual costs of labor burden, limited to the costs of social security (FICA) and Medicare/Medicaid taxes; unemployment insurance costs; health/dental/vision insurance premiums; paid employee leave for holidays, vacation, sick leave, and/or petty leave, not to exceed a total of 30 days per year; retirement contributions; worker’s compensation insurance premiums; and the costs of general liability insurance when premiums are computed based on payroll amounts; the total of which shall not exceed thirty percent (30%) of the actual costs of labor;

4. The actual costs of rental for tools, excluding hand tools; equipment; machinery; and temporary facilities required for the work;

5. The actual costs of premiums for bonds, insurance, permit fees, and sales or use taxes related to the work.

Overtime and extra pay for holidays and weekends may be a cost item only to the extent approved by the owner.

f. Should concealed conditions be encountered in the performance of the work below grade, or should concealed or unknown conditions in an existing structure be at variance with the conditions indicated by the contract documents, the contract sum and time for completion may be equitably adjusted by change order upon claim by either party made within thirty (30) days after the condition has been identified. The cost of such change shall be arrived at by one of the foregoing methods. All change orders shall be supported by a unit cost breakdown showing method of arriving at net cost as defined above.

g. In all change orders, the procedure will be for the designer to request proposals for the change order work in writing. The contractor will provide such proposal and supporting data in suitable format. The designer shall verify correctness. Delay in the processing of the change order due to lack of proper submittal by the contractor of all required supporting data shall not constitute grounds for a time extension or basis of a claim. Within fourteen (14) days after receipt of the contractor’s accepted proposal including all supporting documentation required by the designer**,** the designer shall prepare the change order and forward to the contractor for his signature or otherwise respond, in writing, to

the contractor's proposal. Within seven (7) days after receipt of the change order executed by the contractor, the designer shall, certify the change order by his signature, and forward the change order and all supporting data to the owner for the owner's signature. The owner shall execute the change order and forward to the State Construction Office for final approval**,** within seven (7) days of receipt. The State Construction Office shall act on the change order within seven (7) days. In case of emergency or extenuating circumstances, approval of changes may be obtained verbally by telephone or field orders approved by all parties, then shall be substantiated in writing as outlined under normal procedure.

h. At the time of signing a change order, the contractor shall be required to certify as follows:

"I certify that my bonding company will be notified forthwith that my contract has been changed by the amount of this change order, and that a copy of the approved change order will be mailed upon receipt by me to my surety."

i. A change order, when issued, shall be full compensation, or credit, for the work included, omitted or substituted. It shall show on its face the adjustment in time for completion of the project as a result of the change in the work.

j. If, during the progress of the work, the owner requests a change order and the contractor's terms are unacceptable, the owner**,** with the approval of the State Construction Office, may require the contractor to perform such work on a time and material basis whereupon the contractor shall proceed and keep accurately on such form as specified by the Designer or owner, a correct account of cost together with all proper invoices, payrolls and supporting data. Upon completion of the work a change order will be prepared with allowances for overhead and profit per paragraph d. above and "net cost" and "cost" per paragraph e. above. Without prejudice, nothing in this paragraph shall preclude the owner from performing or to have performed that portion of the work requested in the change order.

ARTICLE 20 - CLAIMS FOR EXTRA COST

a. Should the contractor consider that as a result of instructions given by the designer, he is entitled to extra cost above that stated in the contract, he shall give written notice thereof to the designer within seven (7) days without delay. The written notice shall clearly state that a claim for extra cost is being made and shall provide a detailed justification for the extra cost. The contractor shall not proceed with the work affected until further advised, except in emergency involving the safety of life or property, which condition is covered in Article 19(b) and Article 11(h). No claims for extra compensation shall be considered unless the claim is so made. The designer shall render a written decision within seven (7) days of receipt of claim.

b. The contractor shall not act on instructions received by him from persons other than the designer, and any claims for extra compensation or extension of time on account of such instruction will not be honored. The designer shall not be responsible for misunderstandings claimed by the contractor of verbal instructions which have not been confirmed in writing, and in no case shall instructions be interpreted as permitting a departure from the contract documents unless such instruction is confirmed in writing and supported by a properly authorized change order.

c. Should a claim for extra compensation that complies with the requirements of (a) above by the contractor and is denied by the designer or owner, and cannot be resolved by a

representative of the State Construction Office, the contractor may request a mediation in connection with GS 143-128(f1) in the dispute resolution rules adopted by the State Building Commission (1 N.C.A.C. 30H .0101 through .1001). If the contractor is unable to resolve its claim as a result of mediation, the contractor may pursue the claim in accordance with the provisions of G.S. 143-135.3, or G.S. 143-135.6 where Community Colleges are the owner,and the following:

1. A contractor who has not completed a contract with a board for construction or repair work and who has not received the amount he claims is due under the contract may submit a verified written claim to the director of the State Construction Office of the Department of Administration for the amount the contractor claims is due. The director may deny, allow or compromise the claim, in whole or in part. A claim under this subsection is not a contested case under Chapter 150B of the General Statutes.

2. (a) A contractor who has completed a contract with a board for construction or repair work and who has not received the amount he claims is due under the contract may submit a verified written claim to the director of the State Construction Office of the Department of Administration for the amount the contractor claims is due. The claim shall be submitted within sixty (60) days after the contractor receives a final statement of the board's disposition of his claim and shall state the factual basis for the claim.

   (b) The director shall investigate a submitted claim within ninety (90) days of receiving the claim, or within any longer time period upon which the director and the contractor agree. The contractor may appear before the director, either in person or through counsel, to present facts and arguments in support of his claim. The director may allow, deny or compromise the claim, in whole or in part. The director shall give the contractor a written statement of the director's decision on the contractor's claim.

   (c) A contractor who is dissatisfied with the director's decision on a claim submitted under this subsection may commence a contested case on the claim under Chapter 150B of the General Statutes. The contested case shall be commenced within sixty (60) days of receiving the director's written statement of the decision.

   (d) As to any portion of a claim that is denied by the director, the contractor may, in lieu of the procedures set forth in the preceding subsection of this section, within six (6) months of receipt of the director's final decision, institute a civil action for the sum he claims to be entitled to under the contract by filing a verified complaint and the issuance of a summons in the Superior Court of Wake County or in the superior court of any county where the work under the contract was performed. The procedure shall be the same as in all civil actions except that all issues shall be tried by the judge, without a jury.

ARTICLE 21 - MINOR CHANGES IN THE WORK

The designer will have the authority to order minor changes in the work not involving an adjustment in the contract sum or time for completion, and not inconsistent with the intent of the contract documents. Such changes shall be effected by written order, copied to the State Construction Office, and shall be binding on the owner and the contractor.

ARTICLE 22 - UNCORRECTED FAULTY WORK

Should the correction of faulty or damaged work be considered inadvisable or inexpedient by the owner and the designer, the owner shall be reimbursed by the contractor. A change order will be issued to reflect a reduction in the contract sum.

ARTICLE 23 - TIME OF COMPLETION, DELAYS, EXTENSION OF TIME

a. The time of completion is stated in the Supplementary General Conditions and in the Form of Construction Contract. The Project Expediter, upon notice of award of contract, shall prepare a construction schedule to complete the project within the time of completion as required by Article 14.

b. The contractors shall commence work to be performed under this agreement on a date to be specified in a written Notice to Proceed from the designer and shall fully complete all work hereunder within the time of completion stated. Time is of the essence and the contractor acknowledges the Owner will likely suffer financial damage for failure to complete the work within the time of completion. For each day in excess of the above number of days, the contractor(s) shall pay the owner the sum stated as liquidated damages reasonably estimated in advance to cover the losses to be incurred by the owner by reason of failure of said contractor(s) to complete the work within the time specified, such time being in the essence of this contract and a material consideration thereof.

c. In the event of multiple prime contractors, the designer shall be the judge as to the division of responsibility between the contractor(s), based on the construction schedule, weekly reports and job records, and shall apportion the amount of liquidated damages to be paid by each of them, according to delay caused by any or all of them.

d. If the contractor is delayed at any time in the progress of his work solely by any act or negligence of the owner, the designer, or by any employee of either; by any separate contractor employed by the owner; by changes ordered in the work; by labor disputes at the project site; by abnormal weather conditions not reasonably anticipated for the locality where the work is performed; by unavoidable casualties; by any causes beyond the contractor's control; or by any other causes which the designer and owner determine may justify the delay, then the contract time may be extended by change order only for the time which the designer and owner may determine is reasonable.

   Time extensions will not be granted for rain, wind, snow or other natural phenomena of normal intensity for the locality where work is performed. For purpose of determining extent of delay attributable to unusual weather phenomena, a determination shall be made by comparing the weather for the contract period involved with the average of the preceding five (5) year climatic range during the same time interval based on the National Oceanic and Atmospheric Administration National Weather Service statistics for the locality where work is performed and on daily weather logs kept on the job site by the contractor reflecting the effect of the weather on progress of the work and initialed by the designer's representative. No weather delays shall be considered after the building is dried in unless work claimed to be delayed is on the critical path of the baseline schedule or approved updated schedule. Time extensions for weather delays, acts of God, labor disputes, fire, delays in transportation, unavoidable casualties or other delays which are beyond the control of the Owner do not entitle the Contractor to compensable damages for delays. Any contractor claim for compensable damages for delays is limited to delays caused solely by the owner or its agents. Contractor caused delays shall be accounted for before owner or designer caused delays in the case of concurrent delays.

e. Request for extension of time shall be made in writing to the designer, copies to the owner and SCO, within twenty (20) days following cause of delay. In case of continuing cause for delay, the Contractor shall notify the_Designer to the designer, copies to the owner and SCO, of the delay within 20 days of the beginning of the delay and only one claim is necessary.

f. The contractor shall notify his surety in writing of extension of time granted.

g. No claim for time extension shall be allowed on account of failure of the designer to furnish drawings or instructions until twenty (20) days after demand for such drawings and/or instructions. See Article 5c. Demand must be in written form clearly stating the potential for delay unless the drawings or instructions are provided. Any delay granted will begin after the twenty (20) day demand period is concluded.

ARTICLE 24 - PARTIAL UTILIZATION/BENEFICIAL OCCUPANCY

a. The owner may desire to occupy or utilize all or a portion of the project prior to the completion of the project.

b. Should the owner request a utilization of a building or portion thereof, the designer shall perform a designer final inspection of area after being notified by the contractor that the area is ready for such. After the contractor has completed designer final inspection punch list and the designer has verified, then the designer shall schedule a beneficial occupancy inspection at a time and date acceptable to the owner, contractor(s) and State Construction Office. If beneficial occupancy is granted by the State Construction Office, in such areas the following will be established:

1. The beginning of guarantees and warranties period for the equipment necessary to support. in the area.

2. The owner assumes all responsibiliites for utility costs for entire building.

2. Contractor will obtain consent of surety.

3. Contractor will obtain endorsement from insurance company permitting beneficial occupancy.

c. The owner shall have the right to exclude the contractor from any part of the project which the designer has so certified to be substantially complete, but the owner will allow the contractor reasonable access to complete or correct work to bring it into compliance with the contract.

d. Occupancy by the owner under this article will in no way relieve the contractor from his contractual requirement to complete the project within the specified time. The contractor will not be relieved of liquidated damages because of beneficial occupancy. The designer may prorate liquidated damages based on the percentage of project occupied.

ARTICLE 25 - FINAL INSPECTION, ACCEPTANCE, AND PROJECT CLOSEOUT

a. Upon notification from the contractor(s) that the project is complete and ready for inspection, the designer shall make a Designer final inspection to verify that the project is complete and ready for SCO final inspection. Prior to SCO final inspection, the contractor(s) shall complete all items requiring corrective measures noted at the Designer

final inspection**.** The designer shall schedule a SCO final inspection at a time and date acceptable to the owner, contractor(s) and State Construction Office.

b. At the SCO final inspection, the designer and his consultants shall, if job conditions warrant, record a list of items that are found to be incomplete or not in accordance with the contract documents. At the conclusion of the SCO final inspection, the designer and State Construction Office representative shall make one of the following determinations:

   1. That the project is completed and accepted.

   2. That the project will be accepted subject to the correction of the list of discrepancies (punch list). All punch list items must be completed within thirty (30) days of SCO final inspection or the owner may invoke Article 28, Owner's Right to Do Work.

   4. That the project is not complete and another date for a SCO final inspection will be established.

c. Within fourteen (14) days of final acceptance per Paragraph b1 or within fourteen (14) days after completion of punch list per Paragraph b2 above, the designer shall certify the work and issue applicable certificate(s) of compliance.

d. Any discrepancies listed or discovered after the date of SCO final inspection and acceptance under Paragraphs b1 or b2 above shall be handled in accordance with Article 42, Guarantee.

f. The final acceptance date will establish the following:

   1. The beginning of guarantees and warranties period.

   2. The date on which the contractor's insurance coverage for public liability, property damage and builder's risk may be terminated.

   3. That no liquidated damages (if applicable) shall be assessed after this date.

   4. The termination date of utility cost to the contractor.

g. Prior to issuance of final acceptance date, the contractor shall have his authorized representatives visit the project and give full instructions to the designated personnel regarding operating, maintenance, care, and adjustment of all equipment and special construction elements. In addition, the contractor shall provide to the owner a complete instructional video (media format acceptable to the owner) on the operation, maintenance, care and adjustment of all equipment and special construction elements.

ARTICLE 26 - CORRECTION OF WORK BEFORE FINAL PAYMENT

a. Any work, materials, fabricated items or other parts of the work which have been condemned or declared not in accordance with the contract by the designer shall be promptly removed from the work site by the contractor, and shall be immediately replaced by new work in accordance with the contract at no additional cost to the owner. Work or property of other contractors or the owner, damaged or destroyed by virtue of such faulty work, shall be made good at the expense of the contractor whose work is faulty.

b. Correction of condemned work described above shall commence within twenty-four (24) hours after receipt of notice from the designer, and shall make satisfactory progress, as determined by the designer, until completed.

c. Should the contractor fail to proceed with the required corrections, then the owner may complete the work in accordance with the provisions of Article 28.

ARTICLE 27 - CORRECTION OF WORK AFTER FINAL PAYMENT

See Article 35, Performance Bond and Payment Bond, and Article 42, Guarantee**.** Neither the final certificate, final payment, occupancy of the premises by the owner, nor any provision of the contract, nor any other act or instrument of the owner, nor the designer, shall relieve the contractor from responsibility for negligence, or faulty material or workmanship, or failure to comply with the drawings and specifications. Contractor shall correct or make good any defects due thereto and repair any damage resulting there from, which may appear during the guarantee period following final acceptance of the work except as stated otherwise under Article 42, Guarantee. The owner will report any defects as they may appear to the contractor and establish a time limit for completion of corrections by the contractor. The owner will be the judge as to the responsibility for correction of defects.

ARTICLE 28 - OWNER'S RIGHT TO DO WORK

If, during the progress of the work or during the period of guarantee, the contractor fails to prosecute the work properly or to perform any provision of the contract, the owner, after seven (7) days' written notice sent by certified mail, return receipt requested, to the contractor from the designer, may perform or have performed that portion of the work. The cost of the work may be deducted from any amounts due or to become due to the contractor, such action and cost of same having been first approved by the designer. Should the cost of such action of the owner exceed the amount due or to become due the contractor, then the contractor or his surety, or both, shall be liable for and shall pay to the owner the amount of said excess.

ARTICLE 29 - ANNULMENT OF CONTRACT

If the contractor fails to begin the work under the contract within the time specified, or the progress of the work is not maintained on schedule, or the work is not completed within the time above specified, or fails to perform the work with sufficient workmen and equipment or with sufficient materials to ensure the prompt completion of said work, or shall perform the work unsuitably or shall discontinue the prosecution of the work, or if the contractor shall become insolvent or be declared bankrupt or commit any act of bankruptcy or insolvency, or allow any final judgment to stand against him unsatisfied for a period of forty-eight (48) hours, or shall make an assignment for the benefit of creditors, or for any other cause whatsoever shall not carry on the work in an acceptable manner, the owner may give notice in writing, sent by certified mail, return receipt requested, to the contractor and his surety of such delay, neglect or default, specifying the same, and if the contractor within a period of seven (7) days after such notice shall not proceed in accordance therewith, then the owner shall, declare this contract in default, and, thereupon, the surety shall promptly take over the work and complete the performance of this contract in the manner and within the time frame specified. In the event the surety shall fail to take over the work to be done under this contract within seven (7) days after being so notified and notify the owner in writing, sent by certified mail, return receipt requested, that he is taking the same over and stating that he will diligently pursue and complete the same, the owner shall have full power and authority, without violating the contract, to take the prosecution of the work out of the hands of said contractor, to appropriate or use any or all contract materials and equipment on the grounds as may be suitable and acceptable and may enter into an agreement, either by public letting or negotiation, for the completion of said contract according to the terms and provisions thereof

or use such other methods as in his opinion shall be required for the completion of said contract in an acceptable manner. All costs and charges incurred by the owner, together with the costs of completing the work under contract, shall be deducted from any monies due or which may become due said contractor and surety. In case the expense so incurred by the owner shall be less than the sum which would have been payable under the contract, if it had been completed by said contractor, then the said contractor and surety shall be entitled to receive the difference, but in case such expense shall exceed the sum which would have been payable under the contract, then the contractor and the surety shall be liable and shall pay to the owner the amount of said excess.

ARTICLE 30 - CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE THE CONTRACT

a. Should the work be stopped by order of a court having jurisdiction, or by order of any other public authority for a period of three months, due to cause beyond the fault or control of the contractor, or if the owner should fail or refuse to make payment on account of a certificate issued by the designer within forty-five (45) days after receipt of same, then the contractor, after fifteen (15) days' written notice sent by certified mail, return receipt requested, to the owner and the designer, may suspend operations on the work or terminate the contract.

b. The owner shall be liable to the contractor for the cost of all materials delivered and work performed on this contract plus 10 percent overhead and profit and shall make such payment. The designer shall be the judge as to the correctness of such payment.

ARTICLE 31 - REQUEST FOR PAYMENT

a. Not later than the fifth day of the month, the contractor shall submit to the designer a request for payment for work done during the previous month. The request shall be in the form agreed upon between the contractor and the designer, but shall show substantially the value of work done and materials delivered to the site during the period since the last payment, and shall sum up the financial status of the contract with the following information:

    1. Total of contract including change orders.

    2. Value of work completed to date.

    3. Less five percent (5%) retainage, provided however, that after fifty percent (50%) of the contractor’s work has been satisfactorily completed on schedule, with approval of the owner and the State Construction Office and written consent of the surety, further requirements for retainage will be waived only so long as work continues to be completed satisfactorily and on schedule.

    4. Less previous payments.

    5. Current amount due.

b. The contractor, upon request of the designer, shall substantiate the request with invoices of vouchers or payrolls or other evidence.

c. Prior to submitting the first request, the contractor shall prepare for the designer a schedule showing a breakdown of the contract price into values of the various parts of the work, so arranged as to facilitate payments to subcontractors in accordance with Article 17, Contractor and Subcontractor Relationships. The contractor(s) shall list the

value of each subcontractor and supplier, identifying each minority business subcontractor and supplier as listed in Affidavit C, if applicable.

d. When payment is made on account of stored materials and equipment, such materials must be stored on the owner's property, and the requests for payments shall be accompanied by invoices or bills of sale or other evidence to establish the owner's title to such materials and equipment. Such payments will be made only for materials that have been customized or fabricated specifically for this project. Raw materials or commodity products including but not limited to piping, conduit, CMU, metal studs and gypsum board may not be submitted. Responsibility for such stored materials and equipment shall remain with the contractor regardless of ownership title. Such stored materials and equipment shall not be removed from the owner's property. Should the space for storage on-site be limited, the contractor, at his option, shall be permitted to store such materials and/or equipment in a suitable space off-site. Should the contractor desire to include any such materials or equipment in his application for payment, they must be stored in the name of the owner in an independent, licensed, bonded warehouse approved by the designer, owner and the State Construction Office and located as close to the site as possible. The warehouse selected must be approved by the contractor's bonding and insurance companies; the material to be paid for shall be assigned to the owner and shall be inspected by the designer. Upon approval by the designer, owner and SCO of the storage facilities and materials and equipment, payment therefore will be certified. Responsibility for such stored materials and equipment shall remain with the contractor. Such stored materials and equipment shall not be moved except for transportation to the project site. Under certain conditions, the designer may approve storage of materials at the point of manufacture, which conditions shall be approved by the designer, the owner and the State Construction Office prior to approval for the storage and shall include an agreement by the storing party which unconditionally gives the State absolute right to possession of the materials at anytime. Bond, security and insurance protection shall continue to be the responsibility of the contractor(s).

e. In the event of beneficial occupancy, retainage of funds due the contractor(s) may be reduced with the approval of the State Construction Office to an equitable amount to cover the list of items to be completed or corrected. Retainage may not be reduced to less than two and one-half (2 1/2) times the estimated value of the work to be completed or corrected. Reduction of retainage must be with the consent and approval of the contractor's bonding company.

ARTICLE 32 - CERTIFICATES OF PAYMENT AND FINAL PAYMENT

a. Within five (5) days from receipt of request for payment from the contractor, the designer shall issue and forward to the owner a certificate for payment. This certificate shall indicate the amount requested or as approved by the designer. If the certificate is not approved by the designer, he shall state in writing to the contractor and the owner his reasons for withholding payment.

b. No certificate issued or payment made shall constitute an acceptance of the work or any part thereof. The making and acceptance of final payment shall constitute a waiver of all claims by the owner except:

   1. Claims arising from unsettled liens or claims against the contractor.

   2. Faulty work or materials appearing after final payment.

   3. Failure of the contractor to perform the work in accordance with drawings and specifications, such failure appearing after payment.

4. As conditioned in the performance bond and payment bond.

c. The making and acceptance of final payment shall constitute a waiver of all claims by the contractor except those claims previously made and remaining unsettled (Article 20(c)).

d. Prior to submitting request for final payment to the designer for approval, the contractor shall fully comply with all requirements specified in the" project closeout" section of the specifications. These requirements include but not limited to the following:

1. Submittal of Product and Operating Manuals, Warranties and Bonds, Guarantees, Maintenance Agreements, As-Built Drawings, Certificates of Inspection or Approval from agencies having jurisdiction. (The designer must approve the Manuals prior to delivery to the owner).

2. Transfer of Required attic stock material and all keys in an organized manner.

3. Record of Owner's training.

4. Resolution of any final inspection discrepancies.

5. Granting access to Contractor's records, if Owner's internal auditors have made a request for such access pursuant to Article 52.

e. The contractor shall forward to the designer, the final application for payment along with the following documents:

1. List of minority business subcontractors and material suppliers showing breakdown of contract amounts and total actual payments to subs and material suppliers.

2. Affidavit of Release of Liens.

3. Affidavit of contractors of payment to material suppliers and subcontractors. (See Article 36).

4. Consent of Surety to Final Payment**.**

5. Certificates of state agencies required by state law.

f. The designer will not authorize final payment until the work under contract has been certified by designer, certificates of compliance issued, and the contractor has complied with the closeout requirements. The designer shall forward the contractor's final application for payment to the owner along with respective certificate(s) of compliance required by law.

ARTICLE 33 - PAYMENTS WITHHELD

a. The designer with the approval of the State Construction Office may withhold payment for the following reasons:

1. Faulty work not corrected.

2. The unpaid balance on the contract is insufficient to complete the work in the judgment of the designer.

3. To provide for sufficient contract balance to cover liquidated damages that will be assessed.

b. The secretary of the Department of Administration may authorize the withholding of payment for the following reasons:

1. Claims filed against the contractor or evidence that a claim will be filed.

2. Evidence that subcontractors have not been paid.

c. The Owner may withhold all or a portion of Contractor's general conditions costs set forth in the approved schedule of values, if Contractor has failed to comply with: (1) a request to access its records by Owner's internal auditors pursuant to Article 52; (2) a request for a plan of action and/or recovery schedule under Article 14.j or provide The Owner; (3) a request to provide an electronic copies of Contractor's baseline schedule, updates with all logic used to create the schedules in the original format of the scheduling software; and (4) Contractor's failure to have its Superintendent on the Project full-time; (

d. When grounds for withholding payments have been removed, payment will be released. Delay of payment due the contractor without cause will make owner liable for payment of interest to the contractor in accordance with G.S. 143-134.1. As provided in G.S.143-134.1(e) the owner shall not be liable for interest on payments withheld by the owner for unsatisfactory job progess, defective construction not remedied, disputed work, or third-party claims filed against the owner or reasonable evidence that a third-party claim will be filed.

ARTICLE 34 - MINIMUM INSURANCE REQUIREMENTS

The work under this contract shall not commence until the contractor has obtained all required insurance and verifying certificates of insurance have been approved in writing by the owner. These certificates shall document that coverages afforded under the policies will not be cancelled, reduced in amount or coverages eliminated until at least thirty (30) days after mailing written notice, by certified mail, return receipt requested, to the insured and the owner of such alteration or cancellation. If endorsements are needed to comply with the notification or other requirements of this article copies of the endorsements shall be submitted with the certificates.

a. **Worker's Compensation and Employer's Liability**

The contractor shall provide and maintain, until final acceptance, workmen's compensation insurance, as required by law, as well as employer's liability coverage with minimum limits of $100,000.

b. **Public Liability and Property Damage**

The contractor shall provide and maintain, until final acceptance, comprehensive general liability insurance, including coverage for premises operations, independent contractors, completed operations, products and contractual exposures, as shall protect such contractors from claims arising out of any bodily injury, including accidental death, as well as from claims for property damages which may arise from operations under this contract, whether such operations be by the contractor or by any subcontractor, or by

anyone directly or indirectly employed by either of them and the minimum limits of such insurance shall be as follows:

Bodily Injury:	$500,000 per occurrence
Property Damage:	$100,000 per occurrence / $300,000 aggregate

In lieu of limits listed above, a $500,000 combined single limit shall satisfy both conditions.

Such coverage for completed operations must be maintained for at least two (2) years following final acceptance of the work performed under the contract.

c. **Property Insurance (Builder's Risk/Installation Floater)**

The contractor shall purchase and maintain property insurance until final acceptance, upon the entire work at the site to the full insurable value thereof. This insurance shall include the interests of the owner, the contractor, the subcontractors and sub-subcontractors in the work and shall insure against the perils of fire, wind, rain, flood, extended coverage, and vandalism and malicious mischief. If the owner is damaged by failure of the contractor to purchase or maintain such insurance, then the contractor shall bear all reasonable costs properly attributable thereto; the contractor shall effect and maintain similar property insurance on portions of the work stored off the site when request for payment per articles so includes such portions.

d. **Deductible**

Any deductible, if applicable to loss covered by insurance provided, is to be borne by the contractor.

e. **Other Insurance**

The contractor shall obtain such additional insurance as may be required by the owner or by the General Statutes of North Carolina including motor vehicle insurance, in amounts not less than the statutory limits.

f. **Proof of Carriage**

The contractor shall furnish the owner with satisfactory proof of carriage of the insurance required before written approval is granted by the owner.

ARTICLE 35 - PERFORMANCE BOND AND PAYMENT BOND

a. Each contractor shall furnish a performance bond and payment bond executed by a surety company authorized to do business in North Carolina. The bonds shall be in the full contract amount. Bonds shall be executed in the form bound with these specifications.

b. All bonds shall be countersigned by an authorized agent of the bonding company who is licensed to do business in North Carolina.

ARTICLE 36 - CONTRACTOR'S AFFIDAVIT

The final payment of retained amount due the contractor on account of the contract shall not become due until the contractor has furnished to the owner through the designer an affidavit signed, sworn and notarized to the effect that all payments for materials, services or subcontracted work in connection with his contract have been satisfied, and that no claims or

liens exist against the contractor in connection with this contract. In the event that the contractor cannot obtain similar affidavits from subcontractors to protect the contractor and the owner from possible liens or claims against the subcontractor, the contractor shall state in his affidavit that no claims or liens exist against any subcontractor to the best of his (the contractor's) knowledge, and if any appear afterward, the contractor shall save the owner harmless.

ARTICLE 37 - ASSIGNMENTS

The contractor shall not assign any portion of this contract nor subcontract in its entirety. Except as may be required under terms of the performance bond or payment bond, no funds or sums of money due or become due the contractor under the contract may be assigned.

ARTICLE 38 - USE OF PREMISES

a. The contractor(s) shall confine his apparatus, the storage of materials and the operations of his workmen to limits indicated by law, ordinances, permits or directions of the designer and owner and shall not exceed those established limits in his operations.

b. The contractor(s) shall not load or permit any part of the structure to be loaded with a weight that will endanger its safety.

c. The contractor(s) shall enforce the designer's and owner’s instructions regarding signs, advertisements, fires and smoking.

d. No firearms, any type of alcoholic beverages, or drugs (other than those prescribed by a physician) will be permitted at the job site.

ARTICLE 39 - CUTTING, PATCHING AND DIGGING

a. The contractor shall do all cutting, fitting or patching of his work that may be required to make its several parts come together properly and fit it to receive or be received by work of other contractors shown upon or reasonably implied by the drawings and specifications for the completed structure, as the designer may direct.

b. Any cost brought about by defective or ill-timed work shall be borne by the party responsible therefor.

c. No contractor shall endanger any work of another contractor by cutting, digging or other means. No contractor shall cut or alter the work of any other contractor without the consent of the designer and the affected contractor(s).

ARTICLE 40 - UTILITIES, STRUCTURES, SIGNS

a. The contractor shall provide necessary and adequate facilities for water, electricity, gas, oil, sewer and other utility services which maybe necessary and required for completion of the project including all utilities required for testing, cleaning, balancing, and sterilization of designated plumbing, mechanical and electrical systems. Any permanent meters installed shall be listed in the contractor’s name until work has a final acceptance. The contractor will be solely responsible for all utility costs prior to final acceptance. Contractor shall contact all affected utility companies prior to bid to determine their requirements to provide temporary and permanent service and include all costs associated with providing those services in their bid. Coordination of the work of the utility companies during construction is the sole responsibility of the contractor.

b. Meters shall be relisted in the owner's name on the day following final acceptance of the Project Expediter's work, and the owner shall pay for services used after that date.

c. The owner shall be reimbursed for all metered utility charges after the meter is relisted in the owner's name and prior to completion and acceptance of the work of **all** contractors. Reimbursement shall be made by the contractor whose work has not been completed and accepted. If the work of two or more contractors has not been completed and accepted, reimbursement to the owner shall be paid by the contractors involved on the basis of assessments by the designer.

d Prior to the operation of permanent systems, the Project Expediter will provide temporary power, lighting, water, and heat to maintain space temperature above freezing, as required for construction operations.

e. All contractors shall have the permanent building systems in sufficient readiness for furnishing temporary climatic control at the time a building is enclosed and secured. The HVAC systems shall maintain climatic control throughout the enclosed portion of the building sufficient to allow completion of the interior finishes of the building. A building shall be considered enclosed and secured when windows**,** doorways (exterior, mechanical, and electrical equipment rooms), and hardware are installed**;** and other openings have protection which will provide reasonable climatic control. The appropriate time to start the mechanical systems and climatic condition shall be jointly determined by the contractor(s), the designer and owner. Use of the equipment in this manner shall be subject to the approval of the Designer and owner and shall in no way affect the warranty requirements of the contractor(s).

f. The electrical contractor shall have the building's permanent power wiring distribution system in sufficient readiness to provide power as required by the HVAC contractor for temporary climatic control.

g. The electrical contractor shall have the building's permanent lighting system ready at the time the general contractor begins interior painting and shall provide adequate lighting in those areas where interior painting and finishing is being performed.

h. Each prime contractor shall be responsible for his permanently fixed service facilities and systems in use during progress of the work. The following procedures shall be strictly adhered to:

1. Prior to final acceptance of work by the State Construction Office, each contractor shall remove and replace any parts of the permanent building systems damaged through use during construction.

2. Temporary filters as recommended by the equipment manufacturer in order to keep the equipment and ductwork clean and free of dust and debris shall be installed in each of the heating and air conditioning units and at each return grille during construction. New filters shall be installed in each unit prior to the owner's acceptance of the work.

3. Extra effort shall be maintained to keep the building and the site adjacent to the building clean and under no circumstances shall air systems be operated if finishing and site work operations are creating dust in excess of what would be considered normal if the building were occupied.

4. It shall be understood that any warranty on equipment presented to the owner shall extend from the day of final acceptance by the owner. The cost of warranting the

equipment during operation in the finishing stages of construction shall be borne by the contractor whose system is utilized.

5. The electrical contractor shall have all lamps in proper working condition at the time of final project acceptance.

i. The Project Expediter shall provide, if required and where directed, a shed for toilet facilities and shall furnish and install in this shed all water closets required for a complete and adequate sanitary arrangement. These facilities will be available to other contractors on the job and shall be kept in a neat and sanitary condition at all times. Chemical toilets are acceptable.

j. The Project Expediter shall, if required by the Supplementary General Conditions and where directed, erect a temporary field office, complete with lights, telephone, heat and air conditioning. A portion of this office shall be partitioned off, of sufficient size, for the use of a resident inspector, should the designer so direct.

k. On multi-story construction projects, the Project Expediter shall provide temporary elevators, lifts, or other special equipment for the general use of all contractors. The cost for such elevators, lifts or other special equipment and the operation thereof shall be included in the Project Expediter's bid.

l. The Project Expediter will erect one sign on the project if required. The sign shall be of sound construction, and shall be neatly lettered with black letters on white background. The sign shall bear the name of the project, and the names of prime contractors on the project, and the name of the designer and consultants. Directional signs may be erected on the owner's property subject to approval of the owner with respect to size, style and location of such directional signs. Such signs may bear the name of the contractor and a directional symbol. No other signs will be permitted except by permission of the owner.

ARTICLE 41 - CLEANING UP

a. The contractors shall keep the building and surrounding area reasonably free from rubbish at all times, and shall remove debris from the site on a timely basis or when directed to do so by the designer or Project Expediter. The Project Expediter shall provide an on site refuse container(s) for the use of all contractors. Each contractor shall remove their rubbish and debris from the building on a daily basis. The Project Expediter shall broom clean the building as required to minimize dust and dirt accumulation.

b. The Project Expediter shall provide and maintain suitable all-weather access to the building**.**

c. Before final inspection and acceptance of the building, each contractor shall clean his portion of the work, including glass, hardware, fixtures, masonry, tile and marble (using no acid), clean and wax all floors as specified, and completely prepare the building for use by the owner, with no cleaning required by the owner.

ARTICLE 42 - GUARANTEE

a. The contractor shall unconditionally guarantee materials and workmanship against patent defects arising from faulty materials, faulty workmanship or negligence for a period of twelve (12) months following the date of final acceptance of the work or beneficial occupancy and shall replace such defective materials or workmanship without cost to the owner.

b. Where items of equipment or material carry a manufacturer's warranty for any period in excess of twelve (12) months, then the manufacturer's warranty shall apply for that particular piece of equipment or material. The contractor shall replace such defective equipment or materials, without cost to the owner, within the manufacturer's warranty period.

c. Additionally, the owner may bring an action for latent defects caused by the negligence of the contractor which is hidden or not readily apparent to the owner at the time of beneficial occupancy or final acceptance, whichever occurred first, in accordance with applicable law.

d. Guarantees for roof, equipment, materials, and supplies shall be stipulated in the specifications sections governing such roof, equipment, materials, or supplies.

ARTICLE 43 - CODES AND STANDARDS

Wherever reference is given to codes, standard specifications or other data published by regulating agencies including, but not limited to, national electrical codes, North Carolina state building codes, federal specifications, ASTM specifications, various institute specifications, etc., it shall be understood that such reference is to the latest edition including addenda published prior to the date of the contract documents.

ARTICLE 44 - INDEMNIFICATION

To the fullest extent permitted by law, the contractor shall indemnify and hold harmless the owner, the designer and the agents, consultants and employees of the owner and designer, from and against all claims, damages, losses and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from the performance or failure of performance of the work, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the work itself) including the loss of use resulting there from, and (2) is caused in whole or in part by any negligent act or omission of the contractor, the contractor's subcontractor, or the agents of either the contractor or the contractor's subcontractor. Such obligation shall not be construed to negate, abridge or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this article.

ARTICLE 45 - TAXES

a. Federal excise taxes do not apply to materials entering into state work (Internal Revenue Code, Section 3442(3)).

b. Federal transportation taxes do not apply to materials entering into state work (Internal Revenue Code, Section 3475(b) as amended).

c. North Carolina sales tax and use tax, as required by law, do apply to materials entering into state work and such costs shall be included in the bid proposal and contract sum.

d. Local option sales and use taxes, as required by law, do apply to materials entering into state work as applicable and such costs shall be included in the bid proposal and contract sum.

e. **Accounting Procedures for Refund of County Sales & Use Tax**

Amount of county sales and use tax paid per contractor's statements:

Contractors performing contracts for state agencies shall give the state agency for whose project the property was purchased a signed statement containing the information listed in G.S. 105-164.14(e).

The Department of Revenue has agreed that in lieu of obtaining copies of sales receipts from contractors, an agency may obtain a certified statement as of April 1, 1991 from the contractor setting forth the date, the type of property and the cost of the property purchased from each vendor, the county in which the vendor made the sale and the amount of local sales and use taxes paid thereon. If the property was purchased out-of-state, the county in which the property was delivered should be listed. The contractor should also be notified that the certified statement may be subject to audit.

In the event the contractors make several purchases from the same vendor, such certified statement must indicate the invoice numbers, the inclusive dates of the invoices, the total amount of the invoices, the counties, and the county sales and use taxes paid thereon.

Name of taxing county: The position of a sale is the retailer's place of business located within a taxing county where the vendor becomes contractually obligated to make the sale. Therefore, it is important that the county tax be reported for the county of sale rather than the county of use.

When property is purchased from out-of-state vendors and the county tax is charged, the county should be identified where delivery is made when reporting the county tax.

Such statement must also include the cost of any tangible personal property withdrawn from the contractor's warehouse stock and the amount of county sales or use tax paid thereon by the contractor.

Similar certified statements by his subcontractors must be obtained by the general contractor and furnished to the claimant.
Contractors are not to include any tax paid on supplies, tools and equipment which they use to perform their contracts and should include only those building materials, supplies, fixtures and equipment which actually become a part of or annexed to the building or structure.

ARTICLE 46 - EQUAL OPPORTUNITY CLAUSE

The non-discrimination clause contained in Section 202 (Federal) Executive Order 11246, as amended by Executive Order 11375, relative to equal employment opportunity for all persons without regard to race, color, religion, sex or national origin, and the implementing rules and regulations prescribed by the secretary of Labor, are incorporated herein.

ARTICLE 47 - EMPLOYMENT OF INDIVIDUALS WITH DISABILITIES

The contractor(s) agree not to discriminate against any employee or applicant for employment because of physical or mental disabilities in regard to any position for which the employee or applicant is qualified. The contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified individuals with such disabilities without discrimination based upon their physical or mental disability in all employment practices.

ARTICLE 48 - ASBESTOS-CONTAINING MATERIALS (ACM)

The State of North Carolina has attempted to address all asbestos-containing materials that are to be disturbed in the project. However, there may be other asbestos-containing materials in the work areas that are not to be disturbed and do not create an exposure hazard.

Contractors are reminded of the requirements of instructions under Instructions to Bidders and General Conditions of the Contract, titled Examination of Conditions. Statute 130A, Article 19, amended August 3, 1989, established the Asbestos Hazard Management Program that controls asbestos abatement in North Carolina. The latest edition of *Guideline Criteria for Asbestos Abatement* from the State Construction Office is to be incorporated in all asbestos abatement projects for the Capital Improvement Program.

ARTICLE 49 - MINORITY BUSINESS PARTICIPATION

GS 143-128.2 establishes a ten percent (10%) goal for participation by minority businesses in total value of work for each State building project. The document, *Guidelines for Recruitment and Selection of Minority Businesses for Participation in State Construction Contracts* including Affidavits and Appendix E are hereby incorporated into and made a part of this contract.

ARTICLE 50 – CONTRACTOR EVALUATION

The contractor's overall work performance on the project shall be fairly evaluated in accordance with the State Building Commission policy and procedures, for determining qualifications to bid on future State capital improvement projects. In addition to final evaluation, interim evaluation may be prepared during the progress of project. The document, Contractor Evaluation Procedures, is hereby incorporated and made a part of this contract. The owner may request the contractor's comments to evaluate the designer.

ARTICLE 51 – GIFTS

Pursuant to N.C. Gen. Stat. § 133-32, it is unlawful for any vendor or contractor (i.e. architect, bidder, contractor, construction manager, design professional, engineer, subcontractor, supplier, vendor, etc.), to make gifts or to give favors to any State employee. This prohibition covers those vendors and contractors who: (1) have a contract with a governmental agency; or (2) have performed under such a contract within the past year; or (3) anticipate bidding on such a contract in the future. For additional information regarding the specific requirements and exemptions, vendors and contractors are encouraged to review G.S. Sec. 133-32.

During the construction of the Project, the Contractor is prohibited from making gifts to any of the Owner's employees, Owner's project representatives (architect, engineers, construction manager and their employees), employees of the State Construction Office and/or any other State employee that may have any involvement, influence, responsibilities, oversight, management and/or duties that pertain to and/or relate to the contract administration, financial administration and/or disposition of claims arising from and/or relating to the Contract and/or Project.

ARTICLE 52 – AUDITING-ACCESS TO PERSONS AND RECORDS

In accordance with N.C. General Statute 147-64.7, the State Auditor shall have access to Contractor's officers, employees, agents and/or other persons in control of and/or responsible for the Contractor's records that relate to this Contracts for purposes of conducting audits under the referenced statute. The Owner's internal auditors shall also have the right to access and copy the Contractor's records relating to the Contract and Project during the term of the Contract and within two years following the completion of the Project/close-out of the Contract to verify accounts, accuracy, information, calculations and/or data affecting and/or

relating to Contractor's requests for payment, requests for change orders, change orders, claims for extra work, requests for time extensions and related claims for delay/extended general conditions costs, claims for lost productivity, claims for loss efficiency, claims for idle equipment or labor, claims for price/cost escalation, pass-through claims of subcontractors and/or suppliers, and/or any other type of claim for payment or damages from Owner and/or its project representatives.

ARTICLE 53 – NORTH CAROLINA FALSE CLAIMS ACT

The North Carolina False Claims Act ("NCFCA"), N.C Gen. Stat. § 1-605 through 1-618, applies to this Contract. The Contractor should familiarize itself with the entire NCFCA and should seek the assistance of an attorney if it has any questions regarding the NCFCA and its applicability to any requests, demands and/or claims for payment its submits to the State through the contracting state agency, institution, university or community college.

The purpose of the NCFCA "is to deter persons from knowingly causing or assisting in causing the State to pay claims that are false or fraudulent and to provide remedies in the form of treble damages and civil penalties when money is obtained from the State by reason of a false or fraudulent claim." (Section 1-605(b).) A contractor's liability under the NCFCA may arise from, but is not limited to: requests for payment, invoices, billing, claims for extra work, requests for change orders, requests for time extensions, claims for delay damages/extended general conditions costs, claims for loss productivity, claims for loss efficiency, claims for idle equipment or labor, claims for price/cost escalation, pass-through claims of subcontractors and/or suppliers, documentation used to support any of the foregoing requests or claims, and/or any other request for payment from the State through the contracting state agency, institution, university or community college. The parts of the NCFCA that are most likely to be enforced with respect to this type of contract are as follows:

- A "claim" is "[a]ny request or demand, whether under a contract or otherwise, for money or property and whether or not the State has title to the money or property that (i) is presented to an officer, employee, or agent of the State or (ii) is made to a contractor … if the money or property is to be spent or used on the State's behalf or to advance a State program or interest and if the State government: (a) provides or has provided any portion of the money or property that is requested or demanded; or (b) will reimburse such contractor … for any portion of the money or property which is requested or demanded." (Section 1-606(2).)

- "Knowing" and "knowingly." – Whenever a person, with respect to information, does any of the following: (a) Has actual knowledge of the information; (b) Acts in deliberate ignorance of the truth or falsity of the information; and/or (c) Acts in reckless disregard of the truth or falsity of the information. (Section 1-606(4).) Proof of specific intent to defraud is not required. (Section 1-606(4).)

- "Material" means having a natural tendency to influence, or be capable of influencing, the payment or receipt of money or property. (Section 1-606(4).)

- Liability. – "Any person who commits any of the following acts shall be liable to the State for three times the amount of damages that the State sustains because of the act of that person[:] … (1) Knowingly presents or causes to be presented a false or fraudulent claim for payment or approval. (2) Knowingly makes, uses, or causes to be made or used, a false record or statement material to a false or fraudulent claim. (3) Conspires to commit a violation of subdivision (1), (2) …" (Section 1-607(a)(1), (2).)

- The NCFCA shall be interpreted and construed so as to be consistent with the federal False Claims Act, 31 U.S.C. § 3729, et seq., and any subsequent amendments to that act. (Section 1-616(c).)

Finally, the contracting state agency, institution, university or community college may refer any suspected violation of the NCFCA by the Contractor to the Attorney General's Office for investigation. Under Section 1-608(a), the Attorney General is responsible for investigating any violation of NCFCA, and may bring a civil action against the Contractor under the NCFCA. The Attorney General's investigation and any civil action relating thereto are independent and not subject to any dispute resolution provision set forth in this Contract. (See Section 1-608(a).)

ARTICLE 54 – TERMINATION FOR CONVENIENCE

Owner may at any time and for any reason terminate Contractor's services and work at Owner's convenience. Upon receipt of such notice, Contractor shall, unless the notice directs otherwise, immediately discontinue the work and placing of orders for materials, facilities and supplies in connection with the performance of this Agreement.

Upon such termination, Contractor shall be entitled to payment only as follows: (1) the actual cost of the work completed in conformity with this Agreement; plus, (2) such other costs actually incurred by Contractor as are permitted by the prime contract and approved by Owner; (3) plus ten percent (10%) of the cost of the work referred to in subparagraph (1) above for overhead and profit. There shall be deducted from such sums as provided in this subparagraph the amount of any payments made to Contractor prior to the date of the termination of this Agreement. Contractor shall not be entitled to any claim or claim of lien against Owner for any additional compensation or damages in the event of such termination and payment.

F O R M O F P R O P O S A L

NCDOT Division 14 Assembly Office and Maintenance Shop

North Carolina Department of Transportation

SCO-ID 14-11007-01 A

Contract: _____

Bidder: _____

Date: _____

The undersigned, as bidder, hereby declares that the only person or persons interested in this proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this proposal or in the contract to be entered into; that this proposal is made without connection with any other person, company or parties making a bid or proposal; and that it is in all respects fair and in good faith without collusion or fraud. The bidder further declares that he has examined the site of the work and the contract documents relative thereto, and has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be performed. The bidder further declares that he and his subcontractors have fully complied with NCGS 64, Article 2 in regards to E-Verification as required by Section 2.(c) of Session Law 2013-418, codified as N.C. Gen. Stat. § 143-129(j).

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The Bidder proposes and agrees if this proposal is accepted to contract with the

State of North Carolina through the North Carolina Department of Transportation

in the form of contract specified below, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary to complete the construction of

This scope of work consists construction of a 6,000 SF Office and Maintenance Facility Building for NCDOT. The building consist of wood framing, CMU Block, cement board siding/ trim and architectural shingles and TPO roof system. Site work consist of underground storm water/ Sanitary and utilities connections. NCDOT will perform some site work.

In full in complete accordance with the plans, specifications and contract documents, to the full and entire satisfaction of the State of North Carolina, and the

North Carolina Department of Transportation

with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and the contract documents, for the sum of:

SINGLE PRIME CONTRACT: _____

Base Bid:

_____ Dollars($) _____

General Subcontractor:

_____ Lic _____

Plumbing Subcontractor:

_____ Lic _____

Mechanical Subcontractor:

_____ Lic _____

Electrical Subcontractor:

_____ Lic _____

GS143-128(d) requires all single prime bidders to identify their subcontractors for the above subdivisions of work. A contractor whose bid is accepted shall not substitute any person as subcontractor in the place of the subcontractor listed in the original bid, except (i) if the listed subcontractor's bid is later determined by the contractor to be non-responsible or non-responsive or the listed subcontractor refuses to enter into a contract for the complete performance of the bid work, or (ii) with the approval of the awarding authority for good cause shown by the contractor.

ALTERNATES:

Should any of the alternates as described in the contract documents be accepted, the amount written below shall be the amount to be "added to" or "deducted from" the base bid. (Strike out "Add" or "Deduct" as appropriate.)

GENERAL CONTRACT:

Alternate No. G-1 Provide brick veneer wainscot around the permeter of the building in lieu of extending the cement board siding at the base of the building as shown on the construction documents.

(Add) _____ Dollars($) _____

Alternate No. G-2 Provide Stone veneer wainscot around the perimeter of the building in lieu of extending the cement board siding at the base of the building as shown on the construction documents.

(Add) _____ Dollars($) _____

Alternate No. G-3 Provide canopy roofing and support brackets over the overhead garage doors

(Add) _____ Dollars($) _____

ADD Alternate No. G-4: Provide 4" Ductile Iron Pipe in lieu of Polyvinyl Chloride Pipe. All trenching should be part of base bid. This only material change alternate.

(Add) _____ Dollars($) _____

UNIT PRICES

Unit prices quoted and accepted shall apply throughout the life of the contract, except as otherwise specifically noted. Unit prices shall be applied, as appropriate, to compute the total value of changes in the base bid quantity of the work all in accordance with the contract documents.

SITE CONTRACT:

No. 1 Trenching, Labor and Installation of of 4" Ductile Iron Pipe *Lin. Ft.*

Unit Price ($)_____

No. 2 Trenching, Labor and Installation of 4" Polyvinyl Chloride Pipe Lin. Ft.

Unit Price ($)_____

The bidder further proposes and agrees hereby to commence work under this contract on a date to be specified in a written order of the designer and shall fully complete all work thereunder within the time specified in the Supplementary General Conditions Article 23. Applicable liquidated damages amount is also stated in the Supplementary General Conditions Article 23.

MINORITY BUSINESS PARTICIPATION REQUIREMENTS

Provide with the bid - Under GS 143-128.2(c) the undersigned bidder shall identify **on its bid** (Identification of Minority Business Participation Form) the minority businesses that it will use on the project with the total dollar value of the bids that will be performed by the minority businesses. **Also** list the good faith efforts (Affidavit **A**) made to solicit minority participation in the bid effort.

NOTE: A contractor that performs all of the work with its own workforce may submit an Affidavit (**B)** to that effect in lieu of Affidavit (**A)** required above. The MB Participation Form must still be submitted even if there is zero participation.

After the bid opening - The Owner will consider all bids and alternates and determine the lowest responsible, responsive bidder. Upon notification of being the apparent low bidder, the bidder shall then file within 72 hours of the notification of being the apparent lowest bidder, the following:

An Affidavit (**C**) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the 10% goal established. This affidavit shall give rise to the presumption that the bidder has made the required good faith effort and Affidavit **D** is not necessary;

*** OR ***

If less than the 10% goal, Affidavit (**D**) of its good faith effort to meet the goal shall be provided. The document must include evidence of all good faith efforts that were implemented, including any advertisements, solicitations and other specific actions demonstrating recruitment and selection of minority businesses for participation in the contract.

Note: Bidders must always submit **with their bid** the Identification of Minority Business Participation Form listing all MB contractors, vendors and suppliers that will be used. If there is no MB participation, then enter none or zero on the form. Affidavit A **or** Affidavit B, as applicable, also must be submitted with the bid. Failure to file a required affidavit or documentation with the bid or after being notified apparent low bidder is grounds for rejection of the bid.

Proposal Signature Page

The undersigned further agrees that in the case of failure on his part to execute the said contract and the bonds within ten (10) consecutive calendar days after being given written notice of the award of contract, the certified check, cash or bid bond accompanying this bid shall be paid into the funds of the owner's account set aside for the project, as liquidated damages for such failure; otherwise the certified check, cash or bid bond accompanying this proposal shall be returned to the undersigned.

Respectfully submitted this day of _____

_____
(Name of firm or corporation making bid)

WITNESS:

_____
(Proprietorship or Partnership)

By: _____
Signature

Name: _____
Print or type

Title _____
(Owner/Partner/Pres./V.Pres)

Address _____

_____

ATTEST:

By: _____

Title: _____
(Corp. Sec. or Asst. Sec. only)

License No. _____

Federal I.D. No. _____

Email Address: _____

(CORPORATE SEAL)

Addendum received and used in computing bid:

Addendum No. 1 _____ Addendum No. 3 _____ Addendum No. 5 _____ Addendum No. 6 _____

Addendum No. 2 _____ Addendum No. 4 _____ Addendum No. 6 _____ Addendum No. 7 _____

Identification of HUB Certified/ Minority Business Participation

I,_____,
(Name of Bidder)
do hereby certify that on this project, we will use the following HUB Certified/ minority business as construction subcontractors, vendors, suppliers or providers of professional services.

Firm Name, Address and Phone #	Work Type	*Minority Category	**HUB Certified (Y/N)

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

**** HUB Certification with the state HUB Office required to be counted toward state participation goals.**

The total value of minority business contracting will be ($)_____.

State of North Carolina AFFIDAVIT A – Listing of Good Faith Efforts

County of _____

(Name of Bidder)

Affidavit of_____

I have made a good faith effort to comply under the following areas checked:

Bidders must earn at least 50 points from the good faith efforts listed for their bid to be considered responsive. (1 NC Administrative Code 30 I.0101)

- ❑ **1 – (10 pts)** Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.
- ❑ **2 --(10 pts)** Made the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bids are due.
- ❑ **3** – **(15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- ❑ **4 – (10 pts)** Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- ❑ **5** – **(10 pts)** Attended prebid meetings scheduled by the public owner.
- ❑ **6** – **(20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- ❑ **7 – (15 pts)** Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- ❑ **8** – **(25 pts)** Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- ❑ **9** – **(20 pts)** Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- ❑ **10** - **(20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure to abide by this statutory provision will constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of the minority business commitment and is authorized to bind the bidder to the commitment herein set forth.

Date:_____ Name of Authorized Officer:_____

Signature:_____

Title:_____

State of_____, County of_____

Subscribed and sworn to before me this _____day of _____20____

Notary Public_____

My commission expires _____

State of North Carolina --AFFIDAVIT B-- Intent to Perform Contract with Own Workforce.

County of _____

Affidavit of _____
(Name of Bidder)

I hereby certify that it is our intent to perform 100% of the work required for the _____

_____ contract.
(Name of Project)

In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform all elements of the work on this project with his/her own current work forces; and

The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement. The Bidder agrees to make a Good Faith Effort to utilize minority suppliers where possible.

The undersigned hereby certifies that he or she has read this certification and is authorized to bind the Bidder to the commitments herein contained.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____

State of _____, County of _____

Subscribed and sworn to before me this _____ day of _____ 20___

Notary Public _____

My commission expires _____

State of North Carolina - AFFIDAVIT C - Portion of the Work to be Performed by HUB Certified/Minority Businesses

County of _____

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the portion of the work to be executed by HUB certified/minority businesses as defined in GS143-128.2(g) and 128.4(a),(b),(e) is equal to or greater than 10% of the bidders total contract price, then the bidder must complete this affidavit.
This affidavit shall be provided by the apparent lowest responsible, responsive bidder within **72 hours** after notification of being low bidder.

Affidavit of _____ I do hereby certify that on the
(Name of Bidder)

_____
(Project Name)

Project ID#_____ Amount of Bid $_____

I will expend a minimum of _____% of the total dollar amount of the contract with minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. Attach additional sheets if required

Name and Phone Number	*Minority Category	**HUB Certified Y/N	Work Description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

**** HUB Certification with the state HUB Office required to be counted toward state participation goals.**

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date:_____ Name of Authorized Officer:_____

Signature:_____

Title:_____

State of _____, County of _____
Subscribed and sworn to before me this _____day of _____20____
Notary Public_____
My commission expires_____

State of North Carolina AFFIDAVIT D – Good Faith Efforts

County of _____

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the goal of 10% participation by HUB Certified/ minority business **is not** achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

Affidavit of _____ I do hereby certify that on the
(Name of Bidder)

_____
(Project Name)

Project ID#_____ Amount of Bid $_____

I will expend a minimum of _____% of the total dollar amount of the contract with HUB certified/ minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. (Attach additional sheets if required)

Name and Phone Number	*Minority Category	**HUB Certified Y/N	Work Description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

**** HUB Certification with the state HUB Office required to be counted toward state participation goals.**

Examples of documentation that may be required to demonstrate the Bidder's good faith efforts to meet the goals set forth in these provisions include, but are not necessarily limited to, the following:

A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.

B. Copies of quotes or responses received from each firm responding to the solicitation.

C. A telephone log of follow-up calls to each firm sent a solicitation.

D. For subcontracts where a minority business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.

E. Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.

F. Copy of pre-bid roster

G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.

H. Letter detailing reasons for rejection of minority business due to lack of qualification.

I. Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Failure to provide the documentation as listed in these provisions may result in rejection of the bid and award to the next lowest responsible and responsive bidder.

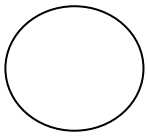
Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date:_____ Name of Authorized Officer:_____

Signature:_____

Title:_____



State of _____, County of _____

Subscribed and sworn to before me this _____ day of _____ 20____

Notary Public_____

My commission expires _____

FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS THAT _____ _____ as principal, and _____, as surety, who is duly licensed to act as surety in North Carolina, are held and firmly bound unto the State of North Carolina* through _____ as obligee, in the penal sum of _____ DOLLARS, lawful money of the United States of America, for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Signed, sealed and dated this ____ day of _____ 20__

WHEREAS, the said principal is herewith submitting proposal for and the principal desires to file this bid bond in lieu of making the cash deposit as required by G.S. 143-129.

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION is such, that if the principal shall be awarded the contract for which the bid is submitted and shall execute the contract and give bond for the faithful performance thereof within ten days after the award of same to the principal, then this obligation shall be null and void; but if the principal fails to so execute such contract and give performance bond as required by G.S. 143-129, the surety shall, upon demand, forthwith pay to the obligee the amount set forth in the first paragraph hereof. Provided further, that the bid may be withdrawn as provided by G.S. 143-129.1

_____(SEAL)

_____(SEAL)

_____(SEAL)

_____(SEAL)

_____(SEAL)

FORM OF CONSTRUCTION CONTRACT

(ALL PRIME CONTRACTS)

THIS AGREEMENT, made the _____ day of _____ in the year of 20__ by and between _____

_____

hereinafter called the Party of the First Part and the *State of North Carolina, through the_____

_____ hereinafter called the Party of the Second Part.

WITNESSETH:

That the Party of the First Part and the Party of the Second Part for the consideration herein named agree as follows:

1. Scope of Work: This scope of work consists of construction of a new 6,000 SF Assembly Office and Maintenance Building for NCDOT. The building consist of wood framing and CMU block with cement board siding/ trim and architectural shingles and EPDM roof system. Roof structure is steel bar joint and wood trusses. Site work consist of underground utilities, rough grading and concrete aprons. NCDOT will perform final grading and pavement. The building will also include MEP systems.

_____

_____

_____

Consisting of the following sheets:

_____

_____

_____

_____

Dated: _____ and the following addenda:

Addendum No _____ Dated: _____ Addendum No. _____ Dated: _____

Addendum No _____ Dated: _____ Addendum No. _____ Dated: _____

Addendum No _____ Dated: _____ Addendum No. _____ Dated: _____

Addendum No _____ Dated: _____ Addendum No. _____ Dated: _____

2. That the Party of the First Part shall commence work to be performed under this agreement on a date to be specified in a written order of the Party of the Second Part and shall fully complete all work hereunder within 360 consecutive calendar days from said date. For each day in excess thereof, liquidated damages shall be as stated in Supplementary General Conditions. The Party of the First Part, as one of the considerations for the awarding of this contract, shall furnish to the Party of the Second

Part a construction schedule setting forth planned progress of the project broken down by the various divisions or part of the work and by calendar days as outlined in Article 14 of the General Conditions of the Contract.

3. The Party of the Second Part hereby agrees to pay to the Party of the First Part for the faithful performance of this agreement, subject to additions and deductions as provided in the specifications or proposal, in lawful money of the United States as follows:

_____

_____($_____).

Summary of Contract Award:

4. In accordance with Article 31 and Article 32 of the General Conditions of the Contract, the Party of the Second Part shall review, and if approved, process the Party of the First Party's pay request within 30 days upon receipt from the Designer. The Party of the Second Part, after reviewing and approving said pay request, shall make payments to the Party of the First Part on the basis of a duly certified and approved estimate of work performed during the preceding calendar month by the First Party, less five percent (5%) of the amount of such estimate which is to be retained by the Second Party until all work has been performed strictly in accordance with this agreement and until such work has been accepted by the Second Party. The Second Party may elect to waive retainage requirements after 50 percent of the work has been satisfactorily completed on schedule as referred to in Article 31 of the General Conditions.

5. Upon submission by the First Party of evidence satisfactory to the Second Party that all payrolls, material bills and other costs incurred by the First Party in connection with the construction of the work have been paid in full, final payment on account of this agreement shall be made within thirty (30) days after the completion by the First Party of all work covered by this agreement and the acceptance of such work by the Second Party.

6. It is further mutually agreed between the parties hereto that if at any time after the execution of this agreement and the surety bonds hereto attached for its faithful performance, the Second Party shall deem the surety or sureties upon such bonds to be unsatisfactory, or if, for any reason, such bonds cease to be adequate to cover the performance of the work, the First Party shall, at its expense, within five (5) days after the receipt of notice from the Second Party so to do, furnish an additional bond or bonds in such form and amount, and with such surety or sureties as shall be satisfactory to the Second Party. In such event no further payment to the First Party shall be deemed to be due under this agreement until such new or additional security for the faithful performance of the work shall be furnished in manner and form satisfactory to the Second Party.

7. The Party of the First Part attest that it and all of its subcontractors have fully complied with all requirements of NCGS 64 Article 2 in regards to E-Verification as required by Section 2.(c) of Session Law 2013-418, codified as N.C. Gen. Stat. § 143-129(j).

IN WITNESS WHEREOF, the Parties hereto have executed this agreement on the day and date first above written in _____ counterparts, each of which shall without proof or accounting for other counterparts, be deemed an original contract.

Witness:

_____
Contractor: (Trade or Corporate Name)

_____
(Proprietorship or Partnership)

By: _____

Title: _____
(Owner, Partner, or Corp. Pres. or Vice Pres. only)

Attest: (Corporation)

By: _____

Title: _____
(Corp. Sec. or Asst. Sec. only)

The State of North Carolina through*

(CORPORATE SEAL)

_____
(Agency, Department or Institution)

Witness:

_____

By:_____

Title: _____

FORM OF PERFORMANCE BOND

Date of Contract: _____

Date of Execution: _____

Name of Principal (Contractor) _____

Name of Surety: _____

Name of Contracting Body: _____

Amount of Bond: _____

Project

KNOW ALL MEN BY THESE PRESENTS, that we, the principal and surety above named, are held and firmly bound unto the above named contracting body, hereinafter called the contracting body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind, ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the contracting body, identified as shown above and hereto attached:

NOW, THEREFORE, if the principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the contracting body, with or without notice to the surety, and during the life of any guaranty required under the contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in _____ counterparts.

Witness:

_____
(Proprietorship or Partnership)

Attest: (Corporation)

By: _____

Title: _____
(Corp. Sec. or Asst. Sec. only)

(Corporate Seal)

_____
Contractor: (Trade or Corporate Name)

By: _____

Title: _____
(Owner, Partner, or Corp. Pres. or Vice Pres. only)

_____
(Surety Company)

Witness:

_____

By: _____

Title: _____
(Attorney in Fact)

Countersigned:

_____

_____
(N.C. Licensed Resident Agent)

_____

_____
Name and Address-Surety Agency

_____

_____
Surety Company Name and N.C. Regional or Branch Office Address

(Surety Corporate Seal)

FORM OF PAYMENT BOND

Date of Contract: _____

Date of Execution: _____

Name of Principal (Contractor) _____

Name of Surety: _____

Name of Contracting Body: _____

Amount of Bond: _____

Project _____

KNOW ALL MEN BY THESE PRESENTS, that we, the principal and surety above named, are held and firmly bound unto the above named contracting body, hereinafter called the contracting body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the contracting body identified as shown above and hereto attached:

NOW, THEREFORE, if the principal shall promptly make payment to all persons supplying labor/material in the prosecution of the work provided for in said contract, and any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in _____ counterparts.

Witness:

_____
Contractor: (Trade or Corporate Name)

_____
(Proprietorship or Partnership)

By: _____

Attest: (Corporation)

Title_____
(Owner, Partner, or Corp. Pres. or Vice Pres. only)

By: _____

Title: _____
(Corp. Sec. or Asst. Sec.. only)

(Corporate Seal)

_____
(Surety Company)

Witness:

By: _____

_____

Title: _____
(Attorney in Fact)

Countersigned:

_____

(Surety Corporate Seal)

_____
(N.C. Licensed Resident Agent)

_____

_____
Name and Address-Surety Agency

_____

_____
Surety Company Name and N.C.
Regional or Branch Office Address

Sheet for Attaching Power of Attorney

Sheet for Attaching Insurance Certificates

APPROVAL OF THE ATTORNEY GENERAL

CERTIFICATION BY THE OFFICE OF STATE BUDGET AND MANAGEMENT

Provision for the payment of money to fall due and payable by the

_____

under this agreement has been provided for by allocation made and is available for the purpose of carrying out this agreement.

This _____day of _____ 20___.

Signed _____
Budget Officer

STATE OF NORTH CAROLINA
COUNTY SALES AND USE TAX REPORT
SUMMARY TOTALS AND CERTIFICATION

CONTRACTOR: _____ Page __1____ of _____

PROJECT: _____ FOR PERIOD: _____

	TOTAL FOR COUNTY OF:	TOTAL FOR COUNTY OF:	TOTAL FOR COUNTY OF:	TOTAL FOR COUNTY OF:	TOTAL FOR COUNTY OF:	TOTAL FOR COUNTY OF:	TOTAL ALL COUNTIES
CONTRACTOR							
SUBCONTRACTOR(S)*							
COUNTY TOTAL							

* Attach subcontractor(s) report(s)
** Must balance with Detail Sheet(s)

I certify that the above figures do not include any tax paid on supplies, tools and equipment which were used to perform this contract and only includes those building materials, supplies, fixtures and equipment which actually became a part of or annexed to the building or structure. I certify that, to the best of my knowledge, the information provided here is true, correct, and complete.

Sworn to and subscribed before me,

This the _____ day of _____, 20____

_____
Signed

_____
Notary Public

_____
Print or Type Name of Above

My Commission Expires: _____

Seal

NOTE:
This certified statement may be subject to audit.

STATE OF NORTH CAROLINA
SALES AND USE TAX REPORT DETAIL

CONTRACTOR: _____

SUBCONTRACTOR _____ FOR PERIOD: _____

PROJECT: _____

PURCHASE DATE	VENDOR NAME	INVOICE NUMBER	TYPE OF PROPERTY	INVOICE TOTAL	COUNTY TAX PAID	COUNTY OF SALE *
				$	$	
				TOTAL:	$	

* If this is an out-of-state vendor, the County of Sale should be the county to which the merchandise was shipped.

SECTION 01 10 00

SUMMARY OF WORK

PART 1 GENERAL

1.1 PROJECT

A. Project Name: Assembly/ Maintenance Building

B. Owner's Name: North Carolina Department of Transportation
   1. Owner's Representative: One person has been designated by NCDOT

C. Architect's Name: Clark Patterson Lee.

D. This scope of work consists of construction of a new 6,000 SF Assembly Office and Maintenance Building for NCDOT. The building consist of wood framing and CMU block with cement board siding/ trim and architectural shingles and EPDM roof system. Roof structure is steel bar joint and wood trusses. Site work consist of underground utilities, rough grading and concrete aprons. NCDOT will perform final grading and pavement. The building will also include MEP systems.

1.2 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on the Cost Agreement Form.

1.3 OWNER OCCUPANCY

A. The Owner will occupy the site during construction. The owner will have ongoing daily activities around the site including heavy truck traffic. The existing maintenance shop will be closed during construction however in case of emergence NCDOT will need access to the existing shop. The contractor shall coordinate with DOT daily.

B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

C. Schedule the Work to accommodate Owner occupancy.

D. There should be no interruption of utilities or service to the existing building or any portion thereof without continuously of two (2) calendar days.

1.4 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to area of the Owner's property.

B. Provide access to and from site as required by law and by Owner.

C. Emergency Building Exits during Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.

D. The Contractor may park on site in a designated area.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 10 00

SECTION 01 22 00

UNIT PRICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. List of unit prices, for use in preparing Bids.

B. Measurement and payment criteria applicable to Work performed under a unit price payment method.

C. Defect assessment and non-payment for rejected work.

1.2 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include full compensation for all required labor, Products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.3 UNIT QUANTITIES SPECIFIED:

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.4 MEASUREMENT OF QUANTITIES

A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.

B. Take all measurements and compute quantities. Measurements and quantities will be verified taken and verified by the Owner's Testing Laboratory.

1.5 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work which is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit sum/price.

1.6 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of the Architect, it is not practical to remove and replace the Work, the Architect will direct an appropriate remedy which may result in an adjustment of payment.

C. The authority of the Architect to assess the defect and identify payment adjustment is final.

1.7 SCHEDULE OF UNIT PRICES

1. Unit Price One: Trenching, Labor and Installation of 4" Ductile Iron Pipe per LF,
2. Unit Price Two: Trenching, Labor and Installation of 4" Polyvinyl Chloride Pipe per LF.

PART 2 PRODUCTS

PART 3 EXECUTION

END OF SECTION 01 22 00

SECTION 01 23 00

ALTERNATES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Alternate submission procedures.

1.2 RELATED SECTIONS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.3 ACCEPTANCE OF ALTERNATES

A. Alternates quoted will be reviewed and accepted or rejected at Owner's discretion. Accepted alternates will be identified in the Owner-Contractor Agreement.

B. Coordinate related work and modify surrounding work to integrate the Work of each alternate.

1.4 SCHEDULE OF ALTERNATES

A. ADD Alternate No. G-1: Provide brick veneer wainscot around the perimeter of the building in lieu extending the cement board siding at the base of the building as shown on the construction documents.

B. ADD Alternate No. G-2: Provide Stone veneer wainscot around the perimeter of the building in lieu extending the cement board siding at the base of the building as shown on the construction documents.

C. ADD Alternate No. G-3: Provide canopy roofing and support brackets over the overhead garage doors.

D. ADD Alternate No. G-4: Provide 4” Ductile Iron Pipe in lieu of Polyvinyl Chloride Pipe. All trenching should be part of base bid. This only material change alternate.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 23 00

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Procedures for modifying the Contract Documents.

1.2 CHANGE PROCEDURES

A. Minor Changes:
   1. The Architect will advise the Contractor and the Owner of minor changes in the Work which do not involve an adjustment to the Contract Sum or to the Contract Time, as authorized by
      a. Such requirements for changes will be issued to the Contractor as supplemental instructions in the form of drawings and/or in writing.

B. Changes Affecting the Contract Sum And/Or the Contract Time:
   1. The Architect may issue a Request For Proposal which shall include:
      a. A detailed description of the Proposed change with supplementary or revised Drawings and Specifications.
      b. A request for a quotation on the change in the Contract Time for executing the change, along with:
         (1) A stipulation of any overtime work required.
      c. A request for the period of time during which the requested quotation will be considered valid.
      d. Contractor shall prepare and submit an estimate (quotation) within 10 days after date of Request For Proposal.
   2. The Contractor may propose changes by submitting a written request to the Designer for the change.
      a. Contractor shall describe the reason for the change.
      b. Contractor shall describe the effect of the proposed change on the Contract Sum and on the Contract Time.
         (1) Statement shall include full documentation of the effect on the Work of the Contractor, and on the Work of separate or other Contractors.
      c. Contractor shall document any requested substitutions in accordance with requirements of Section 01 60 00 (PRODUCT REQUIREMENTS).

C. Forms Of Change Orders:
   1. Stipulated Sum Change Order:
      a. Change Order shall be based on:
         (1) The Request For Proposal and on the Contractor's fixed-price quotation.
         (2) Contractor's request for a Change Order as approved by the Architect.
   2. Construction Change Authorization:
      a. Architect may issue a written directive (signed by the Owner) instructing the Contractor to proceed with a change in the Work, with the change to be included in a subsequent Change Order.
         (1) Written directive will describe the changes in the Work, and will designate the method of determining any change in the Contract Sum and/or Contract Time.
            (a) Time And Materials Change Order:

1) Contractor shall submit an itemized account and supporting data after completion of change, and within the time limits indicated in the Conditions Of The Contract.
2) Architect will determine the allowable change in the Contract Sum and in the Contract Time as provided for in the Contract Documents.
   a) Contractor shall maintain detailed records of work done on a Time And Material basis.
   b) Contractor shall provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.
3) Contractor shall execute the change promptly.

D. Forms For Change Orders: AIA Document G701.

E. Execution Of Change Order:
   1. Architect will issue Change Order for signatures of parties as provided for in the Conditions of the Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 26 00

SECTION 01 29 00

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

1.3 SCHEDULE OF VALUES

A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

B. Forms filled out by hand will not be accepted.

C. Submit Schedule of Values in duplicate within 15 days after date established in Notice to Proceed.

D. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization.

E. Include in each line item, the amount of Allowances specified in this section. For unit cost allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.

F. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.

G. Revise schedule to list approved Change Orders, with each Application For Payment.

1.4 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: As specified in the Supplementary Conditions unless otherwise agreed by the Owner and Contractor.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
   9. Balance to Finish.
   10. Retainage.

E. Execute certification by signature of authorized officer.

F. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.

G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.

H. Submit three signed and notorized copies of each Application for Payment.

I. Include the following with the application:
   1. Transmittal letter as specified for Submittals in Section 01 30 00.
   2. Construction progress schedule, revised and current as specified in Section 01 32 16.
   3. Partial release of liens from General Contractor.
   4. Affidavits attesting to off-site stored products.

J. When Architect requires substantiating information, submit data justifying dollar amounts in question.

1.5 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Price or Contract Time, Architect will issue instructions directly to Contractor.

B. The Architect/Engineer will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing Supplemental Instructions.

C. (AIA G714): Architect/Engineer may issue a document, signed by the Owner and Architect, instructing the Contractor to proceed with a change in the Contract, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

D. The Architect/Engineer may issue a change directive which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a request for any change in Contract Time for executing the change with a stipulation of any overtime work required and sixty (60) days during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 14 days.

E. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 60 00.

F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation as approved by the Owner.
   2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect and Owner.
   3. For pre-determined unit prices and quantities, the amount will based on the fixed unit prices.
   4. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work as approved by the Owner.

G. Substantiation of Costs: Provide full information required for evaluation.
   1. Provide following data:
      a. Quantities of products, labor, and equipment.

b. Taxes, insurance, and bonds.
c. Overhead and profit.
d. Justification for any change in Contract Time.
e. Credit for deletions from Contract, similarly documented.

H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

K. Promptly enter changes in Project Record Documents.

1.6 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
1. All closeout procedures specified in Section 01 70 00.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 29 00

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preconstruction meeting.

B. Progress meetings.

C. Submittals for review, information, and project closeout.

D. Number of copies of submittals.

E. Submittal procedures.

1.2 RELATED SECTIONS

A. Section 00 73 00 - Supplementary Conditions: Dates for applications for payment.

B. Section 01 32 16 - Construction Progress Schedule: Form, content, and administration of schedules.

C. Section 01 70 00 – Execution and Closeout Requirements: Administrative and procedural requirements.

D. Section 01 78 00 – Closeout Submittals: Administrative and procedural requirements.

1.3 PROJECT COORDINATION

A. General Contractor.

B. Cooperate with the General Contractor in allocation of mobilization areas of site; for field offices and sheds, for access, traffic, and parking facilities.

C. During construction, coordinate use of site and facilities through the Project Coordinator.

D. Comply with General Contractor's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

E. Comply with instructions of the General Contractor for use of temporary utilities and construction facilities.

F. Coordinate field engineering and layout work under instructions of the General Contractor.

G. Make the following types of submittals to Architect through the General Contractor:
   1. Requests for information.
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Manufacturer's instructions and field reports.
   6. Applications for payment and change order requests.
   7. Progress schedules.
   8. Coordination drawings.
   9. Closeout submittals.

H. Make the following types of submittals to Architect through the Project Coordinator:

1. Requests for information.
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Manufacturer's instructions and field reports.
6. Applications for payment and change order requests.
7. Progress schedules.
8. Closeout submittals.

I. The Architect shall maintain a record of all items noted on the Architect/Engineer's Observation of Work in Progress, the subcontractor responsible for completing the work, and the date the work was completed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

3.1 PRECONSTRUCTION MEETING

A. Architect will schedule the meeting after Notice to Proceed with construction services.

B. Attendance Required:
1. Owner.
2. Architect.
3. Contractor.
4. Prime Subcontractors.
5. Others deemed necessary by the Architect and General Contractor.

C. Agenda:
1. Submission of executed bonds and insurance certificates.
2. Distribution of Contract Documents.
3. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
4. Designation of personnel representing the parties to Contract, Owner, and Architect.
5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
6. Scheduling.
7. Scheduling activities of a Geotechnical Engineer.

D. The Architect shall record minutes and distribute copies within two days after meeting to participants, with two copies to General Contractor, Owner, participants, and those affected by decisions made.

3.2 PROGRESS MEETINGS

A. The Architect shall schedule and administer meetings throughout progress of the Work at maximum bi-monthly intervals or as determined by the Architect and Owner.

B. The Architect shall make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Job superintendent, General Contractor's Project Manager, Owner's Representative and Architect, as appropriate to agenda topics for each meeting.

D. Agenda:
1. Review minutes of previous meetings.

2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems which impede planned progress.
5. Review of submittals schedule and status of submittals.
6. Review status of Architect/Engineer's Observation of Work in Progress (O.W.I.P.).
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Maintenance of quality and work standards.
11. Effect of proposed changes on progress schedule and coordination.
12. Other business relating to Work.

E. The Architect shall record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.3 CONSTRUCTION PROGRESS SCHEDULE - See Section 01 32 16

3.4 CONSTRUCTION DOCUMENTS

A. The Architect will provide reproducible Drawings and Specifications to the General Contractor free of charge for construction purposes. Additional Drawings and/or Specifications will be furnished on request at Architect's usual charge for reproduction.

3.5 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
1. Product data.
2. Shop drawings.
3. Samples for selection.
4. Samples for verification.

B. Samples will be reviewed only for aesthetic, color, or finish selection.

C. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - CLOSEOUT SUBMITTALS.

3.6 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
1. Design data.
2. Certificates.
3. Test reports.
4. Inspection reports.
5. Manufacturer's instructions.
6. Manufacturer's field reports.
7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner. No action will be taken.

3.7 SUBMITTALS FOR PROJECT CLOSEOUT

A. When the following are specified in individual sections, submit them at project closeout:
1. Project record documents.

2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. Other types as indicated.

B. Submit for Owner's benefit during and after project completion.

3.8 NUMBER OF COPIES OF SUBMITTALS

A. Documents for Review:
1. Small Size Sheets, Not larger than 8-1/2 x 11 inches: Submit the number of copies which the Contractor requires, plus two copies which will be retained by the Architect.
2. Larger sheets, not larger than 36 x 48 inches: Submit two opaque reproductions.

B. Documents for Information: Submit two copies.

C. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.

D. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
1. After review, produce duplicates.
2. Retained samples will not be returned to Contractor unless specifically so stated.

3.9 SUBMITTAL PROCEDURES

A. Transmit each submittal with AIA Form G810.

B. Sequentially number the transmittal forms. Revise submittals with original number and a sequential alphabetic suffix.

C. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

E. Deliver submittals to Architect at business address.

F. Schedule submittals to expedite the Project, and coordinate submission of related items.

G. For each submittal for review, allow 20 days excluding delivery time to and from the Contractor. Allow additional time for complicated or multiple submittals.

H. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

I. Provide space for Contractor and Architect review stamps.

J. When revised for resubmission, identify all changes made since previous submission.

K. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

L. Submittals not requested will not be recognized or processed.

END OF SECTION 01 30 00

SECTION 01 32 16

CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Progress Schedule in the form of Network Analysis.

1.2 REFERENCES

A. Associated General Contractors of America (AGC):
   1. AGC- "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry", 1976 edition. Referred to hereinafter as “AGC CPM Manual”.

1.3 QUALITY ASSURANCE

A. Scheduler:
   1. Specialist Consultant specializing in CPM scheduling, with five years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.
   2. The Scheduling Consultant shall have personnel who can visit the Site weekly, if necessary.

B. Contractor's Administrative Personnel: 2 years minimum experience in using and monitoring CPM schedules on comparable projects.

C. FORMAT OF PROGRESS SCHEDULE (CPM NETWORK ANALYSIS DIAGRAM):
   1. Listings: Reading from left to right, in ascending order for each activity. Identify each activity with the applicable Specification Section number.
   2. Diagram Sheet Size: 30 inches high by width required.
   3. Scale and Spacing: To allow for notations and revisions.

1.4 RESPONSIBILITIES

A. It shall be the responsibility of the Project Expediter to provide a Progress Schedule based on a Critical Path Method Schedule (CPM) for construction of the Project, including all phases and trades required for completion.

B. The list of all activities and costs shall include (but not necessarily limited to) the identical activities and cost item shown on “Application For Payment”.
   1. All items shown on “Application For Payment” shall be broken down for the Progress Schedule into labor and material costs - with no exceptions.

1.5 PROGRESS SCHEDULES

A. Prepare Network Analysis diagrams and supporting mathematical analyses using the Critical Path Method, under concepts and methods outlined in AGC CPM Manual.
   1. Preliminary Progress Schedule Meeting: The Project Expediter shall include in his Base Bid a minimum of three(3) full working days time (for both the Project Manager and Project Superintendent) at the beginning of the Project to review and refine the initial detailed Progress Schedule with subcontractors as required.

2. Within 5 calendar days after the effective date of the Notice To Proceed, the Project Expediter shall have prepared a preliminary time-scaled CPM Network Analysis covering the activities planned to be in progress during the Construction Time of the Contract.
3. The Project Expediter shall prepare(within 10 calendar days after the effective date of the Notice To Proceed) a complete Progress Schedule, utilizing the precedence diagramming technique, including (as a minimum) the following:
   a. Ninety (90) percent of the activities (except Fabricate and Deliver) shall have durations of between three (3) and fifteen (15) working days. No activity on the Progress Schedule shall have a duration exceeding 15 working days.
   b. These activities shall be resource and cost loaded as described below:
   c. The activities on the network shall carry the following information:
      (1) Activity identification number.
      (2) Activity description (activities/items as listed on AIA G702 (Application for Payment) shall read the same as G702).
      (3) Remaining activity duration.
      (4) Activity Value in dollars.
      (5) Activity Manpower in man-days.
   d. A schedule analysis reflected in the following reports:
      (1) A monthly report listing (for each activity) the activity identification number, the activity description, the original duration, the remaining duration, the responsible organization, the earliest and latest start and completion date, and the total slack.
         (a) The reports making up this set shall be sorted by:
            1) Activity identification number.
            2) Early start.
            3) Late start.
            4) Total slack.
      (2) A monthly report showing (for each activity) the amount of activity cost which has been earned to date. This report shall provide subtotals by responsible organization, and shall provide overall totals of Contract Amount and amount earned to date.
      (3) A monthly cash-flow-curve graph. This graph shall indicate the total percentage of activity-dollar-value scheduled to be in place for early and late finish dates, with actuals plotted out monthly.
      (4) A narrative report which provides an interpretation of the results of the computer analysis, and which outlines the means by which schedule problems are to be resolved.
      (5) A two-week Look-Ahead schedule which illustrates the relevant scheduled activities for that two-week period.

B. The CPM analysis system shall include a Submittal, and Approval, and a Fabrication and Delivery activity for each item of major equipment and for each materials item agreed upon by the Project Expediter and the Owner's representative as having the potential to affect the Progress Schedule.

C. The CPM analysis system shall include:
   1. Activities for testing/commissioning/debugging and final inspection.
   2. Punch-list completion activities for each major element of the facility's plumbing, mechanical, electrical, and construction systems.

D. The impact of all occurring Change Orders shall be incorporated into the Progress Schedule.

E. Any request for extension of Contract Time extension shall be accompanied by a proposed updated Progress Schedule substantiating any delay caused by the changed work. The impact of all major

holidays shall be incorporated into the Progress Schedule. The impact shall be quantified and stated explicitly in the narrative report.

F. The impact of historically-predictable weather-delays shall be incorporated into the Progress Schedule.
   1. The impact shall be quantified and stated explicitly in the narrative report.
   2. Historical-weather data-source shall be monthly summaries from the station closest to the Project Site of the previous 5 years correlated by:

G. Coordinate contents with Schedule 0f Values in Section 01 29 00 (PRICE and PAYMENT PROCEDURE).

H. The Project Expediter shall attest and sign a copy of the Progress Schedule. The signature shall attest that the CPM Network Analysis is the "approved Progress Schedule for construction".
   1. All Progress Schedule updates are also attested and signed as "approved updated Schedule".
   2. Forward the signed and approved copies of the Progress Schedule to the Designer promptly upon approval.

1.6 SUBMITTALS

A. Within 10 days after date established in Notice To Proceed, submit proposed preliminary Progress Schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.

B. Participate in review of preliminary and complete Progress Schedule diagrams jointly with Designer.

C. Within 20 days after joint review of proposed preliminary Progress Schedule diagram, submit draft of proposed complete Progress Schedule diagram for review. Include written certification that major Plumbing, Mechanical, and Electrical subcontractors have reviewed and accepted proposed Progress Schedule.

D. Within 10 days after joint review, submit two copies of the complete Progress Schedule, consisting of network diagrams and mathematical analysis, which will be retained by the Designer.

E. Submit updated Progress Schedule with each Application for Payment.
   1. Updating: The Project Expediter shall update the Progress Schedule monthly to show actual progress of the Work.
      a. Current work shall be noted as "ahead", "on", or "behind schedule".
      b. Determine how behind-time work will be expedited, and secure commitment from the entities involved in doing so.
      c. Discuss at the Progress Meeting whether schedule-revisions are required to ensure that current and subsequent Work will be completed within the Contract Time.
   2. The Project Expediter is required to submit an updated monthly Progress Schedule with his monthly payment application. Payment requests made without an updated Progress Schedule will be returned as incomplete.

F. Submit under transmittal letter form specified in Section 01 33 00 (SUBMITTAL PROCEDURES).

1.7 REVIEW AND EVALUATION

A. The Project Expediter shall:
   1. Participate in joint review and evaluation of Progress Schedule (network diagrams and analysis) with Designer at each submittal.
   2. Evaluate Project status to determine Work which is behind schedule, and work which is ahead of schedule.

3. After review, revise Progress Schedule as necessary as result of review, and resubmit within 10 days.

1.8 UPDATING PROGRESS SCHEDULES

A. The Progress Schedule shall be updated according to Section 01323, 1.6.E.1.

B. Maintain Progress Schedules to record actual start and finish dates of completed activities.

C. At each monthly update of the Progress Schedule, the earned value and man-hours expended to date of each activity worked on during the past month shall be submitted in draft form by the Project Expediter to the Designer.
   1. After the Designer and Project Expediter reach agreement on the earned values, the Progress Schedule shall be updated with the man hour expenditures, with remaining durations of activities, and with any logic changes necessary.
   2. The latest updated Project Schedule shall be posted on a wall in or near the field office area of the Project Expediter.
   3. Payment Certification for the Project Expediter shall include and correlate the costs referred to hereinbefore.
   4. The Project Expediter shall perform the following as a part of their participation in the updating of the Progress Schedule:
      a. Indicate progress of each activity to date of revision, with projected completion date of each activity. Annotate diagrams to depict graphically the current status of Work.
      b. Identify activities modified since previous submittal, major changes in the Work, and other identifiable changes.
      c. Indicate changes required to maintain Date Of Substantial Completion.
      d. Submit sorts required to support recommended changes.
      e. Provide narrative report to define problem areas, anticipated delays, and impact on Progress Schedule. Report corrective action taken, or proposed, and its effect (including the effect of changes on schedules of separate Contractors).

D. The Project Expediter shall (at the time of Final Completion) submit (as part of the required completion documents) an “as-built” Progress Schedule and reports incorporating the actual duration and activities which occurred during the Project.

1.9 DISTRIBUTION

A. Following joint review, the Project Expeditor shall distribute copies of updated Progress Schedules to major subcontractors, suppliers, the Designer, and Owner.

B. Project Expediter shall instruct recipients to report promptly (in writing) problems anticipated by projections shown in updated Progress Schedule.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION(Not Used)

END OF SECTION 01 32 16

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Schedule of submittals.

B. Proposed product list.

C. Submittal procedures.

D. Administrative submittals.

E. Shop Drawings.

F. Product data.

G. Manufacturer's instructions.

H. Manufacturer's certificates.

1.2 SCHEDULE OF SUBMITTALS

A. All submittals shall be incorporated into a Schedule Of Submittals.
   1. Submit Schedule to Architect within thirty days after date established in Notice To Proceed.
   2. Allow Architect at least 20 days for review of each submittal after receipt.
   3. Allow more time for complicated, multiple or those submittals requiring reviews by multiple disciplines

B. Schedule submittals to expedite the Project.
   1. Scheduled date for the first submittal.
   2. Related Specification Section number.
   3. Submittal category.
   4. Name of Subcontractor.
   5. Description of the part of the Work covered.
   6. Scheduled date of resubmittal.
   7. Scheduled date of the Architect's final release or approval.

1.3 SUBMITTAL PROCEDURES

A. Transmit each submittal with Contractor's standard transmittal form.
   1. Sequentially number the transmittal forms. Re-submittals shall have original number with an alphabetical suffix. Schedule submittals to expedite the Project schedule. Deliver to Architect. Coordinate submission of related items.
   2. Allow Architect at least 20 days (after receipt by Architect) for review of each submittal.
      a. Allow more time for complicated or multiple submittals.
      b. Time allotted to Architect for each review shall not begin until Architect receives a satisfactory submittal, complying with requirements of Contract Documents for nature of, conditions of, and processing of submittals.
      c. Any submittals not complying with requirements of the Contract Documents will be rejected by the Architect as incomplete or incorrect information.

B. Place a permanent label on the title block of each submittal for identification.

1. Identify Project, date, Contractor, Subcontractor or supplier, pertinent Drawing sheet and detail number(s), Specification Section number, Title of Specification Section, as appropriate on transmittals, submittals, and samples.

C. Provide space for review stamps of Contractor, Architect, and Engineer.
   1. Architect shall reject any submittal not having been reviewed by the Contractor; and shall require, thereby, that item be resubmitted after proper documentation.

D. Identify variations from Contract Documents and Product or systems limitations which may be detrimental to successful performance of the completed Work.

E. Apply Contractor's stamp, signed or initialed to certify that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and of the Contract Documents.

F. The Contractor's submittal and Architect's review of Shop Drawings, Product Data, or Samples that relate to construction activities not complying with the Contract Documents shall not constitute an acceptance nor valid request for substitution, nor shall it constitute approval.

G. Revise and resubmit submittals as required. Identify all changes made since previous submittal.

H. Distribute copies of reviewed submittals to concerned parties. Instruct parties to report promptly any inability to comply with provisions.

1.4 ADMINISTRATIVE SUBMITTALS

A. Administrative actions and submittals that must precede or coincide with submittal of the first Application For Payment shall include the following:
   1. List of Contractor's staff assignments.
   2. List of Subcontractors including name of contract, address, and telephone number.
   3. List of principal suppliers and fabricators.
   4. Schedule of principal products.
   5. Schedule Of Values.
   6. Progress Schedule.
   7. Schedule Of Submittals.
   8. Certificates of Insurance, and insurance policies.
   9. Performance and Payment Bonds.

B. Administrative actions and submittals (in addition to initial actions and submittals) shall include:
   1. Applications For Payments.
   2. Revised Progress Schedule.
   3. Construction Record Documents and Close-Out Submittals.

1.5 PROPOSED PRODUCTS LIST

A. Within 20 days after date of Notice To Proceed, submit complete list of major products proposed for use. Include with name of manufacturer, trade name, and model number of each product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.6 SHOP DRAWINGS

A. Submit in the form of one reproducible transparency (rolled, not folded); and 3 opaque reproductions. The reproducible transparency will be returned to the Contractor. If the submittal is 8-1/2 inches by 11 inches, or 11 inches by 17 inches, submit 3 opaque reproductions.

B. Contractor shall not reproduce the Architect's Drawings for use as Shop Drawings. Sheet size for all Shop Drawings shall be at least 8 1/2 inches by 11 inches, but no larger than 30 inches by 42 inches.

C. After review, reproduce and distribute in accordance with paragraph herein on Submittal Procedures; and provide copies for Operation and Maintenance Data as described in Section 01 78 00 (CLOSEOUT PROCEDURES).

1.7 PRODUCT DATA

A. Submit the number of copies which the Contractor requires, plus two copies which will be retained by the Architect. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement Manufacturer's standard data to provide information unique to this Project.

C. After review, distribute in accordance with Paragraph on Submittal Procedures hereinbefore. Provide copies for Operation and Maintenance Data described in Section 01 78 00 (CLOSEOUT PROCEDURES).

1.8 SAMPLES

A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

B. Submit samples of finishes from the full range of Manufacturer's standard colors or custom colors selected, color range set, textures, and patterns for Architect's selection.
   1. Color photographs of finishes are not acceptable unless authorized by the Architect.

C. Submit the number of samples specified in individual Specification Sections, or as required by the Contractor; one of which will be retained by Architect.

D. Reviewed samples which may be incorporated in the Work are indicated in individual Specification Sections.

E. Maintain sets of samples at the Project Site, for use of quality comparisons throughout the course of construction.

1.9 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual Specification Sections, submit Manufacturer's printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified in this Section for Product Data.

B. Identify conflicts between Manufacturer's instructions and requirements of the Contract Documents.

1.10 MANUFACTURER'S CERTIFICATES

A. When specified in individual Specification Sections, submit Manufacturer's certificate to Architect for review, in quantities specified for Product Data in this Section.

B. Indicate that material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 33 00

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. References and standards.

B. Quality assurance submittals.

D. Control of installation.

E. Tolerances.

F. Testing and inspection services.

G. Manufacturers' field services.

1.2 RELATED SECTIONS

A. Section 01 30 00 - Administrative Requirements: Submittal procedures.

B. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.3 REFERENCES

A. ASTM C 1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

B. ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

1.4 SUBMITTALS

A. Testing Agency Qualifications:
   1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.

B. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor, and Owner.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test/inspection.
      h. Date of test/inspection.
      i. Results of test/inspection.
      j. Conformance with Contract Documents.
      k. When requested by Architect, provide interpretation of results.

C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.

1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
2. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect/Engineer.

1.5 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.6 TESTING AND INSPECTION AGENCIES

A. Owner will employ and pay for services of an independent testing agency to perform specified testing and inspection.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents. Contractor will coordinate with all testing agencies to properly schedule all testing in sequence with the project schedule.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses,

vibration, physical distortion, and disfigurement.

3.2 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.3 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.

B. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
   5. Perform additional tests and inspections required by Architect.
   6. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.

F. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.
   1. Contractor shall coordinate with all testing agencies to properly schedule all testing in

accordance with the Project Schedule.

G. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect. Payment for retesting will be charged to the Contractor by deducting testing charges from the Contract Price.

3.4 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment and other requirements as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.5 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

C. If additional testing is required due to the Contractor's non-compliance with the Contract Documents or acts by the Contractor or Subcontractors that damage the work, the payment for additional testing will be charged to the Contractor by deducting testing charges from the Contract price.

END OF SECTION 01 40 00

SECTION 01 45 33

CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Requirements for Special Inspections.
   1. The Owner shall employ one or more special inspectors to provide inspections during construction.
   2. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the contract Documents requirements.

B. Requirements for the Contractor to provide quality-control services required by Architect or Authorities having jurisdiction are not limited by provisions of this Section.

1.2 DEFINITIONS

A. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.

B. Independent: An approved agency shall be objective and competent. The agency shall also disclose possible conflicts of interest so that objectivity can be confirmed.

C. Equipment: An approved agency shall have adequate equipment to perform required tests. The equipment shall be periodically calibrated.

D. Personnel: An approved agency shall employ experienced personnel educated in conducting, supervising and evaluating tests and/or inspections.

E. Special Inspection, 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.

F. Special Inspection, 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 has been or is being performed and at the completion of the work.

G. Quality-Assurance Services: Activities, actions and procedures performed before and during execution of the work to guard against defects and deficiencies and ensures that proposed construction complies with requirements.

1.3 REGULATORY REQUIREMENTS

A. Copies of Regulations: Obtain copies of the following regulations and retain at the project site to be available for reference by parties who have a reasonable need:

B. 2012 North Carolina State Building Code, Chapter 17 “Structural Tests and Special Inspections”.

1.4 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

B. ACI International (ACI)
   1. ACI 318/318R (2005) Building Code Requirements for Structural Concrete and Commentary

2. ACI 318M (2005) Metric Building Code Requirements for Structural Concrete and Commentary
3. ACI 530/530.1 (2005) Building Code Requirements for Masonry Structures

C. American Institute of Steel Construction (AISC)
1. AISC 341 (2005) Seismic Provisions for Structural Steel Building
2. AISC 360 (2005) Specification for Structural Steel Buildings

D. American Society for Testing and Materials (ASTM)
1. ASTM A 435/A 435M (2001) Straight-Beam Ultrasonic Examination of Steel Plates
2. ASTM A 615/A 615M (2004a) Deformed and Plain Billet-steel Bars for Concrete Reinforcement
3. ASTM A 898/A 898M (2001) Straight Beam Ultrasonic Examination of Rolled Steel Structural Shapes

1.5 QUALITY ASSURANCE

A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of North Carolina and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.

B. Special Inspector: Owner/Owner's Agent shall provide a Special Inspector at the work site for each of the areas of responsibilities, specified below, who shall assist and report to the Owner, Engineer of record and who shall have no duties other than their assigned quality control duties. Special Inspectors are required to be physically present at the construction site to perform the phases of control and prepare documentation for each definable feature of work in their area of responsibility at the frequency specified. Special Inspectors shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements for Special Inspectors shall not supersede building codes and similar regulations governing the Work, nor interfere with local trade-union jurisdictional settlements and similar conventions.

2. Concrete:
   a. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
   b. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I.
   c. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
3. Smoke Control Systems:
   a. Personnel conducting field tests shall be qualified in fire protection engineering, mechanical engineering, and certification as air balancer certified by AABC Test and Balance Technician.
4. Structural Steel:
   a. Personnel conducting inspections shall have current ICC Structural Steel and Welding Certification plus one year of relevant experience, or an equivalent certification program.

5. Welding
   a. Personnel conducting field tests shall be qualified as Certified Welding Inspector (CWI) according to AWS QC1 or an equivalent certification program.

1.6 SPECIAL INSPECTIONS

A. Inspection of Fabricators: Where fabrication of structural load-bearing members and assemblies is being performed on the premises of a fabricator's shop, special inspection of the fabricated items shall be required by this section and as required elsewhere in the code.

B. Steel Construction: The special inspections for steel elements of buildings and structures shall be as required by Section 1704.3 and Table 1704.3 of the State of North Carolina. Where required special inspection of steel shall also comply with Section 1715 of The 2012 North Carolina State Building Code.

C. Concrete Construction: The special inspections and verifications for concrete construction shall be as required by this Section 1704.4 and Table 1704.4 of The 2012 North Carolina State Building Code.

D. Masonry Construction: Masonry construction shall be inspected and evaluated in accordance with the requirements of The 2012 North Carolina State Building Code, depending on the classification of the building or structure or nature of occupancy, as defined by the 2012 North Carolina State Building Code (see Table 1604.5 and Table 1617.6 of The 2012 North Carolina State Building Code).

E. Wood Construction. Special inspections of the fabrication process of wood structural elements and assemblies shall be in accordance with Section 1704.2. of The 2012 North Carolina State Building Code

F. Soils: The special inspections for existing site soil conditions fill placement and load-bearing requirements shall follow Section 1704.7.1 through 1704.7.3 of The 2012 North Carolina State Building Code. The approved soils report, required by Section 1802.2 of The 2012 North Carolina State Building Code, shall be used to determine compliance.

G. Special Cases. Special inspections shall be required for proposed work that is, in the opinion of the code enforcement official, unusual in its nature, such as, but not limited to, the following examples:
   1. Construction materials and systems that are alternatives to materials and systems prescribed by this code.
   2. Unusual design applications of materials described in this code.
   3. Materials and systems required to be installed in accordance with additional manufacturer's instructions that prescribe requirements not contained in this code or in standards referenced by this code.

H. Smoke Control Systems: Smoke control systems shall be tested by a special inspector.

1.7 QUALITY ASSURANCE FOR SEISMIC RESISTANCE

A. Scope: A quality assurance plan for seismic requirements shall be provided in accordance with Section 1705.2 of the 2012 North Carolina State Building Code for the following:
   1. The seismic-force-resisting systems in structures assigned to Seismic Design Category C, D, E or F.
   2. Designated seismic systems in structures assigned to Seismic Design Category D, E or F.

B. The following additional systems in structures assigned to Seismic Design Category C:
   1. HVAC ductwork containing hazardous materials, and anchorage of such ductwork
   2. Piping systems and mechanical units containing flammable, combustible or highly toxic materials
   3. Anchorage of electrical equipment used for emergency or standby power systems.

C. The following additional systems in structures assigned to Seismic Design Category D:
   1. Systems required for Seismic Design Category C
   2. Exterior wall panels and their anchorage.

3. Suspended ceiling systems and their anchorage.
4. Access floors and their anchorage.
5. Steel storage racks and their anchorage, where the importance factor, Ip, determined is equal to 1.5.

D. The following additional systems in structures assigned to Seismic Design Category E or F:
1. Systems required for Seismic Design Categories C and D
2. Electrical equipment.

1.8 QUALITY ASSURANCE FOR WIND REQUIREMENTS

A. Scope: A quality assurance plan for wind requirements shall be provided for all structures constructed in the following areas:
1. In wind exposure categories A and B, where the 3-second-gust basic wind speed is 120 mph or greater.
2. In wind exposure categories C and D, where the 3-second-gust basic wind speed is 110 mph or greater.

1.9 SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE

A. General: Provide Special Inspection where required in Section 1704.1 of the 2012 North Carolina State Building Code.

B. Special Inspections itemized in Section 1707.2 through 1707.8 of the 2012 North Carolina State Building Code are required for the following:
1. The seismic-force-resisting systems in structures assigned to Seismic Design Category C, D, E or F.
2. Designated seismic systems in structures assigned to Seismic Design Category D, E or F.
3. Architectural, mechanical and electrical components in structures assigned to Seismic Design Category C, D, E or F.
4. Structural steel: Continuous special inspection for structural welding in accordance with AISC Seismic.
5. Structural wood: Continuous special inspection during field gluing operations of elements of the seismic-force-resisting system. Periodic special inspections for nailing, bolting, anchoring and other fastening of components within the seismic-force-resisting system, including drag struts, braces and hold-downs.
6. Cold-formed steel framing: Periodic special inspections during welding operations of elements of the seismic-force-resisting system. Periodic special inspections for screw attachment, bolting, anchoring and other fastening of components within the seismic-force-resisting system, including struts, braces, and hold-downs.
7. Storage racks and access floors: Periodic special inspection during the anchorage of access floors and storage racks 8 feet (2438 mm) or greater in height in structures assigned to Seismic Design Category D, E or F.
8. Architectural Components. Periodic special inspection during the erection and fastening of exterior cladding, interior and exterior nonload bearing walls, and veneer in structures assigned to Seismic Design Category D, E or F.
9. Mechanical and electrical components:
    a. Periodic special inspection during the anchorage of electrical equipment for emergency or standby power systems in structures assigned to Seismic Design Category C, D, E or F.
    b. Periodic special inspection during the installation of anchorage of other electrical equipment in structures assigned to Seismic Design Category E or F.
    c. Periodic special inspection during installation of piping systems intended to carry flammable, combustible, or highly toxic contents and their associated mechanical units in structures assigned to Seismic Design Category C, D, E or F.

d. Periodic special inspection during the installation of HVAC ductwork that will contain hazardous materials in structures assigned to Seismic Design Category C, D, E or F.

10. Seismic Isolation System: Provide periodic special inspection during the fabrication and installation of isolator units and energy dissipation devices if used as part of the seismic isolation system.

1.10 STRUCTURAL TESTING FOR SEISMIC RESISTANCE

A. Masonry: Testing and verification of masonry materials and assemblies prior to construction shall comply with the requirements of this section, depending on the classification of building or structure or nature of occupancy, as defined in The Building code of New State (see Table 1604.5 or Section1616.2).

B. Testing for Seismic Resistance: The tests specified in Section1708.3 through 1708.6 of the 2012 North Carolina State Building Code are required for the following:
1. The seismic-force-resisting systems in structures assigned to Seismic Design Category C, D, E or F.
2. Designated seismic systems in structures assigned to Seismic Design Category D, E or F.
3. Architectural, mechanical and electrical components in structures assigned to Seismic Design Category C, D, E or F.

C. Reinforcing and Pre-stressing Steel: Certified mill test reports shall be provided for each shipment of reinforcing steel used to resist flexural, shear and axial forces in reinforced concrete intermediate frames, special moment frames and boundary elements of special reinforced concrete or reinforced masonry shear walls.
1. Where ASTM A 615 reinforcing steel is used to resist earthquake-induced flexural and axial forces in special moment frames and in wall boundary elements of shear walls in structures assigned to Seismic Design Category D, E or F, as determined in Section 1616 of the 2012 North Carolina State Building Code, the testing requirements of ACI 318 shall be met.
2. Where ASTM A 615 reinforcing steel is to be welded, chemical tests shall be performed to determine weld ability in accordance with Section 1903.5.2 of the 2012 North Carolina State Building Code.

D. Structural Steel: The testing contained in the quality assurance plan shall be as required by AISC Seismic and the additional requirements herein. The acceptance criteria for nondestructive testing shall be as required in AWS D1.1 as specified by the registered design professional.
1. Base metal thicker than 1.5 inches (38 mm), where subject to through-thickness weld shrinkage strains, shall be ultrasonically tested for discontinuities behind and adjacent to such welds after joint completion.
2. Any material discontinuities shall be accepted or rejected on the basis of ASTM A 435 or A 898 (Level 1 Criteria) and criteria as established by the registered design professional(s) in responsible charge and the construction documents.

E. Mechanical and Electrical Equipment: Each manufacturer of designated seismic system components shall test or analyze the component and its mounting system or anchorage and shall submit a certificate of compliance for review and acceptance by the registered design professional in responsible charge of the design of the designated seismic system and for approval by the code enforcement official.
1. The evidence of compliance shall be by actual test on a shake table, by three-dimensional shock tests, by an analytical method using dynamic characteristics and forces, by the use of experience data (i.e., historical data demonstrating acceptable seismic performance), or by more rigorous analysis providing for equivalent safety.
2. The special inspector shall examine the designated seismic system and shall determine whether the anchorages and label conform with the evidence of compliance.

F. Seismically Isolated Structures. For required system tests, see Section 1623.8 of the 2012 North Carolina State Building Code.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 STATEMENT OF SPECIAL INSPECTIONS

A. Refer to attached form **"Statement of Special Inspections"** at the end of this section.

B. Refer to attached "**Schedule of Special Inspections**" at the end of this section.

3.2 SPECIAL INSPECTION REPORTS

A. Report Requirement: Special Inspectors shall keep records of inspections. The special inspector shall furnish inspection reports to the code enforcement official, and to the registered design professional in responsible charge.
   1. Reports shall indicate that work inspected was done in conformance to approved construction documents.
   2. Discrepancies shall be brought to the immediate attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the code enforcement official and to the registered design professional in responsible charge prior to the completion of that phase of the work.

B. Periodic Report: On the first day of each month, the special inspector shall furnish to the Architect five copies of the combined progress reports of the special inspector's observations. These progress reports shall list all special inspections of construction or reviews of testing performed during that month, note all uncorrected deficiencies, and describe the corrections made both to these deficiencies and to previously reported deficiencies.
   1. Each monthly report shall be signed by all special inspectors who performed special inspections of construction or reviewed testing during that month, regardless of whether they reported any deficiencies.
   2. Each monthly report shall be signed by the Contractor.

C. Final Report: At completion of construction, each special inspector shall prepare and sign a final report attesting that all work they inspected and all testing and test reports they reviewed were completed in accordance with the approved construction documents and that deficiencies identified were satisfactorily corrected.
   1. The Special Inspector shall submit a combined final report containing the signed final reports.
   2. The Contractors shall sign the combined final report attesting that all final reports of special inspectors that performed work to comply with these construction documents are contained therein, and that the Contractor has reviewed and approved all of the individual inspector's final reports.
   3. Refer to attached form **"Report of Special Inspections"** attached at the end of this section.

END OF SECTION 01 45 33

Statement of Special Inspections

Name of project:

Address or Legal Description:

Owner's Name:

Authority having jurisdiction:

I , as the owners , or Agent of the owner (contractors may not employ the special inspector), certify that I or architect/engineer of record, will be responsible for employing the special inspector(s) as required by the 2012 North Carolina State Building Code Section 1704 for the construction project located at the site listed above.

Signed:

I , as the structural engineer of record, certify that I have prepared the following special inspections program as required by the 2012 North Carolina State Building Code Section 1704 for the construction project located at the site listed above

Printed Name:

Seal

Signature: Date:

List of work requiring special inspections:

See ATTACHED schedule

Special Inspections Report

REPORT TYPE:
☐ Continuous
☐ Periodic
☐ Final
WORK / MATERIAL INSPECTED:

PROJECT NAME:
Address or Legal Description:

Owner's Name:
Phone:
Fax:
APPROVED INSPECTION AGENCY:
Address:

Phone:
Fax:
AUTHORITY HAVING JURISDICTION:
Address:

Phone:
Fax:
REGISTER DESIGN PROFESSION OR RECORD:
Address:

Phone:
Fax:
STATEMENT OF CONFORMANCE:
Discrepancies:

1. None _____
    a. Contractor Review:
    b. Contractor signature:
    c. Contractor correction:

Outstanding Discrepancies:

1. None _____
    a. Authority Having Jurisdiction review:

Registered Design Professional review:

SCHEDULE OF SPECIAL INSPECTIONS
INSPECTIONS OF FABRICATORS

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	AISC Certified Steel Fabricators Inspections of load bearing members and assemblies	On premises inspection of fabricated items	N/A	NA	TBD	N/A	1704.2	Registered Design Professional	
Y	Non-AISC Certified Steel Fabricators Inspections of load bearing members and assemblies. Steel fabricator shall be responsible for the cost of this special inspection.	On premises inspection of fabricated items	Required	NA	TBD	Inspection report	1704.2	Registered Design Professional	
N	AISC Certified Steel Fabricators Detailed fabrication / Quality Control Procedures	Review each Fabricator's quality control procedures	N/A	NA	TBD	N/A	1704.2.1	Registered Design Professional	
Y	Non-AISC Certified Steel Fabricators Detailed fabrication / Quality Control Procedures. Steel fabricator shall be responsible for the cost of this special inspection.	Review each Fabricator's quality control procedures	Prior to Fabrication	NA	TBD	Inspection report	1704.2.1	Registered Design Professional	
Y	Fabricator Certificate Approval	Review Certification of Compliance	Prior to Fabrication	NA	TBD	Submittal of Certificate of Compliance	1704.2.2	Registered Design Professional	
Y	Fabricated Wood structural items	Refer to inspection of fabricators	NA	NA		Statement of Verification	1704.6, Sec. 1704.2		

SCHEDULE OF SPECIAL INSPECTIONS

STEEL CONSTRUCTION

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
Y	Steel construction w/no Welding, thermal cutting or heating	Review each Fabricator's quality control procedures	Prior to Fabrication	NA	NA	Submittal of detailed procedure for material control by the fabricator	1704.3.1	Registered Design Professional	
Y	Welding Fillets	Single pass fillet weld not exceeding 5/16 inch in size	NA	Required	AWS D1.1(1704.3)	Statement of verifying prior qualification , Periodic inspection report, Visual inspection report.	1704.3.2.1, 1704.3	AWS D1.1 (1704.3.1)	
Y	Welding Deck	Floor and roof deck welding	NA	Required	AWS D1.1(1704.3)	Statement of verifying prior qualification , Periodic inspection report, Visual inspection report.	1704.3.2.2, 1704.3	AWS D1.1 (1704.3.1)	

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	Welding Shear studs	Welded studs when used for structural diaphragm	NA	Required	AWS D1.1(1704.3)	Statement of verifying prior qualification , Periodic inspection report, Visual inspection report.	1704.3.2.3, 1704.3	AWS D1.1 (1704.3.1)	
N	Welding CFMF	Welded sheet steel for cold-formed steel framing members such as studs at joist	NA	Required	AWS D1.1(1704.3)	Statement of verifying prior qualification , Inspection report, Visual inspection report.	1704.3.2.4, 1704.3	AWS D1.1 (1704.3.1)	
N	Welding Stairs	Welding of stairs and railing systems	NA	Required	AWS D1.1(1704.3)	Statement of verifying prior qualification , Inspection report, Visual inspection report.	1704.3.2.5, 1704.3	AWS D1.1 (1704.3.1)	
Y	Steel Frame details	Verify compliance with approved construction documents (shop drawings)	Required	NA	NA	Inspection report	1704.3.2	Registered Design Professional	
Y	High strength bolt	Verification that installation meets AISC specification	NA	Required	AISC Specification	Inspection report	1707.4.3.3	Registered Design Professional	

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
Y	Pre-tensioned bolts pre-installation	Observe the pre-installation testing	Prior to construction	NA	AISC Specification	Inspection report	1704.3.3.1, 1704.3.3.2	Registered Design Professional	
Y	Connecting material	Determine that all plies are drawn together	NA	Required	AISC Specification	Inspection report	1704.3.3.1, 1704.3.3.2	Registered Design Professional	
N	Pre-tensioned bolts tightness	Monitor installation for tightness	Required, based on method	Required, based on method	AISC Specification	Monitoring reports	1704.3.3.1, 1704.3.3.2, 1704.3.3.3	Registered Design Professional	
Y	Joints required to be Snug tight	Verify material are drawn together	NA	Required	AISC Specification	Monitoring reports	1704.3.3.1, 1704.3.3.2	Registered Design Professional	
Y	Material verification of high-strength bolts, nuts, and washers.	Identification markings to conform to conform to ASTM Standards specified.	NA	Required	Applicable ASTM material specifications; AISC, ASD, Section A3.4; AISC, LRFD, SectionA3.3.	Inspection report	Table 1703.3	Registered Design Professional	

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
Y	Material verification of high-strength bolts, nuts, and washers.	Manufacturer's certificate of compliance required.	NA	Required	Applicable ASTM material specifications; AISC, ASD, Section A3.4; AISC, LRFD, SectionA3.3.	Inspection report, Certificate of Compliance	Table 1703.3	Registered Design Professional	
Y	Inspection of high-strength bolting:	Bearing-type connections.	NA	Required	AISC LRFD Section M2.5	Inspection report	Table 1703.3, 1704.3.3	Registered Design Professional	
Y	Inspection of high-strength bolting:	Slip-critical connections. (moment connections)	Required	Required	AISC LRFD Section M2.5	Inspection report	Table 1703.3, 1704.3.3	Registered Design Professional	
Y	Material verification of structural steel:	Identification markings to conform to ASTM standards specified.	Required	NA	ASTM 6 or ASTM A568	Inspection report	Table 1703.3, 1708.4	Registered Design Professional	
Y	Material verification of structural steel:	Manufacturers' certified mill test reports required.	Required	NA	ASTM 6 or ASTM A568	Inspection report, Certified mill test report	Table 1703.3, 1708.4	Registered Design Professional	

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
Y	Material verification of weld filler materials:	Identification markings to conform to AWS specifications.	Required	NA	AISC, ASD, Section A3.6; AISC, LRFD, Section A3.5.	Inspection report	Table 1703.3, 1704.3	Registered Design Professional	
Y	Material verification of weld filler materials:	Manufacturer's certificate of compliance required.	Required	NA	AISC, ASD, Section A3.6; AISC, LRFD, Section A3.5.	Inspection report, Certificate of Compliance	Table 1703.3, 1704.3	Registered Design Professional	
Y	Inspection of welding: Structural Steel	Complete and partial penetration groove welds.	Required	NA	AWS D1.1	Inspection report	Table 1703.3, 1704.3.1	Certified Welding Inspector (CWI)	
Y	Inspection of welding: Structural Steel	Multi-pass fillet welds.	Required	NA	AWS D1.1	Inspection report	Table 1703.3, 1704.3.1	Certified Welding Inspector (CWI)	
Y	Inspection of welding: Structural Steel	Single-pass fillet welds greater than 5/16"	Required	NA	AWS D1.1	Inspection report	Table 1703.3, 1704.3.1	Certified Welding Inspector (CWI)	

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
Y	Inspection of welding: Structural Steel	Single-pass fillet welds less than 5/16".	NA	Required	AWS D1.1	Inspection report	Table 1703.3, 1704.3.1	Certified Welding Inspector (CWI)	
Y	Inspection of welding: Structural Steel	Floor and deck welds.	NA	Required	AWS D1.3	Inspection report	Table 1703.3, 1704.3.1	Certified Welding Inspector (CWI)	
N	Inspection of welding: Reinforcing steel:	Verification of weld ability of reinforcing steel other than ASTM A 706	NA	Required	AWS D1.4, ACID 318: 3.5.2	Inspection report	Table 1703.3, 1903.5.2	Certified Welding Inspector (CWI)	
N	Inspection of welding: Reinforcing steel:	Reinforcing steel-resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special reinforced concrete shear walls, and shear reinforcement	Required	NA	AWS D1.4, ACID 318: 3.5.2	Inspection report	Table 1703.3, 1903.5.2	Certified Welding Inspector (CWI)	
N	Inspection of welding: Reinforcing steel:	Shear reinforcement	Required	NA	AWS D1.4, ACID 318: 3.5.2	Inspection report	Table 1703.3, 1903.5.2	Certified Welding Inspector (CWI)	

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	Inspection of welding: Reinforcing steel:	Other reinforcing steel	NA	Required	AWS D1.4, ACID 318: 3.5.2	Inspection report	Table 1703.3, 1903.5.2	Certified Welding Inspector (CWI)	
Y	Inspection of steel frame joint details for compliance with the Construction Documents:	Inspect Details such as bracing and stiffening.	NA	Required	NA	Inspection report	Table 1703.3, 1704.3.2	Registered Design Professional	
Y	Inspection of steel frame joint details for compliance with the Construction Documents:	Inspect member locations.	NA	Required	NA	Inspection report	Table 1703.3, 1704.3.2	Registered Design Professional	
Y	Inspection of steel frame joint details for compliance with the Construction Documents:	Inspect application of joint details at each connection.	NA	Required	NA	Inspection report	Table 1703.3, 1704.3.2	Registered Design Professional	
N	Material Tests	Test for joist hangers	Required	NA	ASTM D 1761, AFPA NDS	Compliance certification	1715	Registered design Professional	

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	Inspection of steel frame joint details for compliance with the Construction Documents:	Vertical load of joist hangers	Required	NA	ASTM D 1761	Compliance certification	1715	Registered design Professional	
N	Inspection of steel frame joint details for compliance with the Construction Documents:	Torsional moment capacity for joist hangers	Required	NA	ASTM D 1761	Compliance certification	1715	Registered design Professional	
N	Inspection of steel frame joint details for compliance with the Construction Documents:	Design value modifications for joist hangers	Required	NA	ASTM D 1761, AFPA NDS	Compliance certification	1715	Registered design Professional	

SCHEDULE OF SPECIAL INSPECTIONS

CONCRETE CONSTRUCTION

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	Concrete testing	Absence of test data	NA	NA	Chapter 3 of ACI 318	Statement of conformance	Table 1704.4, 1704.4.1		
Y	Concrete reinforcement	Inspection of reinforcing steel, including pre-stressing tendons, and placement.	NA	Required	ACID 318:3.5,7.1 – 7.7	Inspection report	Table 1704.4, 1903.5, 1907.1, 1907.7, 1914.4	CERTIFIED-certified Concrete Strength Testing Technician Grade I.	
N	Concrete reinforcement welding	Inspection of reinforcing steel welding in accordance with Table 1704.3, Item 5B.	Required	NA	AWS D1.4 CERTIFIED 318: 3.5.2	Inspection report	Table 1704.4, 1903.5.2	CERTIFIED-certified Concrete Strength Testing Technician Grade I.	
Y	Bolts	Inspect bolts to be installed in concrete prior to and during placement of concrete where allowable loads have been increased	Required	NA	NA	Inspection report	Table 1704.4, 1912.5	ACI-certified Concrete Strength Testing Technician Grade I.	
Y	Design Mix	Verifying use of required design mix.	NA	Required	ACI 318: Ch. 4, 5.2-5.4	Inspection report	Table 1704.4, 1904, 1905.2-1905.4,1914.2, 1914.3		

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
Y	Concrete strength	Strength test	Required	NA	ASTM C 31, ASTM C 39	Inspection report	Table 1704.4, 1905.6.3.2, 1905.6.2.1	ACI-certified Concrete Strength Testing Technician Grade I.	
Y	Slump	Sampling fresh concrete and performing slump, air content and determining the temperature of fresh concrete at the time of making specimens for strength tests.	Required	NA	ASTM C 172, ASTM C 31, ACI 318: 5.6, 5.8	Inspection report	Table 1704.4, 1905.6, 1914.10		
N	Shotcrete	Inspection of concrete and shotcrete placement for proper application techniques.	Required	NA	ACI 318: 5.9, 5.10	Inspection report	Table 1704.4, 1905.9, 1905.10, 1914.6, 1914.6, 1914.7, 1914.8		
Y	Curing	Inspection for maintenance of specified curing temperature and techniques.	NA	Required	ACI 318: 5.11-5.13	Inspection report	Table 1704.4, 1905.11, 1905.13, 1914.9		
N	Pre-stressed concrete	Inspect application of pre-stressing forces.	Required	NA	ACI 318: 18.18	Inspection report	Table 1704.4		

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	Pre-stressed concrete	Inspect grouting of bonded pre-stressing tendons in the seismic-force- resisting system.	Required	NA	ACI 318: 18.16.4	Inspection report	Table 1704.4		
N	Precast	Inspect erection of precast concrete members.	NA	Required	ACI 318: Ch. 16	Inspection report	Table 1704.4		
N	In-situ, Concrete strength	Verification of in-situ concrete strength, prior to Stressing of tendons in post-tensioned concrete	NA	Required	ACI 318: 6.2	Inspection report	Table 1704.4, 1906.2		
N	In-situ, Concrete strength	Verification of in-situ concrete strength, prior to removal of shores and forms from beams and structural slabs.	NA	Required	ACI 318: 6.2	Inspection report	Table 1713		

SCHEDULE OF SPECIAL INSPECTIONS

MASONRY CONSTRUCTION
LEVEL 1

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
Y	Verify to ensure compliance	Proportions of site prepared mortar.	NA	Required	ACI 530.1/ ASCE 6/ TMS 602Art. 2.6A	Inspection report	Table 1704.5.1 Level 1 Special inspections		
Y	Verify to ensure compliance	Construction of mortar joints.	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.3B	Inspection report	Table 1704.5.1 Level 1 Special inspections		
Y	Verify to ensure compliance	Location of reinforcement and connectors.	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.4 and 3.6A	Inspection report	Table 1704.5.1 Level 1 Special inspections		
N	Verify to ensure compliance	Pre-stressing technique.	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.6B	Inspection report	Table 1704.5.1 Level 1 Special inspections		
N	Verify to ensure compliance	Grade and size of pre-stressing tendons and anchorages.	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 2.4B	Inspection report	Table 1704.5.1 Level 1 Special inspections		

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
Y	The inspection program shall verify	Size and location of structural elements.	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, 3.3G		Table 1704.5.1 Level 1 Special inspections		
Y	The inspection program shall verify	Type, size and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction	NA	Required	ACI 530/ ASCE 5/ TMS 402 Sec. 1.15.4, 2.1.2	Inspection report	Table 1704.5.1 Level 1 Special inspections		
Y	The inspection program shall verify	Specified size, grade, and type of reinforcement.	NA	Required	ACI 530/ ASCE 5/ TMS 402 Sec.1.12, ACI 530.1/ ASCE 6/ TMS 602, Art. 2.4, 3.4	Inspection report	Table 1704.5.1 Level 1 Special inspections		
N	The inspection program shall verify	Welding of reinforcing bars.	Required		ACI 530/ ASCE 5/ TMS 402 Sec.2.1.8.6, 2.1.8.6.2	Inspection report	Table 1704.5.1 Level 1 Special inspections, Sec. 2108.9.2.11 item2		
Y	The inspection program shall verify	Protection of masonry during cold weather (temperature below 40ºF) or hot weather (temperature above 90ºF).	NA	Required	ACI 530/ ASCE 5/ TMS 402 Sec.2104.3, 2104.4, ACI 530.1/ ASCE 6/ TMS 602, Art. 1.8	Inspection report	Table 1704.5.1 Level 1 Special inspections, Sec. 2104.3,2104.4		

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
Y	The inspection program shall verify	Application and measurement of pre-stressing force	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.6B	Inspection report	Table 1704.5.1 Level 1 Special inspections		
Y	Prior to grouting verify	Grout space is clean.	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.2D	Inspection report	Table 1704.5.1 Level 1 Special inspections		
Y	Prior to grouting verify	Placement of reinforcement and connectors.	NA	Required	ACI 530/ ASCE 5/ TMS 402 Sec.1.12, ACI 530.1/ ASCE 6/ TMS 602, Art. 3.4	Inspection report	Table 1704.5.1 Level 1 Special inspections		
Y	Prior to grouting verify	Proportions of site-prepared grout.	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 2.6B	Inspection report	Table 1704.5.1 Level 1 Special inspections		
Y	Prior to grouting verify	Construction of mortar joints.	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.3B	Inspection report	Table 1704.5.1 Level 1 Special inspections		

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
Y	Grout placement verify	Grout placement shall be verified to ensure compliance with code and construction document provisions.	Required	NA	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.5	Inspection report	Table 1704.5.1 Level 1 Special inspections		
N	Grout placement verify	Grouting of pre-stressed bonded tendons.	Required	NA	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.6C	Inspection report	Table 1704.5.1 Level 1 Special inspections		
Y	Preparation of grout observe	Preparation of any required grout specimens, mortar specimens and/or prisms shall be observed.	Required	NA	ACI 530.1/ ASCE 6/ TMS 602, Art. 1.4	Inspection report	Table 1704.5.1 Level 1 Special inspections, Sec. 2105.3, 2105.4, 2105.5		
Y	Document compliance verify	Compliance with required inspection provisions of the construction documents and the approved submittals shall be verified.	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 1.5	Inspection report	Table 1704.5.1 Level 1 Special inspections		

Level 2

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	Verify to ensure compliance	Proportions of site prepared mortar, pre-stressing grout for bonded tendons	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 2.6A	Inspection report	Table 1704.5.3 Level 2 Special inspections		
N	Verify to ensure compliance	Construction of mortar joints.	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.3B	Inspection report	Table 1704.5.3 Level 2 Special inspections		
N	Verify to ensure compliance	Location of reinforcement and connectors, and pre-stressing tendons and anchorages.	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.4 and ACI 530/ASCE 5/TMS 402, Section 1.12.3	Inspection report	Table 1704.5.3 Level 2 Special inspections		
N	Verify to ensure compliance	Pre-stressing tendon installation	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.6A	Inspection report	Table 1704.5.3 Level 2 Special inspections		
N	Verify to ensure compliance	Grout specs prior to grouting.	Required	NA	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.2D	Inspection report	Table 1704.5.3 Level 2 Special inspections		

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	Verify to ensure compliance	Grout placement and pre-stressing for bonded tendons	Required	NA	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.5	Inspection report	Table 1704.5.3 Level 2 Special inspections		
N	Verify to ensure compliance	Grouting of pre-stressed bonding tendons	Required	NA	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.6C	Inspection report	Table 1704.5.3 Level 2 Special inspections		
N	The inspection program shall verify	Size and location of structural elements	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.3G	Inspection report	Table 1704.5.3 Level 2 Special inspections		
N	The inspection program shall verify	Type, size and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction	Required	NA	ACI 530.1/ ASCE 6/ TMS 602, Section 1.15.4, 2.1.2	Inspection report	Table 1704.5.3 Level 2 Special inspections		
N	The inspection program shall verify	Specified size, grade and type of reinforcement	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 2.4, 3.4, Section 1.12	Inspection report	Table 1704.5.3 Level 2 Special inspections		

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	The inspection program shall verify	Welding of reinforcing bars	Required	NA	ACI 530/ASCE 5/TMS 402, Section 2.1.8.6, 2.1.8.6.2	Inspection report	Table 1704.5.3 Level 2 Special inspections, Section 2108.9.2.11, Item 2		
N	The inspection program shall verify	Protection of masonry during cold weather (temperature below 40ºF) or hot weather (temperature above 90ºF).	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 1.8	Inspection report	Table 1704.5.3 Level 2 Special inspections, Section 2104.3, 2104.4		
N	The inspection program shall verify	Application and measurement of pre-stressing force	Required	NA	ACI 530.1/ ASCE 6/ TMS 602, Art. 3.6B	Inspection report	Table 1704.5.3 Level 2 Special inspections		
N	Preparation of grout observe	Preparation of any required grout specimens, mortar specimens and/or prisms shall be observed.	Required	NA	ACI 530.1/ ASCE 6/ TMS 602, Art. 1.4	Inspection report	Table 1704.5.3 Level 2 Special inspections, Sec. 2105.3, 2105.4, 2105.5		
N	Document compliance verify	Compliance with required inspection provisions of the construction documents and the approved submittals shall be verified.	NA	Required	ACI 530.1/ ASCE 6/ TMS 602, Art. 1.5	Inspection report	Table 1704.5.3 Level 2 Special inspections		

SCHEDULE OF SPECIAL INSPECTIONS

SOILS

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
Y	Site preparation	Prior to placement of the prepared fill.	Prior to placement	NA	Soil report	Inspection report	1704.1, 1802.2		
Y	Placement of soil	Maximum lift thickness	During placement and compaction of the fill material.	NA	Soil report	Inspection report	1704.1, 1802.2, 1803.4		
Y	Compaction of soil	Evaluate in-place dry density of compacted fill	During placement and compaction of the fill material.	NA	Soil report	Inspection report	1704.1, 1802.2		
Y	Bearing soil testing	Test for soil suitable bearing	Prior to work	NA	Soil report	Inspection report	NA		

SCHEDULE OF SPECIAL INSPECTIONS

PILE FOUNDATIONS

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	Pile Foundations	Observe pile installation and load test	Required	NA		Inspection report	1704.8		

SCHEDULE OF SPECIAL INSPECTIONS

PIER FOUNDATIONS

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	Pier Foundations in Seismic zone C,D,E,F	Observe pier installation	Required	NA		Inspection report	1704.9, 1616.3		

SCHEDULE OF SPECIAL INSPECTIONS

WALL PANELS AND VENEERS

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	Wall panels and veneers in seismic cat. E,F	Observe pier installation and test	Required	NA		Inspection report	1704.10, 1616.3, 1704.5		

SCHEDULE OF SPECIAL INSPECTIONS

SPRAYED FIRE-RESISTANT MATERIALS

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	Substrate	Inspect structural member surface conditions.	Prior to the application of the sprayed fire-resistant material.	NA	Approved fire-resistance design & manufacturer's written instructions	Inspection report	1704.11.1		
	Application	Verify application temperature and manufactures written instructions	Prior to the application of the sprayed fire-resistant material.	NA	Manufactures written instructions	Inspection report	1704.11.2		

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	Thickness	Sample inspection of Floor, Roof, and Wall Assemblies:	Average not less than four measurements per 1,000 sf sprayed area on each floor or part thereof.	NA	ASTM E605	Inspection report	1704.11.3.1		
N	Thickness	Sample inspections, Structural members	Not less than 25 percent of the structural members on each floor	NA	ASTM E605	Inspection report	1704.11.3.2		
N	Density	Sample inspections, Structural members	Perform density test on all bond strength samples taken	NA	ASTM E605	Inspection report	1704.11.4		
N	Bond Strength	Sample inspection, Floor, Roof, and Wall Assemblies:	Not less than one sample per 10,000 sf or part thereof of sprayed area from each floor, roof, and wall assembly in each story.	NA	ASTM E 736	Inspection report	1704.11.5.1		

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	Bond Strength	Sample inspection, Structural framing members:	Not less than one sample for each beam, girder, joist, truss, and column per 10,000 sf of floor area or part thereof in each story.	NA	ASTM E 736	Inspection report	1704.11.5.2		

SCHEDULE OF SPECIAL INSPECTIONS

EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS)

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	EIFS	Inspection of application	Required	NA	Per manufacturer		1704.12		

SCHEDULE OF SPECIAL INSPECTIONS

SPECIAL CASES

Inspection Required	Material / Work	Scope of Inspection	Frequency of Inspection		Reference Standard	Report type	2012 North Carolina State Building Code Section	Qualifications	Approved Agency
			Continuous	Periodic					
N	Alternative materials	TBD				Inspection report	1704.13		
N	Unusual designs	TBD				Inspection report	1704.13		
N	Material not covered in code	TBD				Inspection report	1704.13		

END OF SECTION - 014533

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary utilities.

B. Temporary telephone and facsimile service.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers and fencing.

E. Stairs

F. Vehicular access and parking.

G. Waste removal facilities and services.

1.2 RELATED SECTIONS

A. Section 01 51 00 - Temporary Utilities.

1.3 TEMPORARY UTILITIES - See Section 01 51 00

1.4 TELEPHONE SERVICE

A. Provide, maintain, and pay for telephone service to field office at time of project mobilization.

C. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, in common-use facilities.

1.5 TEMPORARY SANITARY FACILITIES

A. The General Contractor shall provide and maintain in a neat and sanitary condition chemical type toilet facilities which comply with the requirements and regulations of the Department of Health or of other bodies having jurisdiction. These facilities shall be available to all workers on the job. Location shall be coordinate with the owner prior to start of construction.

B. Maintain daily in clean and sanitary condition.

1.6 BARRIERS

A. Provide construction barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations and demolition. The construction area will need to be secure at all times.

B. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.7 STAIRS, RAMPS, SCAFFOLDING AND HOISTS

A. Each Subcontractor shall provide and maintain temporary scaffolding, ramps, and runways as required.

B. Hoisting of materials and equipment shall be provided by the contractor requiring such hoisting.

C. All apparatus, equipment, and construction included in this article shall be in accordance with all applicable state and local laws.

D. The General Contractor shall provide roof and facade protection as necessary where scaffolds and chutes are used.

1.8 VEHICULAR ACCESS AND PARKING

A. Coordinate access and haul routes with governing authorities and Owner.

B. Provide and maintain access to fire hydrants, free of obstructions.

C. Provide off-site parking and transit to and from the project site as required at Contractor's expense.

1.9 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site weekly.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids. Any removal of existing items (windows, doors, etc…) to accommodate chute should be include in the contractor bid.

1.12 FIELD OFFICES

A. Office: Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Provide space for Project meetings, with table and chairs to accommodate 10 persons.

1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

E. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 50 00

SECTION 01 51 00

TEMPORARY UTILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities: Electricity, lighting, heat, ventilation, and water.

1.2 RELATED SECTIONS

A. Section 01 50 00 - Temporary Facilities and Controls: Telephone service for administrative purposes.

1.3 TEMPORARY ELECTRICITY

A. Cost: By Contractor.

B. Provide power service required from utility source.

C. Power Service Characteristics: 110-220 volt, 200 ampere, three phase, four wire.

D. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.

E. Provide main service disconnect and over-current protection at convenient location and meter.

F. Permanent convenience receptacles may be utilized during construction.

G. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain incandescent lighting for construction operations to achieve a minimum lighting level of 1 watt/sq ft. Light fixtures shall be shielded from and directed away from adjacent residential properties.

B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

C. Maintain lighting and provide routine repairs.

1.5 TEMPORARY HEATING

A. Cost of Energy: By Contractor.

B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.

C. Maintain minimum ambient temperature of 70 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.6 TEMPORARY COOLING

A. Cost of Energy: By Contractor.

B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.

C. Maintain maximum ambient temperature of 75 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.7 TEMPORARY WATER SERVICE

A. Cost of Water Used: By Contractor.

B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.

C. Connect to existing water source.
   1. Exercise measures to conserve water.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 51 00

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General product requirements.

B. Transportation, handling, storage and protection.

C. Product option requirements.

D. Substitution limitations and procedures.

E. Procedures for Owner-supplied products.

F. Spare parts and maintenance materials.

1.2 RELATED SECTIONS

A. Section 01 40 00 - Quality Requirements: Product quality monitoring.

1.3 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 30 days after date of Notice to Proceed.
   2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project. Contract Documents shall not be used for submittals.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

E. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

PART 2 PRODUCTS

2.1 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. Do not use products having any of the following characteristics:
   1. Made using or containing CFC's or HCFC's.

2.2 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications referre to procedure of substitutions.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a written request for substitution for any manufacturer not named.

2.3 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra products of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.1 SUBSTITUTION PROCEDURES

A. Substitution only will be considered until 10 days prior to bid opening

B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

D. A request for substitution constitutes a representation that the submitter:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same warranty for the substitution as for the specified product.
3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension which may subsequently become apparent.
5. Will reimburse the Architect and Engineers for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Equivalent products from manufacturers used as equal to the primary specification must meet dimensional/weight/aesthetic qualities of the primary specification. The Project Coordinator shall provide the Architect documentation clearly demonstrating compliance.

G. Substitution Submittal Procedure:
1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
3. Provide sample of substitution to Architect/Engineer as requested.
4. The Architect will notify Contractor in writing of decision to accept or reject request.

3.2 OWNER-SUPPLIED PRODUCTS

A. Owner's Responsibilities:
1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
2. Arrange and pay for product delivery to site.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:
1. Review Owner reviewed shop drawings, product data, and samples.
2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

3.3 TRANSPORTATION AND HANDLING

A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

B. Transport and handle products in accordance with manufacturer's instructions.

C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.4 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

G. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

H. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

I. Prevent contact with material that may cause corrosion, discoloration, or staining.

J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION 01 60 00

SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Surveying for laying out the work.

C. Cleaning and protection.

D. Starting of systems and equipment.

E. Demonstration and instruction of Owner personnel.

F. Closeout procedures, except payment procedures.

1.2 RELATED SECTIONS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures.

B. Section 01 40 00 - Quality Requirements: Testing and inspection procedures.

C. Section 01 50 00 - Temporary Utilities: Temporary heating, cooling, and ventilating facilities.

D. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.

E. Individual Product Specification Sections:
   1. Advance notification to other sections of openings required in work of those sections.
   2. Limitations on cutting structural members.

1.3 QUALIFICATIONS

A. For survey work, employ a land surveyor registered in North Carolina and acceptable to Architect. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

B. For field engineering employ a professional engineer of the discipline required for specific service on Project, licensed in the applicable state.

1.4 PROJECT CONDITIONS

C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.5 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. Coordinate completion and clean-up of work of separate sections.

F. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.1 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that demolition is complete in alteration areas and areas are ready for installation of new work.

C. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

D. Examine and verify specific conditions described in individual specification sections.

E. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

F. Verify that utility services are available, of the correct characteristics, and in the correct locations.

G. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to

applying any new material or substance in contact or bond.

3.3 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered prior to construction.

C. Contractor shall locate and protect survey control and reference points.

D. Control datum for survey is that established by Owner provided survey.

E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

F. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

H. Utilize recognized engineering survey practices.

I. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, and floor elevations.

J. Periodically verify layouts by same means.

K. Maintain a complete and accurate log of control and survey work as it progresses.

3.4 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.5 CUTTING AND PATCHING

A. Execute cutting and patching to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.

B. Execute work by methods to avoid damage to other work, and which will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

C. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior

approval.

D. Restore work with new products in accordance with requirements of Contract Documents.

E. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

F. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.

G. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

H. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.

I. Patch or replace surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. Repair substrate prior to patching finish. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

J. All cutting shall be provided by the Contractor requiring the cutting with the exception of roofing which shall be cut and patched by the roofing contractor.

K. All patching work shall be done by the General Contractor. Patches in finish surfaces shall match the adjacent surfaces in material, finish, and quality. The General Contractor shall finish tight against all ductwork, piping, conduit, etc. to make it smoke tight. Any U. L. rated fire seal material and flanges as required by code and the contract documents shall be applied and installed by the Mechanical, Fire Protection, Plumbing, or Electrical trade as applicable.

3.6 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Collect and remove waste materials, debris, and trash/rubbish from site weekly and dispose off-site; do not burn or bury.

D. Any mud or debris from the construction project deposited on the adjacent streets shall be removed immediately. The general contractor shall include in their bid the cost to clean streets adjacent to the project on a routine basis and as required.

3.7 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.8 STARTING SYSTEMS (NOT USED)

3.9 DEMONSTRATION AND INSTRUCTION (NOT USED)

3.10 ADJUSTING (NOT USED)

3.11 FINAL CLEANING

A. Execute final cleaning after Substantial Completion but before making final application for payment.

B. Use cleaning materials that are nonhazardous.

C. Clean all surfaces exposed to view; remove temporary labels, stains and foreign substances.

D. Clean debris from roofs, gutters, downspouts, and drainage systems.

E. Clean site; sweep paved areas, rake clean landscaped surfaces.

F. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.12 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect and Owner.

B. Notify Architect when work is considered ready for Substantial Completion.

C. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's review.

D. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Owner-occupied areas.

E. Notify Architect when work is considered finally complete.

F. Complete items of work determined by Architect's final inspection.

3.13 MAINTENANCE SERVICE (NOT USED)

END OF SECTION 01 70 00

SECTION 01 78 00

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.2 RELATED SECTIONS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.

C. Individual Product Sections: Warranties required for specific products or Work.

1.3 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Final Acceptance, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Final Acceptance, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings - If full drawing sheets are revised, insert new drawings into the field set and keep original drawing in the field set mark void.
   2. Specifications.

3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed shop drawings, product data, and samples.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. The Project Coordinator shall submit for the Architect's review, the current list of all O.W.I.P. action items with the dates of completion and the person responsible for verifying the work was completed. For items not completed at substantial completion, the Project Coordinator shall annotate the anticipated date of completion for each item.

G. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
3. Field changes of dimension and detail.
4. Details not on original Contract drawings.

3.2 OPERATION AND MAINTENANCE DATA

A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.3 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

3.4 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

C. Include color coded wiring diagrams as installed.

D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Provide servicing and lubrication schedule, and list of lubricants required.

G. Include manufacturer's printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Provide control diagrams by controls manufacturer as installed.

K. Additional Requirements: As specified in individual product specification sections.

3.5 OPERATION AND MAINTENANCE MANUALS

A. Prepare instructions and data by personnel experienced in maintenance, cleaning and operation of described products.

B. Prepare data in the form of an instructional manual. Three manuals will be required.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.

F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

H. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

I. Contents: Prepare a Table of Contents for each volume, with each product or system description

identified, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
    a. Significant design criteria.
    b. List of equipment.
    c. Parts list for each component.
    d. Operating instructions.
    e. Maintenance instructions for finishes, equipment and systems.
    f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
3. Part 3: Project documents and certificates, including the following:
    a. Shop drawings and product data.
    b. Air and water balance reports.
    c. Certificates.
    d. Photocopies of warranties and bonds.

3.6 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Final Acceptance is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.

F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION 01 78 00

SECTION 02 41 16

STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Demolition and removal of buildings and site improvements.
   2. Removing below-grade construction.

B. Related Sections include the following:
   1. Section 01 10 00 "Summary of Work" for use of the premises and phasing requirements.
   2. Section 01 50 00 "Temporary Facilities and Controls" for temporary construction, protection facilities, and environmental-protection measures for building demolition operations.
   3. Section 31 10 00 "Site Clearing" for site clearing and removal of above- and below-grade site improvements not part of building demolition.

1.2 DEFINITIONS

A. Demolish: Completely remove and legally dispose of off-site.

B. Recycle: Recovery of demolition waste for subsequent processing in preparation for reuse.

C. Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner. Include fasteners or brackets needed for reattachment elsewhere.

1.3 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.
   1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified refrigerant recovery technician.

B. Proposed Protection Measures: Submit informational report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
   1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain including means of egress from those buildings.

C. Schedule of Building Demolition Activities: Indicate the following:
   1. Detailed sequence of demolition work, with starting and ending dates for each activity.
   2. Temporary interruption of utility services.
   3. Shutoff and capping or re-routing of utility services.

D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

E. Predemolition: Show existing conditions of adjoining construction and site improvements, including finish surfaces, which might be misconstrued as damage caused by demolition operations. Photograph or video and submit before the Work begins.

F. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI A10.6 and NFPA 241.

C. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

D. Predemolition Conference: Conduct conference at Project site.
1. Inspect and discuss condition of construction to be demolished.
2. Review structural load limitations of existing structures.
3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review and finalize protection requirements.
5. Review procedures for noise control and dust control.
6. Review procedures for protection of adjacent buildings.
7. Review items to be salvaged and returned to Owner.

1.6 PROJECT CONDITIONS

A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.

B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
1. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
    a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.

C. Owner assumes no responsibility for buildings and structures to be demolished.
1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

D. Hazardous Materials: If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. On-site storage or sale of removed items or materials is not permitted.

1.7 COORDINATION

A. Arrange demolition schedule so as not to interfere with operations of adjacent occupied buildings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting demolition operations.

B. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.

D. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

3.2 PREPARATION

A. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.

Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.

1. Coordinate with Owner to arrange to shut off indicated utilities.
2. Arrange to shut off indicated utilities with utility companies.
3. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
4. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.

B. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of demolition.

C. Salvaged Items: Comply with the following:

1. Clean salvaged items of dirt and demolition debris.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to storage area designated by Owner.
5. Protect items from damage during transport and storage.

3.3 PROTECTION

A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.

1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.

a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.

C. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Division 01 Section "Temporary Facilities and Controls."
1. Protect adjacent buildings and facilities from damage due to demolition activities.
2. Protect existing site improvements, appurtenances, and landscaping to remain.
3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.

D. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.4 DEMOLITION, GENERAL

A. General: Demolish indicated existing buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
2. Maintain fire watch during and for at least two hours after flame cutting operations.
3. Maintain adequate ventilation when using cutting torches.
4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Engineering Surveys: During demolition, perform surveys to detect hazards that may result from building demolition activities.

C. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

D. Explosives: Use of explosives is not permitted.

3.5 DEMOLITION BY MECHANICAL MEANS

A. Below-Grade Construction: Demolish foundation walls and other below-grade construction.
   1. Remove below-grade construction, including basements, foundation walls, and footings, completely.

B. Below-Grade Construction: Demolish foundation walls and other below-grade construction that are within footprint of new construction and extending 5 feet outside footprint indicated for new construction. Abandon below-grade construction outside this area.
   1. Remove below-grade construction, including basements, foundation walls, and footings, completely.

C. Below-Grade Construction: Demolish foundation walls and other below-grade construction.
   1. Remove below-grade construction, including basements, foundation walls, and footings, completely.

D. Existing Utilities: Abandon existing utilities and below-grade utility structures. Cut utilities flush with grade.

E. Existing Utilities: Demolish existing utilities and below-grade utility structures that are within 5 feet outside footprint indicated for new construction. Abandon utilities outside this area.

   1. Fill abandoned utility structures with satisfactory soil materials according to backfill requirements in Section 312000 "Earth Moving."
   2. Piping: Disconnect piping at unions, flanges, valves, or fittings.
   3. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

F. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.
   1. Piping: Disconnect piping at unions, flanges, valves, or fittings.
   2. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

G. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.

H. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

   1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.

3.6 SITE RESTORATION

A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction

B. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in 31 20 00 "Earth Moving."

C. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.7 REPAIRS

A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and legally dispose of them in an EPA-approved landfill acceptable to authorities having jurisdiction.
   1. Do not allow demolished materials to accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Do not burn demolished materials.

3.9 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.
   1. Clean roadways of debris caused by debris transport.

END OF SECTION 02 41 16

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
   1. Footings.
   2. Foundation walls.
   3. Slabs-on-grade.

B. Related Sections include the following:
   1. Section 31 20 00 - "Earth Moving" for drainage fill under slabs-on-grade.
   2. Section 32 13 13 - "Concrete Paving" for exterior concrete pavement and walks.
   3. Section 31 50 00 - "Excavation Support and Protection" for shoring, bracing and underpinning.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with fly ash; subject to compliance with requirements.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture, indicating quantity of each ingredient and admixtures proposed or required. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
   1. For mix designs based on field experience, include individual strength test results, standard deviation, and required average compressive strength calculations.
   2. For mix designs based on trial, include proportions, test results, and graphic analysis indicating average compressive strength.
   3. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.
   1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and installing and removing reshoring.

E. Schedule for Concrete Placement: Order-of-construction schedule by location in structure.
   1. Include shop drawings indicating all construction joints required, including any anticipated joints due to placement schedule.

F. Submit description of planned procedures and protective measures for cold weather or hot weather concreting.

G. Welding certificates.

H. Qualification Data: For Installer.

I. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
   1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

J. Material Certificates: For each of the following, signed by manufacturers; indicate compatibility with application of surface applied flooring products where applicable:
   1. Cementitious materials.
   2. Admixtures.
   3. Form materials and form-release agents.
   4. Steel reinforcement and accessories.
   5. Curing compounds.
   6. Floor and slab treatments.
   7. Bonding agents.
   8. Adhesives.
   9. Vapor retarders.
   10. Joint-filler strips.
   11. Repair materials.

K. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.

L. Field quality-control test and inspection reports.
   1. Include copies of delivery tickets complying with ASTM C 94 for each load of concrete delivered to the site.

M. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
   1. Comply with requirements of the Concrete Manufacturers Association “Concrete Plant Standards.”

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

D. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
   1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
   2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
   3. ACI 305, "Hot Weather Concreting".

4. ACI 306, "Cold Weather Concreting".
5. ACI 308, "Guide to Curing Concrete".
6. ACI 302, "Guide for Concrete Floor and Slab Construction".
7. Concrete Repair Manual, by ACI and ICRI.

F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

G. Mockups: Cast concrete slab-on-grade and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship.
1. Build panel approximately 200 sq. ft. for slab-on-grade and 100 sq. ft. for formed surface in the location indicated or, if not indicated, as directed by Architect.
2. Approved panels may become part of the completed Work if undisturbed at time of Substantial Completion.

H. The Contractor is responsible for correction of concrete work which does not conform to the specified requirements, including strength, tolerances, and finishes. The Contractor shall correct deficient concrete as directed by the Architect.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
1. Store steel reinforcement off ground, under suitable cover or enclosed.
2. Maintain ease of access for inspection and identification of materials.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Metal or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
   a. High-density overlay, Class 1 or better.
   b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
   c. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.

3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
   1. Include supplementary requirement S1.

B. Plain-Steel Wire: ASTM A 82, as drawn.

C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
   1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
   2. Supporting devices for slabs-on-grade shall have sand plates.

C. Tie Wire: 16 gauge annealed type.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
   1. Portland Cement: ASTM C 150, Type I or II. Supplement with the following:
      a. Fly Ash: ASTM C 618, Class F.

B. Aggregates, General: Tested and passed within 6 months of use for the following:
   1. Gradation: ASTM C 136.
   2. Material Passing No. 200 Sieve: ASTM C 117.
   3. Organic Impurities: ASTM C 40.
   4. Soundness: ASTM C 88.
   5. Clay Lumps: ASTM C 142.
   6. Lightweight Constituents: ASTM C 123.
   7. Abrasiveness of Coarse Materials: ASTM C 131.
   8. Soft Particles: ASTM C 235.
   9. Freeze/Thaw Resistance: ASTM C 66, ASTM C 682.

C. Normal-Weight Aggregates: ASTM C 33, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
   1. Maximum Coarse-Aggregate Size:
      a. Percentage passing No. 200 sieve shall be less than 0.7%.
      b. Nominal size 1 1/2": ASTM Size No. 467.
      c. Nominal size 1": ASTM Size No. 57.
      d. Nominal size 1/2": ASTM Size No. 7.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
      a. Percentage passing No. 200 sieve shall be less than 3%.

D. Water: ASTM C 94 and potable.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride. Admixtures which result in more than 0.1% of soluble chloride ions by weight of cement are prohibited.
1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Retarding Admixture: ASTM C 494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494, Type C.
1. Products:
   a. Euclid Chemical Company (The); Eucon CIA.
   b. Grace Construction Products, W. R. Grace & Co.; DCI.
   c. Master Builders, Inc.; MasterLife CI 30.
   d. Sika Corporation; Sika CNI.

2.6 VAPOR RETARDERS

A. Plastic Vapor Retarder: ASTM E 1745, Class B. Include manufacturer's recommended adhesive or pressure-sensitive tape.
1. Products:
   a. Fortifiber Corporation; Moistop Ultra.
   b. Raven Industries Inc.; Vapor Block 15.
   c. Stego Industries, LLC; Stego Wrap, 15 mils.
   d. Reef Industries, Inc.; Griffolyn Type 85.

B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

C. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

2.7 FLOOR AND SLAB TREATMENTS

A. Penetrating Liquid Floor Treatment: ASTM C309 and C1315.
1. Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components.
2. Odorless; colorless.
3. Formulated to penetrate, harden, and densify concrete surfaces.
4. Formulated to reduce water vapor and alkali migration detrimental to adhesion of applied sheet or tile floor finishes.
5. Products:
   a. Burke by Edoco; Titan Hard.

b. ChemMasters; Chemisil Plus.
c. ChemTec International; ChemTec One.
d. Concrete Waterproofing Products, Inc.; Creteseal CS2000.
e. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Intraseal.
f. Euclid Chemical Company (The); Euco Diamond Hard.
g. Meadows, W. R., Inc.; Liqui-Hard.
h. Symons Corporation, a Dayton Superior Company; Buff Hard.

2.8 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
1. Products:
a. Burke by Edoco; BurkeFilm.
b. ChemMasters; Spray-Film.
c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
d. Euclid Chemical Company (The); Eucobar.
e. L&M Construction Chemicals, Inc.; E-Con.
f. MBT Protection and Repair, Div. of ChemRex; Confilm.
g. Meadows, W. R., Inc.; Sealtight Evapre.
h. Sika Corporation, Inc.; SikaFilm.
i. Symons Corporation, a Dayton Superior Company; Finishing Aid.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
1. Characteristics: Acrylic polymer blend; non-yellowing from ultraviolet exposure; dustproofs concrete.
2. Products:
a. ChemMasters; Safe-Cure Clear.
b. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; High Seal.
c. Euclid Chemical Company (The); Diamond Clear VOX.
d. L&M Construction Chemicals, Inc.; Dress & Seal WB.
e. MBT Protection and Repair, Div. of ChemRex; MasterKure-N-Seal VOC.
f. Meadows, W. R., Inc.; Vocomp-20.
g. Sonneborn, Div. of ChemRex; Kure-N-Seal.
h. Symons Corporation, a Dayton Superior Company; Cure & Seal 18 Percent E.
i. Tamms Industries, Inc.; Clearseal WB STD.

F. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
1. Products:
a. Burke by Edoco; Cureseal 1315.
b. ChemMasters; Spray-Cure & Seal Plus.
c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Sealcure 1315.

d. Euclid Chemical Company (The); Super Diamond Clear.
e. L&M Construction Chemicals, Inc.; Lumiseal Plus.
f. Meadows, W. R., Inc.; CS-309/30.
g. Sonneborn, Div. of ChemRex; Kure-N-Seal 5.
h. Tamms Industries, Inc.; LusterSeal 300.

G. Evaporation Retarder:
Products:
a. BASF Construction Chemicals; Master Builders, Confilm.

2.9 RELATED MATERIALS

A. Expansion-Joint-Filler and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber for pavements and sidewalks, and ASTM D 1752, cork or self-expanding cork for slabs-on-grade.

B. Preformed Control Joint Former for joints to receive sealant or for sawcut type joints. To be used only with approval of the Architect.

C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Reglets: Fabricate reglets of not less than 0.0217-inch-thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

E. Burlap: AASHTO M 182, Class 2 jute or kenaf cloth.

2.10 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.

2.11 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, on the basis of laboratory trial mixture or field test data, or both, according to ACI 301. Proportion design mixes per the

recommendations of ACI 211.1 for normal weight concrete and ACI 211.2 for structural lightweight concrete.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
2. Design mixes to meet or exceed each requirement specified. Adjust mix design to meet the most stringent requirement.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
1. Fly Ash: 15 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use set-accelerating corrosion-inhibiting admixture in concrete mixtures where indicated.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings and Non-Retaining Walls: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio by Weight: 0.50.
3. Minimum Cementitious Materials Content: 475 lb/cu. yd.
4. Maximum Nominal Aggregate Size: 1 inch.
5. Maximum Slump Limit: 3-1/2 inches, plus or minus 1 inch.

B. Slabs-on-Grade (Interior): Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio by Weight: 0.45.
3. Minimum Cementitious Materials Content: 540 lb/cu. yd.
4. Maximum Nominal Aggregate Size: 1 inch.
5. Maximum Slump Limit: 3-1/2 inches, plus or minus 1 inch.

C. Exposed Foundation, Exterior Walks and Retaining Walls: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio by Weight: 0.45.
3. Minimum Cementitious Materials Content: 590 lb./cu.yd.
4. Minimum Nominal Aggregate Size: 1/2 inch.
5. Maximum Nominal Aggregate Size: 1-1/2 inches.
6. Maximum Slump Limit: 3-1/2 inches, plus or minus 1 inch.
7. Air Content: 4.5 percent, plus or minus 1.5 percent.

D. Normal Weight Concrete; Site Slipform Curbs: Proportion normal-weight concrete mixture as follows:
1. Minimum compressive strength f'c: 4,000 psi @ 28 days.
2. Maximum water-cementitious ratio by weight: 0.44
3. Total cement content: 675 lbs. per cubic yard.
4. Coarse aggregate size: 1/4"– 3/4".

5. Maximum slump: 1inch, plus or minus 0.5 inch.
6. Air Content: 5 percent, plus or minus 1.5 percent.
7. Schedule: exterior slipform curbs.

G. Controlled Low Strength Material (CLSM)
1. Permanent Material
   a. Material shall meet the requirements of ACI 229R with a minimum compressive strength of 400 lb./sq. in.
2. Removable Material
   a. Material shall meet the requirements of ACI 229R with a minimum compressive strength of 50 to 100 lb./sq. in.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

B. Bend steel reinforcement in accordance with ACI 318.
1. Do not heat steel reinforcement for bending. Bend or straighten bars cold.
2. Do not bend partially embedded steel reinforcement, except as approved.

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, paragraphs 1 to 15 and 18 only, and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Earth forms are not permitted.

C. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

D. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class C, 1/2 inch for rough-formed finished surfaces.

E. Construct forms tight enough to prevent loss of concrete mortar.

F. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.

G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

I. Chamfer exterior corners and edges of permanently exposed concrete, unless specifically indicated otherwise on the drawings.

J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges." Misplaced or damaged anchor rods will be subject to re-engineering fees.
   2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
   3. Installed penetrating conduits and embedded pipes in concrete shall comply with Section 6.3 of ACI 318.
      a. No conduits or embedded pipes shall be located within slab-on-grade.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
   1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
   2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR RETARDERS

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
   1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
   1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
   2. Allow six hours between completion of reinforcement installation and placement of concrete for special inspection.

B. Clean reinforcement of dirt, grease, scale, loose rust, oil, paint and other foreign matter prior to installation.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
   1. Weld reinforcing bars according to AWS D1.4, where indicated.

D. Splicing and Embedment of Reinforcement: Conform to ACI 318 Chapter 12 for wired lap splices and embedment lengths.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

G. "Hooking-up" or "Walking-in" of any reinforcement will not be permitted.

H. Maintain required concrete cover dimensions indicated. Coordinate placement of conduit and inserts with reinforcement. Protect installed reinforcement from damage or displacement prior to and during concrete placement.

I. The Contractor shall repair or replace damaged, distorted, or displaced reinforcement.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
   1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
   2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
   3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.

4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
7. Provide waterstops as indicated, and at all construction joints below grade adjacent to usable spaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
3. Spacing of joints shall not exceed 2.5 times the thickness of the slab nor 15 feet on center. All panels should be square or nearly so. Joints shall typically isolate columns and run between columns.

D. Contraction Joints in Walls: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Provide adequate shear reinforcement as indicated or directed. Construct contraction joints as follows:

E. Joints shall be constructed to provide for the installation of watertight joint and sealant, and filled with sealant.

F. Spacing of joints shall be located about 4 feet from corners and intersections, and then at 25 feet on center thereafter.

G. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

H. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed and corrections made.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
   1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
   2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
      a. Do not supplement mechanical consolidation by hand, spading, rodding, or tamping unless approved by Architect.
   3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
   1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
   2. Maintain reinforcement in position on chairs during concrete placement.
   3. Screed slab surfaces with a straightedge and strike off to correct elevations.
   4. Slope surfaces uniformly to drains where required.
   5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Provide sufficient time for excess water to evaporate prior to placement of floor coverings.

G. Refer to floor covering product manufacturer submittals for requirements.

H. Cold-Weather Placement: Comply with ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
   2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

I. Hot-Weather Placement: Comply with ACI 305 and as follows:
   1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
   2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
   1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
   2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture 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.
   3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/8 inch in one direction.
   1. Apply scratch finish to surfaces to receive concrete floor toppings, or to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
   1. Apply float finish to surfaces to receive trowel finish, or to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
   a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot-long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/8 inch.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
   1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.

F. Broom Finish: Apply a broom finish to exposed concrete platforms, steps, and ramps, and elsewhere as indicated.
   1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment. Misplaced or damaged anchor bolts will be subject to re-engineering fees.

3.11 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306 for cold-weather protection and ACI 305 for hot-weather protection during curing.

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

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
   1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
      a. Water.
      b. Continuous water-fog spray.
      c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
      a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments as recommended by manufacturer.
      b. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor coverings used on Project.
   3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
      a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
      b. Curing compound to be applied only in locations permitted or required.
   4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.
      a. Curing and sealing compound to be applied only in locations permitted or required.

3.12 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
   1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
   2. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
   1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and

loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Exposed reinforcing steel shall be mechanically cleaned using sandblasting or waterblasting methods. Reinforcing steel shall be free from rust, grease, or other bond-inhibiting coating.

F. Repairs of depths greater than 3 inches are not covered by this specification. Notify Architect if such conditions are discovered for further direction of repair methods and products.

G. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

H. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:
1. Steel reinforcement placement.
2. Headed bolts and studs.
3. Verification of use of required design mixture.
4. Concrete placement, including conveying and depositing.
5. Curing procedures and maintenance of curing temperature.
6. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, equilibrium unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C 31.
    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
    b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
7. Compressive-Strength Tests: ASTM C 39; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.

b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 72 hours of finishing.

END OF SECTION 03 30 00

SECTION 04 20 00

UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Face brick ADD Alternate G-1.
2. Mortar and grout.
3. Ties and anchors.
4. Embedded flashing.
5. Miscellaneous masonry accessories.

B. Related Sections:
1. Section 07 62 00 - "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.
2. Section 08 91 10 - "Louvers and Vents" for wall vents (brick vents).

1.2 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:
1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.

C. Samples for Initial Selection:
1. Face brick.
2. Colored mortar.
3. Weep holes/vents.

D. Samples for Verification: For each type and color of the following:
1. Face brick, in the form of straps of five or more bricks
2. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.

E. Qualification Data: For testing agency.

F. Material Certificates: For each type and size of the following:
1. Masonry units.
2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Grout mixes. Include description of type and proportions of ingredients.
4. Reinforcing bars.
5. Joint reinforcement.
6. Anchors, ties, and metal accessories.

G. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.

H. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

I. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.4 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

D. Installer Qualifications: The masonry installation contractor shall provide qualified installers. The International Masonry Institute (IMI) provides training and technical services to contractors will come to the job site to train masons in flashing fundamentals. Each employee shall receive this training prior to performing work on this project.

E. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Division 01 Section "Quality Requirements" for mockups.
   1. Build sample panels for typical exterior wall in sizes approximately **60 inches** long by **48 inches** high].
   2. Clean one-half of exposed faces of panels with masonry cleaner indicated.
   3. Protect approved sample panels from the elements with weather-resistant membrane.
   4. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
      a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
   2. Where one wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
   1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.2 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
   1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.

2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Face Brick: Facing brick complying with ASTM C 216. (ADD ALTERNATE G-1)
1. Products: Subject to compliance with requirements, provide the following:
   a. Boral- Salisbury Walnut Grove.
   b. Forterra Texas Collection V318
   c. Glen Geary - Baxter
2. Grade: SW.
3. Type: FBX.
4. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
6. Size (Actual Dimensions): 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.
7. Application: Use where brick is exposed unless otherwise indicated.

2.3 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
1. Products: Subject to compliance with requirements, provide one of the following:
   a. Davis Colors; True Tone Mortar Colors.
   b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
   c. Solomon Colors, Inc.; SGS Mortar Colors.

E. Aggregate for Mortar: ASTM C 144.
1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

F. Aggregate for Grout: ASTM C 404.

G. Water: Potable.

2.4 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
   1. Mill-Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 641, Class 1 coating.
   2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
   3. Steel Sheet, Galvanized after Fabrication: ASTM A 1008, Commercial Steel, with ASTM A 153, Class B coating.
   4. Steel Plates, Shapes, and Bars: ASTM A 36.

B. Corrugated Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 7.6 to 12.7 mm and an amplitude of 0.06 to 0.10 inch made from 0.030-inch- thick, steel sheet, galvanized after fabrication.

C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
   1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, stainless-steel wire.
   2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch- diameter, stainless-steel wire.

D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

E. Partition Top anchors: 0.105-inch- thick metal plate with 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

F. Adjustable Masonry-Veneer Anchors:
   1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
      a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
   2. Contractor's Option: Unless otherwise indicated, provide any of the following types of anchors:
   3. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.
      a. Products: Subject to compliance with requirements, provide one of the following:
         1) Dayton Superior Corporation, Dur-O-Wal Division; D/A 213 or D/A 210 with D/A 700-708.
         2) Heckmann Building Products Inc.; 315-D with 316 or Pos-I-Tie.
         3) Hohmann & Barnard, Inc.; DW-10, DW-10HS or DW-10-X.
         4) Wire-Bond; 1004, Type III or RJ-711.
      b. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch- thick, steel sheet, galvanized after fabrication.
      c. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.187-inch- diameter, hot-dip galvanized steel wire.
   4. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length

required to penetrate steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.

a. Products: Subject to compliance with requirements, provide one of the following:
   1) ITW Buildex; Teks Maxiseal with Climaseal finish.
   2) Textron Inc., Textron Fastening Systems; Elco Dril-Flex with Stalgard finish.

5. Stainless-Steel Drill Screws for Steel Studs: Proprietary fastener consisting of carbon-steel drill point and 300 Series stainless-steel shank, complying with ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length required to penetrate steel stud flange with not less than three exposed threads.
   a. Products: Subject to compliance with requirements, provide one of the following:
      1) Dayton Superior Corporation, Dur-O-Wal Division; Stainless Steel SX Fastener.
      2) ITW Buildex; Scots long life Teks.

2.5 MISCELLANEOUS ANCHORS

A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.

B. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of dimensions indicated.

C. Postinstalled Anchors: Chemical anchors.
   1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 unless otherwise indicated.
   2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.6 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual"" and as follows:
   1. Stainless Steel: ASTM A 240, Type 304, 0.016 inch thick.
   2. Copper: ASTM B 370, Temper H00, cold-rolled copper sheet, 16-oz./sq. ft. weight or 0.0216 inch thick or ASTM B 370, Temper H01, high-yield copper sheet, 12-oz./sq. ft. weight or 0.0162 inch thick.
   3. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
   4. Fabricate through-wall metal flashing embedded in masonry from copper, with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.
      a. Products: Subject to compliance with requirements, provide one of the following:
         1) Cheney Flashing Company; Cheney 3-Way Flashing (Sawtooth).
         2) Keystone Flashing Company, Inc.; Keystone 3-Way Interlocking Thruwall Flashing.
         3) Sandell Manufacturing Co., Inc.; Mechanically Keyed Flashing.
   5. Fabricate through-wall flashing with sealant stop unless otherwise indicated. Fabricate by bending metal back on itself 3/4 inch at exterior face of wall and down into joint 1/4 inch to form a stop for retaining sealant backer rod.

6. Fabricate metal sealant stops for ribbed metal flashing from plain metal flashing of same metal as ribbed flashing and extending at least 3 inches into wall with hemmed inner edge to receive ribbed flashing and form a hooked seam. Form hem on upper surface of metal so that completed seam will shed water.

B. Flexible Flashing: Use one of the following unless otherwise indicated:
   1. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637, 0.040 inch thick.
      a. Products: Subject to compliance with requirements, provide one of the following:
         1) Carlisle Coatings & Waterproofing; Pre-Kleened EPDM Thru-Wall Flashing.
         2) Firestone Specialty Products; FlashGuard.
         3) Heckmann Building Products Inc.; No. 81 EPDM Thru-Wall Flashing.
         4) Hohmann & Barnard, Inc.; Epra-Max EPDM Thru-Wall Flashing.
         5) Sandell Manufacturing Co., Inc.; EPDM Flashing.

C. Application: Unless otherwise indicated, use the following:
   1. Where flashing is indicated to receive counterflashing, use metal flashing.
   2. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a sealant stop or flexible flashing with a metal sealant stop.
   3. Where flashing is fully concealed, use flexible flashing.

D. Solder and Sealants for Sheet Metal Flashings: As specified in Division 07 Section "Sheet Metal Flashing and Trim."

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

D. Weep/Vent Products: Use the following unless otherwise indicated:
   1. Round Plastic Weep/Vent Tubing: Medium-density polyethylene, 3/8-inch OD by 4 inches long.
   2. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

E. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
      b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.

c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

2.8 CAVITY-WALL INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, closed-cell product extruded with an integral skin.

B. Adhesive: Type recommended by insulation board manufacturer for application indicated.

2.9 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Diedrich Technologies, Inc.
b. EaCo Chem, Inc.
c. ProSoCo, Inc.

2.10 MASONRY-CELL INSULATION

A. Loose-Granular Fill Insulation: Perlite complying with ASTM C 549, Type II (surface treated for water repellency and limited moisture absorption) or Type IV (surface treated for water repellency and to limit dust generation).

B. Molded-Polystyrene Insulation Units: Rigid, cellular thermal insulation formed by the expansion of polystyrene-resin beads or granules in a closed mold to comply with ASTM C 578, Type I. Provide specially shaped units designed for installing in cores of masonry units.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Concrete Block Insulating Systems; Korfil.
b. Shelter Enterprises Inc.; Omni Core.

2.11 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.

B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
1. For masonry below grade or in contact with earth, use Type S.
2. For reinforced masonry, use Type S.
3. For mortar parge coats, use Type S.
4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
5. For interior non-load-bearing partitions, Type O may be used instead of Type N.

C. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Mix to match Architect's sample.

3. Application: Use pigmented mortar for exposed mortar joints with the following units:
   a. Decorative CMUs.
   b. Pre-faced CMUs.
   c. Face brick.
   d. Cast stone trim units.

D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
   1. Application: Use colored aggregate mortar for exposed mortar joints with the following units:
      a. Face brick.

E. Grout for Unit Masonry: Comply with ASTM C 476.
   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
   2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
   1. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:
1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:
1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:
1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
   1. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section "Fire-Resistive Joint Systems."

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:
   1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
   2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
   3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
   4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
   1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
   2. Allow cleaned surfaces to dry before setting.
   3. Wet joint surfaces thoroughly before applying mortar.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.6 CAVITY WALLS

A. Bond wythes of cavity walls together using one of the following methods:
   1. Masonry Veneer Anchors: Comply with requirements for anchoring masonry veneers.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

C. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
   1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.7 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
   1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
   2. Embed connector sections and continuous wire in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of sheathing.
   3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
   4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form expansion joints in brick as follows:
   1. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."

C. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants," but not less than 3/8 inch.
   1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.9 FLASHING, WEEP HOLES, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under building paper or building wrap, lapping at least 4 inches.
3. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Division 07 Section "Joint Sealants" for application indicated.
4. Install metal sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Division 07 Section "Joint Sealants" for application indicated.
5. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
6. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
1. Use specified weep/vent products or open head joints to form weep holes.
2. Space weep holes 24 inches o.c. unless otherwise indicated.

E. Place pea gravel in cavities as soon as practical to a height equal to height of first course above top of flashing, but not less than 2 inches, to maintain drainage.
1. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

F. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products or open head joints to form vents.
1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.10 THRU WALL FLASHING INSPECTION PROCEDURE

A. At all area of thru wall flashing installation the completed flashing assembly shall be tested for leaks by flood testing the assembly before the brick masonry is less than 2 feet above the bottom of the flashing material. Should the results indicate that the flashing is not watertight the brickwork shall be removed and flashing resealed until no leaks are present.
1. Continue brick masonry construction only after the Construction Manager has verified that no leaks exist in the wall construction.

3.11 FIELD QUALITY CONTROL

A. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.

B. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

C. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.

D. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

E. Prism Test: For each type of construction provided, according to ASTM C 1314 at **7** days and at 28 days.

3.12 FIELD QUALITY CONTROL

A. Notify Architect's Project representatives in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until Architect's Project representatives have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

B. Inspecting: Owner will engage an inspector to perform inspections and prepare reports for thru wall flashing installation. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.

C. All thru wall flashing installed in this project shall be water tested to verify completed installations will perform as designed. These tests shall be witnessed and approved by the Architect [Construction Manager].
   1. Testing will require that water be run into the brick cavity for a period of one hour to verify that no leaks exist. End dams are required at the end of all continuous through wall flashings so the water is directed to the weeps.

3.13 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
   1. Crush masonry waste to less than 4 inches in each dimension.
   2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Division 31 Section "Earth Moving."
   3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 20 00

SECTION 04 70 00

CULTURED STONE

PART 1—GENERAL

1.1 SUMMARY

A Section Includes: Manufactured stone veneer and application materials.

B. Related Sections:

1. Section 07 27 26 – "Fluid Applied Membrane Air Barrier."
2. Section 07 62 00 – "Sheet Metal Flashing and Trim:" specifying flashing materials.

C. Alternates:

1. Reference Section 01 23 00−Alternates.

1.2 REFERENCES

A. American Concrete Institute (ACI).

B. American Society for Testing and Materials (ASTM):

1. ASTM C 39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
2. ASTM C 67, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
3. ASTM C 177, Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
4. ASTM C 192, Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
5. ASTM C 270, Standard Specifi cation for Mortar for Unit Masonry.
6. ASTM C 482, Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement.
7. ASTM D 226, Standard Specifi cation for Asphalt-Saturated Organic Felt Used in Roofi ng and Waterproofi ng.
8. ASTM E 2556/ E 2556M Standard Specifi cation for Vapor Permeable Flexible Sheet Water Resistive Barriers Intended for Mechanical Attachment.

C. Building Materials Evaluation Commission.

D. International Code Council (ICC):

1. ES Report.
2. UBC Standard No. 14-1, Kraft Waterproof Building Paper.

E. Masonry Standards Joint Committee (MSJC) of The Masonry Society.

F. Underwriters Laboratories (UL):

1. Classification File Number.
2. UL 723, Standard for Safety for Surface Burning Characteristics of Building Materials. I. US Department of Housing and Urban Development (HUD): Material Release Number.

1.03 SUBMITTALS

A. Reference Section 01 33 00−Submittal Procedures; submit following items:
   1. Product Data: Manufactured masonry and application materials including mortar color charts, and water resistive barrier.
   2. Samples: Panel containing full-size samples of specified manufactured masonry showing full range of colors and textures complete with specified mortar.
      a. Actual size of masonry sample approximately 12 by 12 inches (300 by 300 mm).
   3. Quality Assurance/Control Submittals:
      a. Qualifications:
         1) Proof of manufacturer qualifications.
         2) Proof of installer qualifications.
      b. Certificates: ICC-ES Report.
      c. Test Reports for physical properties.
      d. Manufacturer's Installation Instructions.

B. Closeout Submittals: Reference Section 01 78 00−Closeout Submittals; submit following items:
   1. Maintenance Instructions.
   2. Special Warranties.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer Qualifications:
      a. Minimum five years experience in producing manufactured masonry.
      b. Member of following organizations:
         1) MSJC.
         2) ACI.
         3) ASTM.
   2. Installer Qualifications: Company with documented experience in installation of manufactured masonry including minimum 5 projects within 400 mile radius of this Project.

B. Certifications:
   1. Current ICC-ES Report.
   2. UL: Classification File Number.

C. Field Samples: Provide in a location selected by Architect showing representative sample of installed product including penetration and termination details, corner detail and mortar color and tooling.
   1. Reference Section 01 45 00 − Quality Control.
   2. Minimum Size: 4 by 4 feet (1200 by 1200 mm).
   3. Approved field samples may remain as part of completed Work.

1.5 DELIVERY, STORAGE, AND HANDLIN

A. Reference Section 01 66 00−Product Storage and Handling Requirements.

B. Follow manufacturer's instructions.

C. Store moisture-sensitive materials in weather protected enclosures.

1.6 PROJECT/SITE CONDITIONS

A. Environmental Requirements: Maintain materials and ambient temperature in area of installation at minimum 40 degrees F (4 degrees C) prior to, during, and for 48 hours following installation.

1.7 WARRANTY

A. Special Warranty: Provide manufacturer's standard limited warranty against defects in manufacturing for a period of 50 years following date of Final Acceptance.

1.8 MAINTENANCE

A. Extra Materials: Furnish extra manufactured stone material in a variety of shapes and sizes in quantity equal to three percent of the installed stone.

PART 2—PRODUCTS

2.1 ACCEPATABLE MANUFACTURER

A. Boral Stone Products LLC, Drystack Ledgerstone

B. Owens Corning, Chardonnay Drystack Ledgestone

C. Premier Stone, Stack Walnut

2.2 MANUFACTURED MASONRY MATERIALS

A. Cultured Stone® Textures:
1. Single Texture Color: See the drawings
    a. Color: As shown on Drawings.
    b. Size: As shown on Drawings.
2. Watertable/Sill—Stone Textured:
    a. Color: As shown on Drawings.
    b. Size: 2 (front), 2-$^1/_2$ (back), by 3 by 18 inches (50 (front), 65 (back) by 75 by 455 mm).
    c. Provide sloped top surface and drip edge.

B. Manufactured Masonry Physical Properties:
1. Compressive Strength: ASTM C 192 and ASTM C 39, 1800 psi (12.4 MPa)
2. Bond Between Stone Unit, Type S Mortar, and Backing: ASTM C 482, 50 psi (345 kPa).
3. Thermal Resistance: ASTM C 177, R-factor, 0.355 per inch (25.4 mm) of thickness.
4. Freeze/Thaw: ASTM C 67, 50 cycles, no disintegration and less than 3 percent weight loss.
5. Fire Hazard Test, UL 723:
    a. Flame spread: 0.
    b. Smoke Development: 0.
6. Maximum Veneer Unit Weight: 15 psf (73 kg/m^2).

2.3 RELATED MATERIALS

A. Water Resistive Barrier: Vapor permeable flexible sheet water resistive barriers comply with ASTM E 2556/ E 2556M

B. Metal Lath: 18 (1.3 mm) gauge woven wire mesh

C. Fasteners:

1. Into Wood Studs: Minimum 1/8 inch (25 mm) shank diameter galvanized nails or minimum 3/4 inch (19 mm) crown staples of sufficient length to penetrate 1 inch (25 mm) minimum into the stud.

D. Mortar: Premixed Type N, Type S. Comply with ASTM C 270.
1. Mortar Color: Iron oxide pigments. The stone is dry stack stone

E. Weep screed as required for installation over framed construction.

PART 3—EXECUTION

3.1 EXAMINATION

A. Examine substrates upon which manufactured masonry will be installed.

B. Coordinate with responsible entity to correct unsatisfactory conditions.

C. Commencement of work by installer is acceptance of substrate conditions.

3.2 PREPARATION

A. Protection: Prevent work from occurring on the opposite of walls to which manufactured masonry is applied during and for 48 hours following installation of the manufactured masonry.

B. Surface Preparation: Follow manufacturer's instructions designated below for the appropriate type of manufactured masonry and substrate.

3.3 INSTALLATION

A. Install Cultured Stone® products in accordance with manufacturer's Cultured Stone® installation instructions using [grouted] [tight fi t] joints.

B. Install Cultured Brick® products in accordance with manufacturer's Cultured Brick® installation instructions.

C. Install architectural trim products in accordance with manufacturer's Cultured Stone® installation instructions.

D. Install/Apply Related Materials specified above in accordance with type of substrate and manufactured masonry manufacturer's installation instructions.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide 2 periodic site visits.

3.5 CLEANING

A. Reference Section 01 74 00−Cleaning and Waste Management.

B. Clean manufactured masonry in accordance with manufacturer's installation instructions.

3.6 PROTECTION

A. Protect finished work from rain during and for 48 hours following installation.

B. Protect finished work from damage during remainder of construction period.

END OF SECTION 04 70 00

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Structural steel.
   2. Architecturally exposed structural steel.
   3. Grout.

B. Related Sections include the following:
   1. Section 01 40 00 - "Quality Requirements" for independent testing agency procedures and administrative requirements.
   2. Section 05 31 00 - "Steel Decking" for field installation of shear connectors.
   3. Division 09 painting sections for surface preparation and priming requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

B. Architecturally Exposed Structural Steel: Structural steel designated as architecturally exposed structural steel in the Contract Documents.

1.4 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand ASD-service loads indicated and comply with other information and restrictions indicated.
   1. Select and complete connections using schematic details indicated and AISC's "Manual of Steel Construction – 13th Edition, Allowable Stress Design," Part 9.
   2. Engineering Responsibility: Fabricator's responsibilities include using a qualified professional engineer licensed in the state of North Carolina to prepare structural analysis data for structural-steel connections.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication of structural-steel components.
   1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
   2. Include embedment drawings.
   3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
   4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts.

C. Welding certificates.

D. Qualification Data: For Installer, fabricator, professional engineer and testing agency.

E. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
   1. Structural steel including chemical and physical properties.
   2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
   3. Direct-tension indicators.
   4. Shop primers.
   5. Nonshrink grout.

F. Source quality-control test reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.

B. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

D. Comply with applicable provisions of the following specifications and documents:
   1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
   2. AISC's "Seismic Provisions for Structural Steel Buildings" and "Supplement No. 2."
   3. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
   4. AISC's "Specification for the Design of Steel Hollow Structural Sections."
   5. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
   6. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

E. Mockups: Build mockups of architecturally exposed structural steel to set quality standards for fabrication and installation.
   1. Coordinate finish painting requirements with Division 09 painting Sections.
   2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.
   1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
   2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.8 COORDINATION

A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992 and ASTM A 572, Grade 50.

B. Channels, Angles-Shapes: ASTM A 36.

C. Plate and Bar: ASTM A 36.

D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

E. Steel Pipe: ASTM A 53, Type E or S, Grade B.
1. Weight Class: Standard.
2. Finish: Black, except where indicated to be galvanized.

F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
1. Finish: Plain.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers, plain.

C. Unheaded Anchor Rods: ASTM A 36.
1. Configuration: Straight.
2. Nuts: ASTM A 563 heavy hex carbon steel.
3. Plate Washers: ASTM A 36 carbon steel.
4. Washers: ASTM F 436 hardened carbon steel.
5. Finish: Plain.

D. Threaded Rods: ASTM A 36.
1. Nuts: ASTM A 563 heavy hex carbon steel.
2. Washers: ASTM F 436 hardened carbon steel.
3. Finish: Plain.

E. Clevises and Turnbuckles: ASTM A 108, Grade 1035, cold-finished carbon steel.

F. Eye Bolts and Nuts: ASTM A 108, Grade 1030, cold-finished carbon steel.

G. Sleeve Nuts: ASTM A 108, Grade 1018, cold-finished carbon steel.

2.3 PRIMER

A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

B. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
   1. Camber structural-steel members where indicated.
   2. Identify high-strength structural steel according to ASTM A 6 and maintain markings until structural steel has been erected.
   3. Mark and match-mark materials for field assembly.
   4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Architecturally Exposed Structural Steel: Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel identified as architecturally exposed structural steel.
   1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, seam marks, roller marks, rolled trade names, and roughness.
   2. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.

C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
   1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
   1. Do not thermally cut bolt holes or enlarge holes by burning.

E. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

F. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning and/or SSPC-SP 2, "Hand Tool Cleaning."

G. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.
   1. Cut, drill, or punch holes perpendicular to steel surfaces.
   2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
   3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Snug tightened, except slip critical at wind frames and moment connections.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
   1. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
   2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
   3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
      a. Grind butt welds flush.
      b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials.
5. Galvanized surfaces.
6. Machined or milled surfaces.
7. Top flanges of composite beams.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils and an average thickness of 2.0 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123.
1. Fill vent holes and grind smooth after galvanizing.
2. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.

2.9 SOURCE QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
2. AISC Quality-Certified Fabricator: Owner will waive testing and inspection.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:
1. Ultrasonic Inspection: ASTM E 164.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."

B. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
   1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
   2. Weld plate washers to top of base plate.
   3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.
   4. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
   1. Level and plumb individual members of structure.
   2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.

G. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1.

H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Snug tightened, except slip critical for wind frames and moment connections.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
   1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic

Design" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
    a. Grind butt welds flush.
    b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.
1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:
    a. Ultrasonic Inspection: ASTM E 164.

D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:
1. Perform bend tests if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, bearing plates, and abutting structural steel.
1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

END OF SECTION 05 12 00

SECTION 05 21 00

STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Long-span steel joists.
   2. Joist accessories.

B. Related Sections include the following:
   1. Section 04 20 00 - "Unit Masonry" for installing bearing plates in unit masonry.

1.3 DEFINITIONS

A. SJI "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.

B. Design special joists to withstand design loads with live load deflections no greater than the following:
   1. Roof Joists: Vertical deflection of 1/240 of the span.

C. Wind Uplift Loads:
   1. Eaves and Overhangs: 35 psf minimum.
   2. Roof Field: 20 psf minimum.

1.5 SUBMITTALS

A. Product Data: For each type of joist, accessory, and product indicated.

B. Shop Drawings: Show layout, designation, number, type, location, and spacing of joists. Include joining and anchorage details, bracing, bridging, joist accessories; splice and connection locations and details; and attachments to other construction.
   1. Indicate locations and details of bearing plates to be embedded in other construction.
   2. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.

C. Welding certificates.

D. Manufacturer Certificates: Signed by manufacturers certifying that joists comply with requirements.

E. Mill Certificates: Signed by bolt manufacturers certifying that bolts comply with requirements.

F. Qualification Data: For manufacturer and professional engineer.

G. Field quality-control test and inspection reports.

H. Research/Evaluation Reports: For joists.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables of SJI "Specifications."
   1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

B. SJI Specifications: Comply with standard specifications in SJI's "Specifications" that are applicable to types of joists indicated.

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.8 SEQUENCING

A. Deliver steel bearing plates to be built into cast-in-place concrete and masonry construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel: Comply with SJI's "Specifications" for web and steel-angle chord members.

B. Steel Bearing Plates: ASTM A 36.

C. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.
   1. Finish: Plain, uncoated.

D. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
   1. Finish: Plain.

E. Welding Electrodes: Comply with AWS standards.

2.2 PRIMERS

A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.3 LONG-SPAN STEEL JOISTS

A. Manufacture steel joists according to "Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as follows:
   1. Joist Type: LH-series steel joists.
   2. End Arrangement: Special.
   3. Top-Chord Arrangement: Pitched 1/2 inch per 12 inches, 2 ways.

B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.

C. Provide holes in chord members for connecting and securing other construction to joists.

D. DO NOT camber long-span steel joists.

2.4 JOIST ACCESSORIES

A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.

B. Fabricate steel bearing plates with integral anchorages of sizes and thicknesses indicated. Shop prime paint.

C. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.5 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.

B. Do not prime paint joists and accessories to receive sprayed fire-resistive materials.

C. Apply 1 coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
   1. Before installation, splice joists delivered to Project site in more than one piece.
   2. Space, adjust, and align joists accurately in location before permanently fastening.
   3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.

C. Field weld joists to supporting steel bearing plates. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
   1. Weld and bolt joists with end movement connections as indicated.

D. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.

B. Field welds will be visually inspected according to AWS D1.1.

C. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following procedures, as applicable:
   1. Ultrasonic Testing: ASTM E 164.

D. Bolted connections will be visually inspected.

E. High-strength, field-bolted connections will be tested and verified according to procedures in RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts."

F. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.

G. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

3.4 REPAIRS AND PROTECTION

A. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel, and accessories.
   1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
   2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 21 00

SECTION 05 31 00

STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Roof deck.

1.3 SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

C. Product Certificates: For each type of steel deck, signed by product manufacturer.

D. Welding certificates.

E. Field quality-control test and inspection reports.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
   1. Power-actuated mechanical fasteners.

G. Research/Evaluation Reports: For steel deck.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.

B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
   2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.

D. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

E. FMG Listing: Provide steel roof deck evaluated by FMG and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1.6 COORDINATION

A. Coordinate installation of sound-absorbing insulation strips in topside ribs of acoustical deck with roofing installation specified in Division 07 Roofing Section to ensure protection of insulation strips against damage from effects of weather and other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Steel Deck:
      a. Consolidated Systems, Inc.
      b. Epic Metals Corporation.
      c. Marlyn Steel Decks, Inc.
      d. Nucor Corp.; Vulcraft Division.
      e. Roof Deck, Inc.
      f. United Steel Deck, Inc.
      g. Verco Manufacturing Co.
      h. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

2.2 ROOF DECK

A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
   1. Galvanized Steel Sheet: ASTM A 653, Structural Steel, Grade 33, G60 zinc coating.
   2. Deck Profile: Type WR, wide rib.
   3. Profile Depth: 1-1/2 inches, unless otherwise indicated.
   4. Design Uncoated-Steel Thickness: 0.0358 inch.
   5. Span Condition: As indicated.
   6. Side Laps: Overlapped.

2.3 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.

G. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, thick, with factory-punched hole of 3/8-inch minimum diameter.

H. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch- wide flanges and level recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.

I. Flat Sump Plate: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

J. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

K. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.

B. Locate deck bundles to prevent overloading of supporting members.

C. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

D. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

E. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

G. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

H. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
   1. Weld Diameter: 5/8 inch, nominal.
   2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches apart in the field of roof and 6 inches apart in roof corners and perimeter, based on roof-area definitions in FMG Loss Prevention Data Sheet 1-28.
   3. Weld Washers: Install weld washers at each weld location.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 36 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
2. Fasten with a minimum of 1-1/2-inch- long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2 inches, with end joints as follows:
1. End Joints: Lapped 2 inches minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 31 00

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Framing with dimension lumber.
2. Incidental framing with timber.
3. Framing with engineered wood products.
4. Wood blocking and nailers.
5. Wood furring and grounds.
6. Wood sleepers.
7. Utility shelving.
8. Plywood backing panels.

B. Related Requirements:
1. Section 06 16 00 - "Sheathing."
2. Section 06 17 53 - "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.
3. Section 31 31 16 - "Termite Control" for site application of borate treatment to wood framing.

1.2 DEFINITIONS

A. Exposed Framing: Framing not concealed by other construction.

B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

C. Timber: Lumber of 5 inches nominal or greater in least dimension.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:
   1. Wood-preservative-treated wood.
   2. Fire-retardant-treated wood.
   3. Engineered wood products.
   4. Power-driven fasteners.
   5. Powder-actuated fasteners.
   6. Expansion anchors.
   7. Metal framing anchors.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
   1. Factory mark each piece of lumber with grade stamp of grading agency.
   2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
   3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
   4. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

C. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
   1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
   1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
   2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
   1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

D. Application: Treat items indicated on Drawings, and the following:
   1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
   3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
   4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
   5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
   1. Use treatment that does not promote corrosion of metal fasteners.
   2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
   1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat items indicated on Drawings, and the following:
   1. Framing for raised platforms.
   2. Concealed blocking.
   3. Framing for non-load-bearing partitions.
   4. Framing for non-load-bearing exterior walls.
   5. Roof construction.

6. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Maximum Moisture Content: 19 percent for 2-inch nominal thickness or less, unless otherwise indicated.

B. Species and Grade: As indicated on drawings for the following uses:
1. Exterior and load-bearing walls.
2. Non-load-bearing interior partitions.
3. Framing other than non-load-bearing interior partitions.
4. Ceiling joists.
5. Joists, rafters, and other framing not listed above.

C. Species and Grade: Any species and grade with a modulus of elasticity of at least 1,400,000 psi and an extreme fiber stress in bending of at least 1050 psi for 2-inch nominal thickness and 12-inch nominal width for single-member use for the following:
1. Exterior and load-bearing walls.
2. Framing other than non-load-bearing interior partitions.

2.5 TIMBER FRAMING

A. Provide timber framing complying with the following requirements, according to grading rules of grading agency indicated:
1. Species and Grade: Hem-fir, Douglas Fir, or Spruce-Pine-Fir, Select Structural grade; NLGA, NSLB, WCLIB, or WWPA.
2. Species and Grade: Southern Yellow Pine, No. 1 grade; SPIB.
3. Maximum Moisture Content: 19 percent.
4. Additional Restriction: Free of heart centers.

2.6 ENGINEERED WOOD PRODUCTS

A. Engineered Wood Products, General: Products shall contain no urea formaldehyde.

B. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

C. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Boise Cascade Corporation.
b. Georgia-Pacific.
c. Louisiana-Pacific Corporation.
d. Weldwood of Canada Limited; Subsidiary of International Paper Corporation.
e. Weyerhaeuser Company.
2. Extreme Fiber Stress in Bending, Edgewise: 2250 psi for 12-inch nominal- depth members.
3. Modulus of Elasticity, Edgewise: 2,000,000 psi

2.7 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.
7. Utility shelving.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content and any of the following species:
   1. Northern species; NLGA.
   2. Eastern softwoods; NeLMA.

C. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

D. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.8 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.9 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
   1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, fasteners shall be of hot-dipped zinc coated galvanized steel, stainless steel, silicon bronze or copper in accordance with 2304.9.5 of the 2012 North Carolina State Building Code.

   2. Connector that are used in exterior application and in contact with preservative treated wood shall have coating types and weights in accordance with treated wood or connector manufacturer's recommendations, a minimum of ASTM A 653, type G185 zinc coated galvanized steel or equivalent shall be used.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
   1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.10 METAL FRAMING ANCHORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Alpine Engineered Products, Inc.
   2. Cleveland Steel Specialty Co.
   3. KC Metals Products, Inc.
   4. Harlen Metal Products, Inc.
   5. Phoenix Metal Products, Inc.
   6. Simpson Strong-Tie Co., Inc.
   7. USP Structural Connectors.

B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
   1. Use for interior locations unless otherwise indicated.

D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch
   1. Use for wood-preservative-treated lumber and where indicated.

E. Stainless-Steel Sheet: ASTM A 666, Type 304.
   1. Use for exterior locations and where indicated.

2.11 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.
   1. Use as a separator between preservative-treated wood and metal decking.

C. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
   1. Adhesives shall have a VOC content of [70] g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.
   1. Use for exposed ends of posts and beams.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.

G. Do not splice structural members between supports unless otherwise indicated.

H. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
   1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

I. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
   1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
   2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal- thickness.
   3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
   4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

J. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

K. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
   1. Use inorganic boron for items that are continuously protected from liquid water.
   2. Use copper naphthenate for items not continuously protected from liquid water.

L. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code
   2. NES NER-272 for power-driven fasteners.

M. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

N. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
   1. Comply with approved fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
   2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
   3. Use common nails as approved for compliance with structural requirements. Drive nails snug but do not countersink nail heads.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- size furring **vertically** per manufacture recommendation.

C. Furring to Receive Gypsum Board or Plaster Lath: Install 1-by-2-inch nominal- size furring vertically at 16 inches o.c.

3.4 WALL AND PARTITION FRAMING INSTALLATION

A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction unless otherwise indicated.
   1. For exterior walls, provide 2-by-6-inch nominal size wood studs spaced 16 inches o.c. unless otherwise indicated.
   2. For interior partitions and walls, provide 2-by-4-inch nominal size wood studs spaced 16 inches o.c. unless otherwise indicated.

3. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.

B. Construct corners and intersections with three or more studs.

C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.
2. For load-bearing walls, provide double-jamb studs for openings 60 inches and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated.

3.5 RAFTER FRAMING INSTALLATION

A. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.

B. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal- size boards between every third pair of rafters, but not more than 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.

C. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.6 TIMBER FRAMING INSTALLATION

A. Install timber with crown edge up and provide not less than 4 inches of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports as indicated if not continuous.

B. Where beams or girders are framed into pockets of exterior concrete or masonry walls, provide 1/2-inch air space at sides and ends of wood members.

C. Install wood posts using metal anchors indicated.

D. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

3.7 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 00

SECTION 06 16 00

SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Composite nail base insulated roof sheathing.

B. Related Requirements:
1. Section 06 10 00 - "Rough Carpentry" for wood blocking panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For following products, from ICC-ES:
1. Foam-plastic sheathing.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 COMPOSITE NAIL BASE INSULATED ROOF SHEATHING

A. Vented, Oriented-Strand-Board-Surfaced, Polyisocyanurate-Foam Sheathing: Rigid, cellular, polyisocyanurate thermal insulation complying with ASTM C 1289, Type II, Class 1, with oriented strand board adhered to spacers on one face.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Atlas Roofing Corporation.
b. Cornell Corporation.
c. Dow Chemical Company (The).
d. Johns Manville; Berkshire Hathaway Inc.
e. Rmax, Inc.
f. HunterPanels.
2. Polyisocyanurate-Foam Thickness: 1 inch.
3. Oriented-Strand-Board Nominal Thickness: 7/16 inch .
4. Spacers: Wood furring strips or blocks not less than 1 inch thick and spaced not more than 16 inches o.c.

2.2 FASTENERS

A. Screws for Fastening Oriented-Strand-Board-Surfaced, Polyisocyanurate-Foam Sheathing to thru metal roofing to wood deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-

protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117. Provide washers or plates if recommended by sheathing manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
   1. Slot back of insulation to fit over existing ribs or at contractors option “bend and hammer ribs flat.”

B. Securely attach to substrate by fastening as indicated, complying with the following:
   1. NES NER-272 for power-driven fasteners.
   2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
   3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."

C. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 FOAM-PLASTIC SHEATHING INSTALLATION

A. Comply with manufacturer's written instructions.

B. Foam-Plastic Wall Sheathing: Install vapor-relief strips or equivalent for permitting escape of moisture vapor that otherwise would be trapped in cavity behind sheathing.

C. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

END OF SECTION 06 16 00

SECTION 06 17 53

SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Wood roof trusses.
2. Wood girder trusses.
3. Wood truss bracing.
4. Metal truss accessories.

B. Related Requirements:
1. Section 06 16 00 - "Sheathing" for roof sheathing and subflooring.
2. Section 31 31 16 - "Termite Control" for site application of borate treatment to wood trusses.

1.2 DEFINITIONS

A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.

B. Shop Drawings: Show fabrication and installation details for trusses.
1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
2. Indicate sizes, stress grades, and species of lumber.
3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
6. Show splice details and bearing details.

C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer licensed in the state of North Carolina responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For metal connector-plate manufacturer and professional engineer.

B. Material Certificates: For dimension lumber specified to comply with minimum specific gravity. Indicate species and grade selected for each use and specific gravity.

C. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss fabricating firm.

D. Evaluation Reports: For the following, from ICC-ES:
   1. Metal-plate connectors.
   2. Metal truss accessories.

1.5 QUALITY ASSURANCE

A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
   1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
   2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Handle and store trusses to comply with recommendations in TPI BCSI**,** "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
   1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
   2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
   3. Provide for air circulation around stacks and under coverings.

B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified North Carolina professional engineer, as defined in Division 01 Section "Quality Requirements," to design metal-plate-connected wood trusses.

B. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
   1. Design Loads: As indicated on Drawing S800.
   2. Maximum Deflection under Design Loads: As indicated on Drawing S800.

C. Comply with applicable requirements and recommendations of the following publications:
   1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
   2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
   3. TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.2 DIMENSION LUMBER

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
   1. Factory mark each piece of lumber with grade stamp of grading agency.

2. Provide dressed lumber, S4S.
3. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

B. Minimum Chord Size for Roof Trusses: 2 by 6 inches nominal for top chords.

C. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Division 06 Section "Rough Carpentry."

2.3 METAL CONNECTOR PLATES

A. Source Limitations: Obtain metal connector plates from single manufacturer.

B. General: Fabricate connector plates to comply with TPI 1.

C. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.

B. Nails, Brads, and Staples: ASTM F 1667.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Cleveland Steel Specialty Co.
2. KC Metals Products, Inc.
3. Phoenix Metal Products, Inc.
4. Simpson Strong-Tie Co., Inc.
5. USP Structural Connectors.

B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

D. Truss Tie-Downs: Bent strap tie for fastening roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick. Tie fastens to one side of truss, top plates, and side of stud below.

E. Truss Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of truss and fastens to both sides of truss, top plates, and one side of stud below.

F. Truss Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening roof trusses to wall studs below, 2-1/2 inches wide by 0.062 inch thick. Tie fits over top of truss and fastens to both sides of truss, inside face of top plates, and both sides of stud below.

G. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches wide by 0.050 inch thick. Clip is fastened to truss through slotted holes to allow for truss deflection.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 94 percent zinc dust by weight.

2.7 FABRICATION

A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.

B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.

C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
   1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

2.8 SOURCE QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections.
   1. Provide special inspector with access to fabricator's documentation of detailed fabrication and quality-control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.
   2. Provide special inspector with access to places where wood trusses are being fabricated to perform inspections.

B. Correct deficiencies in Work that special inspections indicate does not comply with the Contract Documents.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wood trusses only after supporting construction is in place and is braced and secured.

B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install and brace trusses according to TPI recommendations and as indicated.

E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.

F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.

G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.

H. Securely connect each truss ply required for forming built-up girder trusses.
   1. Anchor trusses to girder trusses as indicated.

I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
   1. Install bracing to comply with Division 06 Section "Rough Carpentry."

J. Install wood trusses within installation tolerances in TPI 1.

K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.

L. Replace wood trusses that are damaged or do not meet requirements.

3.2 REPAIRS AND PROTECTION

A. Protect wood trusses from weather. If, despite protection, wood trusses become wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

END OF SECTION 06 17 53

SECTION 06 41 00

CUSTOM CASEWORK

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. Specially fabricated custom cabinet units.

B. Specially fabricated custom countertops.

C. Cabinet hardware.

D. Plastic Laminate.

E. Preparation for installing utilities.

F. Shelving.

1.2 RELATED DOCUMENTS INCLUDE:

A. I Series Drawings- Finish Plans

B. A700 Series Drawings – Interior Elevations

1.3 REFERENCES:

A. Americans with Disabilities Act (ADA-AG) and ANSI A117.1 2009- Standards for use by the disabled.

B. Architectural Woodwork Institute AWI Quality Standards, Current Edition.

C. FS MM-L-736 - Lumber, Hardwood.

D. FS MMM-A-130 - Adhesive, Contact.

E. National Electric Manufacturers Association (NEMA) LD3 -High Pressure Decorative Laminates.

F. North Carolina State Building Code 2012.

1.4 SUBMITTALS:

A. Submit under provisions of Section 01 33 00 (SUBMITTAL PROCEDURES).

B. Shop Drawings: Indicate plans and elevations, materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location, and schedule of finishes.

C Samples: Submit two samples of each type of plastic laminate.

D. Samples: Submit one unit each type and finish of exposed cabinet hardware where manufacturers other than those specified are proposed for use on the Project.

1.5 QUALITY ASSURANCE:

A. Perform work in accordance with AWI Custom quality.

B. Work in this Section shall comply with the specified grades or Work and Sections of the current edition of the Architectural Woodwork Institute Quality Standards.

1. Trim: Standard 300
2. Cabinets: Standard 400
3. Shelving: Standard 600

1.6 QUALIFICATIONS:

A. The subcontractor for the fabrication of architectural woodwork shall be able to demonstrate successful experience with work of comparable extent, complexity and quality to that shown and specified.

B. As documentation, manufacturer shall submit neutral Pre-qualification Form found in the Appendix in the AWI Quality Standards, current edition.

C. Manufacturer shall be a member in good standing of the Architectural Woodwork Institute.

1.7 DEFINITIONS:

A. Exposed Parts: Surfaces visible when:
1. Drawer fronts are closed;
2. Cabinets and shelving are open-type or behind clear glass doors;
3. Bottom of cabinets are seen 42” or more above finished floor;
4. Tops of cabinets are seen below 78” above finished floor, or are visible from an upper floor or staircase after installation;
5. Portions of cabinets are visible after fixed appliances are installed;
6. Front edges of cabinet body members are visible or seen through a gap of greater than 1/8” with doors and drawers closed.

B. Semi-Exposed Parts: Surfaces visible when:
1. Drawers/doors are in the open position;
2. Bottoms of cabinets are between 30” and up to 42” above finish floor;
3. All front edges of shelving behind doors.

C. Concealed Surfaces: Surfaces are concealed when:
1. Surfaces are not visible after installation;
2. Bottoms of cabinets are less than 30’ above finished floor;
3. Tops of cabinets are over 78” above finish floor and are not visable from and upper level;
4. Stretchers, blocking and/or components are concealed by drawers.

1.8 DELIVERY, STORAGE, AND HANDLING:

A. Deliver, store and handle products to site under provisions of Section 01600 (PRODUCT REQUIREMENTS).

B. Wet construction operations, including simulated acoustical spray finish and painting, must be completed prior to the delivery of any item of architectural woodwork furnished by the contractor. All items shall be protected against dampness and other detrimental conditions during and after delivery.

C. No pencil, crayon or other marks shall be made on any exposed or semi-exposed surfaces. Tags or pressure-sensitive labels shall be used for identification purposes.

D. All items shall be adequately covered with polyethylene, or other non-staining material, and this protection maintained until installation. Special attention shall be given to items to receive job-applied natural finish as scratched or marred surfaces will not be acceptable; items so affected will be replaced at the contractor's expense. Splintered and/or chipped edges on any item will likewise be cause for rejection.

E. Store materials in ventilated, interior locations under constant minimum temperatures of 60 degrees Fahrenheit and maximum relative humidity of 55 percent.

1.9 FIELD MEASUREMENTS:

A. Field verify all measurements prior to fabrication of any custom casework.

1.10 COORDINATION:

A. Coordinate work under provisions of Section 01 60 00 Product Requirements.

B. Coordinate the work with plumbing and electrical rough-in.

C. Locations of blocking, furring, nailers, etc., for the support of attachment of architectural woodwork items shall be accurately coordinated with rough carpentry and gypsum wallboard work.

D. Temporary protection of finished surfaces by work by other trades shall be provided as necessary during the installation of woodwork items.

PART 2 PRODUCTS

2.1 WOOD MATERIALS:

A. Hardwood Lumber: graded in accordance with AWI Custom; moisture content shall comply with requirements of referenced quality standard for moisture content of lumber in relation to relative humidity conditions existing during time of fabrication and in installation areas.

HARDWOOD ITEMS	FACE SPECIES	CUT
Trim	Poplar	Plain Sawn

2.2 SHEET MATERIALS:

A. Medium Density Fiberboard: Core material complying with ANSI A208.2.

B. Plywood for Plastic Laminate: A-C EXT-APA for cabinet counter tops with sinks and splashes; A-A EXT APA for vertical application on both sides.

ITEM
Countertops to receive plastic laminate
Back splashes to receive plastic laminate
Cabinet Frame to receive plastic laminate
Door and Drawer Fronts to receive plastic laminate
Shelves to receive plastic laminate

2.3 MANUFACTURERS - PLASTIC LAMINATE:

A. Provide plastic laminates available through manufacturers listed in finish schedule
   a. Corian
   b. Wilsonart
   c. Formica

2.4 LAMINATE MATERIALS:

A. Plastic Laminate: NEMA LD 3; color, pattern, and surface texture as indicated in finish Schedule.

B. Laminate Backing Sheet: NEMA LD-3 BKL backing grade, undecorated plastic laminate.

2.5 SOLID SURFACING:

A. Standard: For purposes of designating type and quality for the Work under this Section, Drawings and Specifications are based on products manufactured or provided by Formica.

B. Acceptable: Products of the following manufacturer's which are equivalent to or better than the performance standards, design, color, dimensions, function, and relation to adjacent work of the standard Manufacturer will be acceptable for use on this Project:
   1. Corian
   2. Wilsonart
   3. Formica

2.6 SOLID SURFACING MATERIALS:

A. Solid Surfacing (45.7 cm) Formica, color, series and pattern as indicated in Color Schedule.

B. All edges to be 2" bullnose.

2.7 ACCESSORIES:

A. Adhesive: FS MMM-A-130 contact adhesive Type recommended by AWI and laminate manufacturer to suit application.

B. Fasteners: Size and type to suit application.

C. Grommets: Black plastic grommets for cables and plugs through counter tops.

2.8 CABINET HARDWARE:

A. Standard: For purposes of designating type and quality for the Work under this Section, Drawings and Specifications are based on products manufactured or provided by Companies listed below.

B. Acceptable: Products of the following manufacturers which are equivalent to or better than the performance standards, design, color, dimensions, function, and relation to adjacent work of the standard Manufacturer will be acceptable for use on this Project.
   1. Sugatsune
   2. Accuride
   3. Blum

C. Schedule: Bases of Design is based on Sugatsune.

1.	Drawer Slides: Drawer (Up to 6" Deep)	Sugatsune	Full Extension
2.	Cabinet Shelf Standards	Sugatsune	AP-DM Alum. Mortise
3.	Cabinet Shelf Rests	Sugatsune	AP FB 20
4.	Drawer & Door Pulls	Sugatsune	DL Series (Satin)
5.	Hinges	Sugatsune	Conceal Hinges HES 3030BR Satin Chrome
6.	Cabinet Locks	Sugatsune	1830 MK Million Lick Satin

2.9 FABRICATION:

A. Fabricate to AWI Custom Quality Standards.

B. Cabinet backs may be constructed with 1/4" plywood backs with 3/4" X 4" solid wood stretchers.

C. Door and Drawer Fronts: 3/4 inch thick; flush overlay style.

D. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings. Joints between sections shall be inconspicuous, permanently secure, and with no apparent interruption of continuity of assembly when in place.

E. Fit shelves, doors, and exposed edges with matching 3/8 inch hardwood edging or as indicated on the drawings. Use one piece for full length only.

F. Cap exposed plastic laminate finish edges with material of same finish and pattern. Laminate concealed construction with plastic laminate cabinet liner.

G. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting. Provide blocking and lockouts as required and indicated to secure work in place.

H. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Unless indicated otherwise, all countertops of fixed units that are against permanent vertical surfaces shall have a backsplash.

I. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

J. All joints in flat sheet work shall be glued and secured with the specified joint fasteners. Shop miters 4" or more shall be glued and doweled unless detailed otherwise. Miters less than 4" shall be glued with concealed splines. Plywood sheets shall be sanded both faces and fine belt sanded on the exposed and concealed faces to furnish a suitable surface for finishing.

K. Mechanically fasten back splash to countertops with steel brackets at 16 inches on center.

L. Provide cutouts for plumbing fixtures, inserts, outlet boxes fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal contact surfaces of cut edges.

M. Secure plastic laminate with contact cement. Where plastic laminate edge banding is required, apply the banding prior to the face. Joints shall be held to a minimum and shall be as indicated on the approved shop drawings. No exposed nails, screws or attachments will be accepted.

2.10 FINISHING:

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations. Wood fillers shall match surrounding surfaces and shall be type recommended for specified finishes.

PART 3 EXECUTION

3.1 EXAMINATION:

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting the work of this section are placed and ready to receive this work.

3.2 INSTALLATION:

A. Install work in accordance with AWI Custom Quality Standards.

B. Set and secure casework in place; rigid, plumb, and level.

C. Scribe work abutting other components, with maximum gap of 1/32”. Do not use additional overlay trim to conceal larger gaps.

D. Install hardware in accordance with manufacturer's instructions.

E. Use fixture attachments in concealed locations for wall mounted components.

F. Use concealed joint fasteners to align and secure adjoining cabinet units and counter tops.

G. Secure cabinet and counter bases to floor using appropriate angles and anchorages.

H. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.3 ADJUSTING:

A. Adjust work under provisions of Section 01 78 00 (CLOSEOUT PROCEDURES).

B. Adjust moving or operating parts to function smoothly and correctly.

3.4 CLEANING:

A. Clean work under provisions of 01 78 00 (CLOSEOUT PROCEDURES).

B. Clean casework, counters, shelves, hardware, fittings and fixtures.

C. Protect finished installation from damage by water, heat and other causes until acceptance of Project. Warpage, surface discoloration and damage will be cause for rejection and replacement at no additional cost to the Owner.

END OF SECTION 06 41 00

SECTION 07 11 13

BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Cold-applied, emulsified-asphalt dampproofing.

B. Related Sections include the following:
   1. Division 07 Section Fluid Applied Membrane Air Barrier.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.

B. Material Certificates: For each product, signed by manufacturers.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.4 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.

B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Degussa Building Systems; Sonneborn Brand Products.
   2. Henry Company.
   3. Karnak Corporation.
   4. Koppers Inc.
   5. Meadows, W. R., Inc.
   6. Tamms Industries, Inc.

B. Trowel Coats: ASTM D 1227, Type II, Class 1.

C. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.

D. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

2.2 PROTECTION COURSE

A. Protection Course, Asphalt-Board Type: ASTM D 6506, premolded, 1/8-inch- thick, multi-ply, semirigid board consisting of a mineral-stabilized asphalt core sandwiched between layers of asphalt-saturated felt, and faced on 1 side with polyethylene film.

2.3 MISCELLANEOUS MATERIALS

A. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.

B. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.

C. Patching Compound: Manufacturer's fibered mastic of type recommended by dampproofing manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.
   1. Proceed with dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

C. Apply patching compound for filling and patching tie holes, honeycombs, reveals, and other imperfections; cover with asphalt-coated glass fabric.

3.3 APPLICATION, GENERAL

A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.
   1. Apply additional coats if recommended by manufacturer or if required to achieve coverages indicated.
   2. Allow each coat of dampproofing to cure before applying subsequent coats.
   3. Allow for manufacturer’s recommended drying time prior to backfilling.

B. Apply dampproofing to footings and foundation walls where opposite side of wall faces building interior.
   1. Apply from finished-grade line to top of footing, extend over top of footing, and down a minimum of 6 inches over outside face of footing.
   2. Extend 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
   3. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch- wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.

C. Apply dampproofing to provide continuous plane of protection on exterior face of inner wythe of exterior masonry cavity walls.
   1. Lap dampproofing at least 1/4 inch onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.
   2. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe, and lap dampproofing at least 1/4 inch onto shelf angles supporting veneer.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. On Parged Masonry Foundation Walls: Apply 2 brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat, 1 fibered brush or spray coat at not less than 3 gal./100 sq. ft., or 1 trowel coat at not less than 4 gal./100 sq. ft..

B. On Unparged Masonry Foundation Walls: Apply primer and 1 trowel coat at not less than 5 gal./100 sq. ft..

C. On Masonry Backup for Stone Veneer Assemblies Apply primer and 1 brush or spray coat at not less than 1 gal./100 sq. ft..

D. On Exterior Face of Inner Wythe of Cavity Walls: Apply primer and 1 brush or spray coat at not less than 1 gal./100 sq. ft..

3.5 INSTALLATION OF PROTECTION COURSE

A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing material manufacturer's written recommendations for attaching protection course.
   1. Install protection course within 24 hours of installation of dampproofing (while coating is tacky) to ensure adhesion.

3.6 CLEANING

A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

END OF SECTION 07 11 13

SECTION 07 21 00

THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Foam-plastic board insulation.
2. Glass-fiber blanket insulation.
3. Vapor retarders.

B. Related Sections:
1. Section 04 20 00 - "Unit Masonry" for insulation installed in cavity walls and masonry cells.
2. Division 07 Section “Fluid Applied Membrane Air Barrier” for water-vapor-permeable barriers.
3. Section 07 27 26 - “Fluid-Applied Membrane Air Barriers” for vapor-retarding and waterproof membrane placed over sheathing and under board insulation.
4. Section 07 84 46 - "Firestopping" for insulation installed as part of a perimeter fire-resistive joint system.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:
1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. DiversiFoam Products.
   b. Dow Chemical Company (The).
   c. Owens Corning.
2. Type IV, 25 psi.

B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

2.2 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. CertainTeed Corporation.
2. Guardian Building Products, Inc.
3. Johns Manville.
4. Knauf Insulation.
5. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics. http://www.certainteed.com

C. Kraft-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type II (non-reflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).

D. Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class B (faced surface with a flame-propagation resistance of 0.12 W/sq. cm); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

E. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

F. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.3 VAPOR RETARDERS

A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.

B. Fire-Retardant, Reinforced-Polyethylene Vapor Retarders: Two outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nonwoven grid of nylon cord or polyester scrim and weighing not less than 22 lb/1000 sq. ft., with maximum permeance rating of 0.1317 perm and with flame-spread and smoke-developed indexes of not more than 5 and 60, respectively, per ASTM E 84.
1. Products: Subject to compliance with requirements, provide one of the following:
   a. Raven Industries Inc.; DURA-SKRIM 2FR.
   b. Reef Industries, Inc.; Griffolyn T-55 FR.

C. Foil-Polyester-Film Vapor Retarders: Two layers of 0.5-mil- thick polyester film laminated to an inner layer of 1-mil- thick aluminum foil, with maximum water-vapor transmission rate in flat condition of 0.0 g/h x sq. m and with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
   1. Products: Subject to compliance with requirements, provide the following:
      a. Alumiseal Corporation; Zero Perm Vapor Barrier.

D. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.4 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
   1. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
   2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.

B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
   1. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
      a. Ceiling plenums.
      b. Attic spaces.
      c. Where indicated.

C. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 inch between face of insulation and substrate to which anchor is attached.

D. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF BELOW-GRADE INSULATION

A. On vertical footing and foundation wall surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
   1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

B. On horizontal surfaces under slabs, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
   1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

3.4 INSTALLATION OF WALL INSULATION AT AIR BARRIERS

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.

3.5 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
   4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
   5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
   6. For wood-framed construction, install blankets according to ASTM C 1320 and as follows:
      a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
   7. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
      a. Exterior Walls: Set units with facing placed toward interior of construction.
      b. Interior Walls: Set units with facing placed toward areas of high humidity.

C. Loose-Fill Insulation: Apply according to ASTM C 1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
   1. For cellulosic-fiber loose-fill insulation, comply with CIMA's Bulletin #2, "Standard Practice for Installing Cellulose Insulation."

D. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

E. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
   1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
   2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.6 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION

A. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install blanket insulation over entire ceiling area in thicknesses indicated. Extend insulation 48 inches up either side of partitions.

3.7 INSTALLATION OF VAPOR RETARDERS

A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.
   1. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.
   2. Before installing vapor retarders, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
   3. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.

C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.

D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.8 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00

SECTION 07 27 26

FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Fluid-applied membrane air barrier, vapor retarding.

B. Related Sections include the following:
   1. Section 04 20 00 - "Unit Masonry" for embedded flashings.
   2. Section 06 16 00 - "Sheathing" for wall sheathings.
   3. Section 07 21 00 - "Thermal Insulation" for foam-plastic board insulation.
   4. Section 07 62 00 - "Sheet Metal Flashing and Trim" for sheet metal flashings.
   5. Section 07 92 00 - "Joint Sealants" for joint-sealant materials and installation.

1.2 DEFINITIONS

A. ABAA: Air Barrier Association of America.

B. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.3 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-retarding air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air Barrier Assembly Air Leakage: Not to exceed 0.004 cfm x sq. ft. of surface area at 1.57 lbf/sq. ft.; ASTM E 283.

1.4 SUBMITTALS

A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.

B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
   1. Include details of interfaces with other materials that form part of air barrier.

C. Product Certificates: For air barriers, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with the barrier; signed by product manufacturer.

D. Qualification Data: For Applicator.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for air barriers.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Preinstallation Conference: Conduct conference at Project site.
   1. Include installers of other construction connecting to air barrier, including roofing, waterproofing, architectural precast concrete, masonry, sealants, windows, glazed curtain walls, and door frames.
   2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air barrier manufacturer.

B. Remove and replace liquid materials that cannot be applied within their stated shelf life.

C. Store rolls according to manufacturer's written instructions.

D. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 FLUID-APPLIED MEMBRANE AIR BARRIER

A. Fluid-Applied, Vapor-Retarding Membrane Air Barrier: Elastomeric, modified bituminous membrane.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Elastomeric Modified Bituminous Membrane:
         1) Carlisle Coatings & Waterproofing; Barriseal.
         2) Meadows, W. R., Inc.; Air-Shield LM.
         3) Tremco Incorporated; ExoAir.
   2. Physical and Performance Properties: Cured products at minimum 0.040 inch thickness shall meet the following requirements:
      a. Tensile Elongation: Not less than 1,000 per cent, ASTM D-412
      b. Low Temperature Flexibility: Pass at minus-25°F, ASTM D 1970
      c. Peel Adhesion: ASTM D 903 not less than the following:
         1) 2.5 lb/in, due to substrate failure, on exterior grade gypsum sheathing substrate.
         2) 19 lb/in on concrete substrate.
         3) 22.5 lb/in on concrete masonry unit (CMU) substrate.
         4) 25 lb/in on HDPE film concrete substrate.

d. Elastic Recovery: Not less than 98 per cent, ASTM D 3407
e. Vapor Permeability: Not more than 0.02 Perm, ASTM E-96, Method B
f. Air Permeance: Not more than 0.009 L/s per m^2 of area at 75 Pa pressure differential, ASTM E-2178 modified, product spray-applied over medium density concrete masonry unit (CMU) wall.
g. VOC Level: Less than 40g/L

2.2 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid waterborne or solvent-borne primer recommended for substrate by manufacturer of air barrier material.

C. Counterflashing Strip: Modified bituminous, 40-mil- thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil- thick, crosslaminated polyethylene film with release liner backing.

D. Butyl Strip: Vapor-retarding, 30- to 40-mil- thick, self-adhering; polyethylene-film-reinforced top surface laminated to layer of butyl adhesive with release liner backing.

E. Modified Bituminous Strip: Vapor-retarding, 40-mil- thick, smooth-surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick polyethylene film with release liner backing.

F. Joint Reinforcing Strip: Air barrier manufacturer's glass-fiber-mesh tape.

G. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

H. Adhesive and Tape: Air barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.

I. Sprayed Polyurethane Foam Sealant: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

J. Modified Bituminous Transition Strip: Vapor-retarding, 40-mil- thick, smooth-surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick polyethylene film with release liner backing.

K. Elastomeric Flashing Sheet: ASTM D 2000, 2BC415 to 3BC620, minimum 50- to 65-mil- thick, cured sheet neoprene with manufacturer's recommended contact adhesives and lap sealant.

L. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.

2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
4. Verify that masonry joints are flush and completely filled with mortar.
5. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate patching membrane.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 JOINT TREATMENT

A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.
   1. Prime substrate and apply a single thickness of preparation coat strip extending a minimum of 3 inches along each side of joints and cracks. Apply a double thickness of air barrier membrane and embed a joint reinforcing strip in preparation coat.

B. Gypsum Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C 1193 and with air barrier manufacturer's written instructions. Apply first layer of fluid air barrier membrane at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air barrier membrane over joint reinforcing strip.

3.4 TRANSITION STRIP INSTALLATION

A. Install strips, transition strips, and auxiliary materials according to air barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
   1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
   2. Install butyl or modified bituminous strip on roofing membrane or base flashing, selected for compatibility, so that a minimum of 3 inches of coverage is achieved over both substrates.

B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

C. Connect and seal exterior wall air barrier membrane continuously to roofing membrane air barrier, concrete below-grade structures, floor-to floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

E. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply modified bituminous transition strip or elastomeric flashing sheet so that a minimum of 3 inches of coverage is achieved over both substrates. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.
1. Modified Bituminous Transition Strip: Roll firmly to enhance adhesion.
2. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6 inches o.c. Apply lap sealant over exposed edges and on cavity side of flashing sheet.

G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant.

H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

I. Seal top of through-wall flashings to air barrier with an additional 6-inch- wide transition strip.
1. Non-metallic flashings: Modified bituminous strip.
2. Metal through-wall flashings: Counterflashing strip.

J. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

K. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5 AIR BARRIER MEMBRANE INSTALLATION

A. Apply air barrier membrane to form a seal with strips and transition strips and to achieve a continuous air barrier according to air barrier manufacturer's written instructions.
1. Spray-apply membrane unless otherwise indicated.

B. Apply air barrier membrane within manufacturer's recommended application temperature ranges.

C. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours.
1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

D. Apply a continuous unbroken air barrier to substrates to attain the following minimum cured membrane thickness. Apply membrane in full contact around protrusions such as masonry ties.
1. Vapor-Retarding Membrane Air Barrier: 40-mil dry film thickness.

E. Apply strip and transition strip over cured air membrane overlapping 3 inches onto each surface according to air barrier manufacturer's written instructions.

F. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.

B. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
1. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Continuous structural support of air barrier system has been provided.
3. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
4. Site conditions for application temperature and dryness of substrates have been maintained.
5. Maximum exposure time of materials to UV deterioration has not been exceeded.
6. Surfaces have been primed, if applicable.
7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
8. Termination mastic has been applied on cut edges.
9. Strips and transition strips have been firmly adhered to substrate.
10. Compatible materials have been used.
11. Transitions at changes in direction and structural support at gaps have been provided.
12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

C. Remove and replace deficient air barrier components and retest as specified above.

3.7 CLEANING AND PROTECTION

A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed for more than 30 days.
2. Protect air barrier from contact with creosote, uncured coal-tar products, TPO, EPDM, flexible PVC membranes, and sealants not approved by air barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 07 27 26

SECTION 07 31 10

ASPHALT SHINGLES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Asphalt Architectural 30 year shingles.
   2. Synthetic Underlayment
   3. Exhaust vents
   4. Aluminum flashings and exposed valleys.

1.2 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of asphalt shingle, ridge and hip cap shingles ridge vent and exposed valley lining indicated.
   1. Include similar Samples of trim and accessories involving color selection.

C. Qualification Data: For Installer, including certificate signed by asphalt shingle manufacturer stating that Installer is approved, authorized, or licensed to install roofing system indicated.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for asphalt shingles.

E. Research/Evaluation Reports: For asphalt shingles.

F. Maintenance Data: For asphalt shingles to include in maintenance manuals.

G. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual that is approved, authorized, or licensed by asphalt shingle roofing system manufacturer to install roofing system indicated.

B. Source Limitations: Obtain ridge and hip cap shingles ridge vents through one source from a single asphalt shingle manufacturer.

C. Fire-Test-Response Characteristics: Provide asphalt shingle and related roofing materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Exterior Fire-Test Exposure: Class A; ASTM E 108 or UL 790, for application and roof slopes indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double-stack rolls.
   1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.

B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt shingle roofing to be performed according to manufacturer's written instructions and warranty requirements.
   1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period. Materials failures include manufacturing defects and failure of asphalt shingles to self-seal after a reasonable time.
   1. Material Warranty Period: 40 years from date of Final Acceptance, prorated, with first 3 years non-prorated.
   2. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds up to 90 mph for 5 years from date of Final Acceptance.
   3. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor five years from date of Final Acceptance.
   4. The Contractor shall warrant the material and workmanship of the roofing system against leakage and defects due to faulty material, workmanship and contract negligence for a period of two (2) years following Final Acceptance.
   5. Workmanship Warranty Period: 2 years from date of Final Acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2.2 GLASS-FIBER-REINFORCED ARCHITECTURAL ASPHALT SHINGLES

A. Architectural Laminated-Strip Asphalt Shingles: ASTM D 3462, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.
   1. Available Products:
      a. Prestique Cool Color Series by GAF/Elk
      b. CertainTeed Corporation; Landmark and Landmark Plus
      c. Owens Corning; Oakridge PRO
   2. Cutout Shape: Deep shadow line Architectural Shingle.
   3. Strip Size: Manufacturer's standard.

4. Algae Resistance: Granules treated to resist algae discoloration.
5. Solar reflectance value of 0.27
6. Color and Blends: As selected by Architect from manufacturer's full range of colors and blends.

B. Ridge Shingles: Manufacturer's units to match architectural asphalt shingles.

C. Valleys: All valleys to be exposed .032" aluminum. Install aluminum at all valley locations per manufacture recommendations.

2.3 UNDERLAYMENT MATERIALS

A. Synthetic: ASTM D 4869, Type l, Type ll, synthetic felts.

B. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, minimum of 8-mil- thick, slip-resisting. This product will also be used be installed at all shingle locations, 4'-0" min. up from the roof drip edge towards the ridge. Also install a single layer vertically of at all valley locations pior to installation of the synthetic material and metal flashing. Overlap at all seams per manufacturer's recommendations.
1. Available Products:
   a. Grace, W. R. & Co.; Grace Tri-Flex® Xtreme.
   b. Vapor Shield

2.4 EXHAUST LOUVERS FOR ROOF

A. Exhaust Louver Vent: Manufacturer's standard fully enclosed hood to protect again insect infiltration and leaf; slant back design. Galvanized
1. Available Products:
   a. GAF, Master Flow; SS890G
2. Minimum Net Free Area: 60 sq. in. per ft.
3. Width: 12-inches
4. Color. Black
5. See roof plan for locations

2.5 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized steel wire shingle nails, minimum 0.120-inch- diameter, smooth shank, sharp-pointed, with a minimum 3/8-inch- diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.
1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

2.6 METAL FLASHING AND TRIM

A. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item. Flashing to be aluminum .032".
1. Apron Flashings: Fabricate with lower flange a minimum of 4 inches over and 4 inches beyond each side of down slope asphalt shingles and 12 inches up the vertical surface.

2. Step Flashings: Fabricate with a head lap of 4 inches and a minimum extension of 6 inches over the underlying asphalt shingle and 8 inches up the vertical surface.

3. Cricket Flashings: Fabricate with concealed flange extending a minimum of 24 inches beneath upslope asphalt shingles and 6 inches beyond each side of chimney and 8 inches above the roof plane. Coordinate with metal on chimney to ensure two unlike metals are not in direct contact with each other. Provide an adhered rubber strip between the two unlike metals.

4. Valley Flashing Center valley to be "V" Crimp, shingle overlap min 5" open valley portion shall be min. 5". Edge of the valley shall be hook edge and cleated 2' on center. 8" of overlap in the direction of flow.

5. Drip/Rake Edges: Fabricate in lengths not exceeding 10 feet with 2-inch roof deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge. Drip/Rake edge color to be mill finish aluminum.

B. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof and extending at least 4 inches from pipe onto roof.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.
3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. Single-Layer Synthetic Underlayment: Install single layer of synthetic underlayment on roof deck perpendicular to roof slope in parallel courses. Lap sides as recommended by manufacture details inches over underlying course. Lap ends as per the manufacture recommendation and details Stagger end laps as per manufacture details

B. General: Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

C. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

E. Two Piece Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with elastomeric sealant.

1. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant anchor and washer at 36-inch centers.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:

1. Turn flashing down inside vent piping, being careful not to block vent piping with flashing.
2. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

G. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

H. Apron Flashings: Extend lower flange over and beyond each side of downslope asphalt shingles and up the vertical surface.

I. Step Flashings: Install with a headlap of 2 inches and extend over the underlying asphalt shingle and up the vertical surface. Fasten to roof deck only.

J. Cricket Flashings: Install against the roof-penetrating element extending concealed flange beneath upslope asphalt shingles and beyond each side.

K. Rake Drip Edges: Install rake drip edge flashings over underlayment and fasten to roof deck.

L. Vented Eave Drip Edges: Install vented eave drip edge flashings below underlayment and fasten to roof sheathing.

M. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer. Pipe color to be primed and painted, color to be selected by the Architect.

3.3 ASPHALT SHINGLE INSTALLATION

A. Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed with self-sealing strip face up at roof edge.
1. Extend asphalt shingles 1/2 inch over fascia at eaves and rakes.
2. Install starter strip along rake edge.

C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

D. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

E. Fasten asphalt shingle strips with a minimum of four or five roofing nails located according to manufacturer's written instructions.
   1. Where roof slope exceeds 20:12, seal asphalt shingles with asphalt roofing cement spots after fastening with additional roofing nails.
   2. When ambient temperature during installation is below 50 deg F, seal asphalt shingles with asphalt roofing cement spots.

F. Open Valleys: All open valleys to be exposed mill finish aluminum. Cut and fit asphalt shingles at open valleys, trimming upper concealed corners of shingle strips. Maintain uniform width of exposed open valley from highest to lowest point.
   1. Set valley edge of asphalt shingles in a 5-inch- wide bed of asphalt roofing cement.

G. Hip Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.
   1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

END OF SECTION 07 31 10

SECTION 07 41 13

METAL ROOF PANELS (Alternate G-3)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Standing-seam metal roof panels.

B. Related Sections:
1. Section 05 31 00 - "Steel Decking" for steel roof deck supporting metal roof panels.
2. Section 07 62 00 - "Sheet Metal Flashing and Trim" for field-formed and other sheet metal work not part of metal roof panel assemblies.
3. Section 07 92 00 - "Joint Sealants" for field-applied sealants not otherwise specified in this Section.

1.2 DEFINITIONS

A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight roofing system.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Metal roof panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Water Penetration: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:
1. Test-Pressure Difference: 2.86 lbf/sq. ft. for roof slopes less than 30 degrees.
2. Test-Pressure Difference: 20 percent of positive design wind pressure, but not less than 6.24 lbf/sq. ft. and not more than 12.0 lbf/sq. ft. for roof slopes greater than 30 degrees.
3. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
4. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.

C. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
1. Uplift Rating: UL 90.

D. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

E. Thermal Performance: Provide insulated metal roof panel assemblies with thermal-resistance value (R-value) indicated when tested according to ASTM C 518.

F. Energy Performance: Provide roof panels with solar reflectance index not less than **78** when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

G. Energy Performance: Provide roof panels that are listed on the U.S. Department of Energy's ENERGY STAR Roof Products Qualified Product List for low-slope roof products.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of roof panel and accessory.

B. conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.

C. Samples for Initial Selection: For each type of metal roof panel indicated with factory-applied color finishes.
   1. Include similar Samples of trim and accessories involving color selection.

D. Manufacturer Certificates: Signed by manufacturer certifying that roof panels comply with energy performance requirements specified in "Performance Requirements" Article.
   1. Submit evidence of meeting performance requirements.

E. Qualification Data: For qualified.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

G. Maintenance Data: For metal roof panels to include in maintenance manuals.

H. Warranties: Samples of special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain each type of metal roof panels from single source from single manufacturer.

C. Surface-Burning Characteristics: Provide metal roof panels having insulation core material with the following surface-burning characteristics as determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 450 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.

B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

E. Protect foam-plastic insulation as follows:
1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warranty requirements.

B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal roof panels with rain drainage work, flashing, trim, and construction of decks parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
   a. Structural failures including rupturing, cracking, or puncturing.
   b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Period: Two years from date of Final Acceptance.
3. The Contractor shall warrant the material and workmanship of the roofing system against leakage and defects due to faulty material, workmanship and contract negligence for a period of two (2) years following Final Acceptance.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Final Acceptance.

C. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
1. Warranty Period: 20 years from date of Final Acceptance.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
   1. Surface: Smooth, flat finish.
   2. Exposed Coil-Coated Finish:
      a. 3-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      b. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.
   3. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

B. Panel Sealants:
   1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
   2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.

2.2 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: 30 to 40 mils thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
   1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
   2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
   3. Products: Subject to compliance with requirements, provide one of the following:
      a. Carlisle Coatings & Waterproofing Inc., Div. of Carlisle Companies Inc.; CCW WIP 300HT.
      b. Grace Construction Products; a unit of Grace, W. R. & Co.; Ultra.
      c. Henry Company; Blueskin PE200 HT.
      d. Metal-Fab Manufacturing, LLC; MetShield.
      e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

B. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felts.

C. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.3 SUBSTRATE BOARDS

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M.
   1. Type and Thickness: Type X, 5/8 inch.
   2. Product: Subject to compliance with requirements, provide Dens-Dek by Georgia-Pacific Corporation.

B. Substrate-Board Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FMG 4470, designed for fastening substrate board to substrate.

2.4 MISCELLANEOUS METAL FRAMING

A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653, G60 hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.

B. Hat-Shaped, Rigid Furring Channels:
1. Nominal Thickness: 0.040 inch.
2. Depth: 7/8 inch.

C. Cold-Rolled Furring Channels: Minimum 1/2-inch- wide flange.
1. Nominal Thickness: 0.064 inch.
2. Depth: 3/4 inch.
3. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with nominal thickness of 0.040 inch.
4. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

D. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, and depth required to fit insulation thickness indicated.
1. Nominal Thickness: 0.025 inch.

E. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

2.5 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.6 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
2. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1637.

B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ATAS International, Inc.
   b. Copper Sales, Inc.
   c. Englert, Inc.
   d. Fabral.
   e. Merchant & Evans.
   f. Metal Sales Manufacturing Corporation.
   g. Petersen Aluminum Corporation.
   h. Ultra Seam Incorporated.
2. Material: Aluminum sheet, **0.032 inch** thick.
   a. Exterior Finish: **3-coat fluoropolymer**
   b. Color: As selected by Architect from manufacturer's full range.
3. Clips: **Floating to accommodate thermal movement**.
   a. Material: **0.028-inch-**nominal thickness, [**zinc-coated (galvanized)**] steel sheet.
   b. Material: **0.025-inch** thick, stainless-steel sheet.
4. Joint Type: **As standard with manufacturer**.
5. Panel Coverage: **24 inches**.
6. Panel Height: [**.5 inches**

2.7 ACCESSORIES

A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
   1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
   2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
   3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

B. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum 0.018 inch thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

2.8 SNOW GUARDS

A. Snow Guards: Prefabricated, noncorrosive units designed to be installed without penetrating metal roof panels, and complete with predrilled holes, clamps, or hooks for anchoring.
   1. Surface-Mounted, Plastic, Stop-Type Snow Guards: **Integral color** polycarbonate stops designed for attachment to pan surface of metal roof panels using construction adhesive, silicone or polyurethane sealant, or adhesive tape.
      a. Products: Subject to compliance with requirements, provide product manufactured by one of the following:
         1) Berger Bros. Co.
         2) Chemlink.
         3) Polar Blox.

4) SNOBLOX
5) Sno-Gem, Inc.
6) Snojax Inc.

2.9 FABRICATION

A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. End Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. End Seams for Other Than Aluminum: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

2.10 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the Work.

B. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.

C. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

D. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

B. Substrate Board: Install substrate boards over roof **sheathing** on entire roof surface. Attach with substrate-board fasteners.
1. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
2. Comply with UL requirements for fire-rated construction.

C. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.
1. Soffit Framing: Wire tie furring channels to supports.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated **below** wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches Roll laps with roller. Cover underlayment within 14 days.
1. Roof perimeter for a distance up from eaves of **24 inches** beyond interior wall line.
2. Valleys, from lowest point to highest point, for a distance on each side of 18 inches. Overlap ends of sheets not less than 6 inches.
3. Rake edges for a distance of 18 inches.
4. Hips and ridges for a distance on each side of 12 inches.
5. Roof to wall intersections for a distance from wall of 18 inches.
6. Around dormers, chimneys, skylights, and other penetrating elements for a distance from element of 18 inches.

B. Apply slip sheet over underlayment before installing metal roof panels.

C. Install flashings to cover underlayment to comply with requirements specified in Division 07 Section "Sheet Metal Flashing and Trim."

3.4 METAL ROOF PANEL INSTALLATION, GENERAL

A. Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.

B. Thermal Movement. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Predrill panels for fasteners.
1. Point of Fixity: Fasten each panel along a single line of fixing located at [**eave**] [**ridge**] [**center of panel length**] [**locations indicated on Drawings**].

2. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.

C. Install metal roof panels as follows:
1. Field cutting of metal panels by torch is not permitted.
2. Install panels perpendicular to purlins.
3. Locate and space fastenings in uniform vertical and horizontal alignment.
4. Provide metal closures at **rake edges** each side of ridge caps.
5. Flash and seal metal roof panels with weather closures at eaves, rakes
6. End Splices: Locate panel end splices over, but not attached to, structural supports. Stagger panel end splices to avoid a four-panel splice condition.
7. Install metal flashing to allow moisture to run over and off metal roof panels.

D. Fasteners:
1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized-steel fasteners for surfaces exposed to the interior.
2. Aluminum Roof Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

E. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

F. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
1. Coat back side of roof panels with bituminous coating where roof panels will contact wood, ferrous metal, or cementitious construction.

G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.
1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

3.5 METAL ROOF PANEL INSTALLATION

A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

3.6 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
   1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
   2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.7 SNOW GUARD INSTALLATION

A. Stop-Type Snow Guards: Attach snow guards to metal roof panels with adhesive, sealant, or adhesive tape, as recommended by manufacturer. Do not use fasteners that will penetrate metal roof panels.
   1. Provide rows of snow guards, at locations indicated on Drawings, spaced 24” apart, beginning 12” up from gutter, with each snow guard centered between panel ribs.

3.8 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.

C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 41 13

SECTION 07 42 93

SOFFIT PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes metal soffit panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:
   1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
   2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
   1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
   1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, tests performed by a qualified testing agency.

C. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leak proof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including rupturing, cracking, or puncturing.
      b. Deterioration of metals and other materials beyond normal weathering.
   2. Warranty Period: Two years from date of Final Acceptance.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer **agrees** to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Final Acceptance.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
   1. Wind Loads: As indicated on Drawings.
   2. Other Design Loads: As indicated on Drawings
   3. Deflection Limits: For wind loads, no greater than 1/240 of the span.

B. Air Infiltration: Air leakage of not more than [0.06 cfm/sq. ft. (0.3 L/s per sq. m)] when tested according to ASTM E 283 at the following test-pressure difference:
   1. Test-Pressure Difference: 1.57 lbf/sq. ft. (75 Pa)] [6.24 lbf/sq. ft. (300 Pa).

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
   1. Test-Pressure Difference: 2.86 lbf/sq. ft. (137 Pa)

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): [120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces

2.2 METAL SOFFIT PANELS

A. General: Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Metal Soffit Panels:

   1. Finish: As indicated on Drawings'
   2. Sealant: Factory applied within interlocking joint.

C. Flush-Profile Metal Soffit Panels Perforated panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels.
   1. Atlas International
   2. Centiva Architectural Systems
   3. Firestone building Products.
   4. Aluminum Sheet: Coil-coated sheet, ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
      a. Thickness: 0.040 inch (1.02 mm)
      b. Surface: Smooth, flat
      c. Exterior Finish: [Three-coat fluoropolymer]
      d. Color: Match gutter color.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation

unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
   1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
   1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
   2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
   3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.4 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
   1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
   2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
   a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
   1. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

C. Aluminum Panels and Accessories:
   1. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   2. Mica Fluoropolymer: AAMA 2605. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   3. Metallic Fluoropolymer: AAMA 2605. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   4. FEVE Fluoropolymer: AAMA 2605. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   5. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.
2. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.
   a. Verify that air- or water-resistive barriers been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.
   1. Soffit Framing: as required to comply with requirements for assemblies indicated.

3.3 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Shim or otherwise plumb substrates receiving metal panels.
   2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
   3. Install screw fasteners in predrilled holes.
   4. Locate and space fastenings in uniform vertical and horizontal alignment.
   5. Install flashing and trim as metal panel work proceeds.
   6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
   7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:
   1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
   2. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
   3. Copper Panels: Use copper, stainless-steel, or hardware-bronze fasteners.
   4. Stainless-Steel Panels: Use stainless-steel fasteners.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
   1. Apply panels and associated items true to line for neat and weathertight enclosure.
   2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.

3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

E. Watertight Installation:
1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.4 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 42 93

SECTION 07 46 00

SIDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Fiber-cement siding.
2. Fiber-cement fascia.

B. Related Sections:
1. Section 06 10 00 - "Rough Carpentry" for wood furring, grounds, nailers, and blocking.
2. Section 06 16 00 - "Sheathing" for wall sheathing and weather-resistive barriers.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each type, color, texture, and pattern required.
1. 12-inch- long-by-actual-width Sample of siding.
2. 24-inch- wide-by-36-inch- high Sample panel of siding assembled on plywood backing.
3. 12-inch- long-by-actual-width Sample of soffits.
4. 12-inch- long-by-actual-width Samples of trim and accessories.

C. Maintenance Data: For each type of siding and soffits and related accessories to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.

B. Source Limitations: Obtain each type, color, texture, and pattern of including related accessories, from single source from single manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials in a dry, well-ventilated, weathertight place.

1.5 COORDINATION

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.6 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Furnish full lengths of siding and fascia including related accessories, in a quantity equal to 2 percent of amount installed.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING

A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. CertainTeed Corp.
      b. GAF Materials Corporation.
      c. James Hardie.
   2. Horizontal Pattern: Boards 5-1/4 inches wide in plain style.
      a. Texture: Wood grain.
   3. Vertical Pattern: 48-inch- wide sheets with wood-grain texture and grooves [8 inches] [12 inches] o.c.
   4. Shingle Pattern: 48-inch- wide, staggered-edge notched sheets with wood-grain texture.
   5. Factory Priming: Manufacturer's standard color plus technology to comply with regional area of the project site.

2.2 ACCESSORIES

A. Fasteners:
   1. For fastening to wood, use siding nails of sufficient length to penetrate a minimum of 1 inch into substrate.
   2. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch, or three screw-threads, into substrate.
   3. For fastening fiber cement, use hot-dip galvanized fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and fascia and related accessories.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

A. General: Comply with siding and fascia manufacturer’s written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
   1. Do not install damaged components.
   2. Center nails in elongated nailing slots without binding siding to allow for thermal movement.

B. Install fiber-cement siding and fascia and related accessories.
   1. Install fasteners no more than 24 inches o.c.

3.4 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 07 46 00

SECTION 07 53 23

ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Adhered EPDM membrane roofing system.
   2. Vapor retarder.
   3. Roof insulation.

B. Section includes the installation of acoustical roof deck rib insulation strips furnished under Division 05 Section "Steel Decking."

C. Related Sections:
   1. Section 05 31 00 - "Steel Decking" for furnishing acoustical deck rib insulation.
   2. Section 07 62 00 - "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counterflashings.
   3. Section 07 92 00 - "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.2 DEFINITIONS

A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.

C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
   1. Corner Uplift Pressure: See the chart on sheet S802
   2. Perimeter Uplift Pressure: See the chart on sheet S802
   3. Field-of-Roof Uplift Pressure: See the chart on sheet S802

D. FM Approvals Listing: Provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals' markings.
   1. Fire/Windstorm Classification: Class 1A-90
   2. Hail Resistance: SH.

E. Energy Performance: Provide roofing system with initial Solar Reflectance Index not less than 29 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

F. Energy Performance: Provide roofing system that is listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low slope roof products.

G. Energy Performance: Provide roofing system with initial solar reflectance not less than [0.70] and emissivity not less than [0.75] when tested according to CRRC-1.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
   1. Base flashings and membrane terminations.
   2. Tapered insulation, including slopes.
   3. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

C. Qualification Data: For qualified Installer and manufacturer.

D. Manufacturer Certificate: Signed by roofing manufacturer certifying that membrane roofing system complies with requirements specified in "Performance Requirements" Article.
   1. Submit evidence of complying with performance requirements.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.

F. Field quality-control reports.

G. Maintenance Data: For membrane roofing system to include in maintenance manuals.

H. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

B. Source Limitations: Obtain components including roof insulation fasteners for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.

C. Exterior Fire-Test Exposure: ASTM E 108, Class B; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

D. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

E. Preinstallation Roofing Conference: Conduct conference at Project site.
   1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
   2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, roof pavers, and other components of membrane roofing system.
2. Warranty Period: 20 years from date of Final Acceptance
3. The Contractor shall warrant the material and workmanship of the roofing system against leakage and defects due to faulty material, workmanship and contract negligence for a period of two (2) years following Final Acceptance.

PART 2 - PRODUCTS

2.1 EPDM MEMBRANE ROOFING

A. EPDM: ASTM D 4637, Type I, non-reinforced, uniform, flexible EPDM sheet.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Carlisle SynTec Incorporated.
   b. Firestone Building Products.
   c. GAF Materials Corporation.
   d. Tremco, Inc.
2. Thickness: 60 mils, nominal.
3. Exposed Face Color: Black

2.2 AUXILIARY MEMBRANE ROOFING MATERIALS

A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
   1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
   2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
      a. Plastic Foam Adhesives: 50 g/L.
      b. Gypsum Board and Panel Adhesives: 50 g/L.
      c. Multipurpose Construction Adhesives: 70 g/L.
      d. Fiberglass Adhesives: 80 g/L.
      e. Contact Adhesive: 80 g/L.
      f. Single-Ply Roof Membrane Sealants: 450 g/L.
      g. Nonmembrane Roof Sealants: 300 g/L.
      h. Sealant Primers for Nonporous Substrates: 250 g/L.
      i. Sealant Primers for Porous Substrates: 775 g/L.
      j. Other Adhesives and Sealants: 250 g/L.

B. Sheet Flashing: 60-mil- thick EPDM, partially cured or cured, according to application.

C. Bonding Adhesive: Manufacturer's standard.

D. Seaming Material: Single-component, butyl splicing adhesive and splice cleaner.

E. Lap Sealant: Manufacturer's standard, single-component sealant, colored to match membrane roofing.

F. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.

G. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

H. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to roofing system manufacturer.

I. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

2.3 SUBSTRATE BOARDS

A. Substrate Board: ASTM C 1177, glass-mat, water-resistant gypsum substrate, Type X, 5/8 inch thick.
   1. Products: Subject to compliance with requirements, provide the following:

a. Georgia-Pacific Corporation; Dens Deck.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate panel to roof deck.

2.4 VAPOR RETARDER

A. Glass-Fiber Felt: ASTM D 2178, Type IV, asphalt impregnated.

2.5 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by EPDM membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
1. Use Type II, Class I, Grade 3 where indicated for higher compressive strength.

C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches unless otherwise indicated.
1. Provide minimum slope of 1/8 inch per 12 inches at reroofed areas.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.6 INSULATION ACCESSORIES

A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation[and cover boards] to substrate, and acceptable to roofing system manufacturer.

C. Bonding Adhesive: Manufacturer's standard.

D. Cover Board: ASTM C 1177, glass-mat, water-resistant gypsum substrate,.
1. Products: Subject to compliance with requirements, provide the following:
a. Georgia-Pacific Corporation; Dens Deck.

2.7 ASPHALT MATERIALS

A. Roofing Asphalt: ASTM D 312, Type III or Type IV.

B. Asphalt Primer: ASTM D 41.

2.8 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick, and acceptable to membrane roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
   1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
   2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
   3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Decking."
   4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
   5. Verify that gypsum and concrete substrates are visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
   6. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

D. Install acoustical roof deck rib insulation strips, specified in Division 05 Section "Steel Decking," according to acoustical roof deck manufacturer's written instructions, immediately before installation of overlying construction and to remain dry.

3.3 SUBSTRATE BOARD

A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
   1. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.
      a. Omit substrate board at gypsum decks and concrete decks.

3.4 VAPOR-RETARDER INSTALLATION

A. Provide vapor retarder at wood decks, concrete decks and gypsum decks.

B. Built-Up Vapor Retarder: Install two glass-fiber felt plies lapping each felt 19 inches over preceding felt. Embed each felt in a solid mopping of hot roofing asphalt. Glaze-coat completed surface with hot roofing asphalt. Apply hot roofing asphalt within plus or minus 25 deg F of equiviscous temperature.
   1. Omit vapor retarder at steel deck.

C. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.

3.5 INSULATION INSTALLATION

A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Minimum Average Thickness: As required to obtain an average thermal resistance of R-20.
   1. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
   1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

G. Mechanically Fastened and Adhered Insulation: Install first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
   1. Fasten first layer of insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
   2. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
   3. Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.

H. Adhere cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together.
   1. Install cover boards according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
   2. Install cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.6 ADHERED MEMBRANE ROOFING INSTALLATION

A. Adhere membrane roofing over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.

B. Start installation of membrane roofing in presence of membrane roofing system manufacturer's technical personnel.

C. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.

E. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeters.

F. Apply membrane roofing with side laps shingled with slope of roof deck where possible.

G. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping membrane roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of membrane roofing terminations.
   1. Apply a continuous bead of in-seam sealant before closing splice if required by membrane roofing system manufacturer.

H. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

I. Spread sealant or mastic bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.

3.7 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.8 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.9 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

B. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

END OF SECTION 07 53 23

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Manufactured Products:
      a. Manufactured reglets.
   2. Formed Products:
      a. Formed roof drainage sheet metal fabrications.
      b. Formed steep-slope roof sheet metal fabrications.
      c. Formed wall sheet metal fabrications.

B. Related Sections:
   1. Section 04 20 00 - “Unit Masonry” for manufactured through-wall flashing.
   2. Section 06 10 00 - "Rough Carpentry" for wood nailers, curbs, and blocking.
   3. Section 07 41 13 - "Metal Roofing" for sheet metal flashing and trim integral with metal roof panels.

1.2 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. SPRI Wind Design Standard: Manufacture and install roof-edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressures:
   1. Design Pressure: As indicated on Drawings.

C. Metal Edge Securement: Install in accordance with ANSI/SPRI ES-1, “American National Standard for Edge Systems Used with Low-Slope Roofing Systems.”

D. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
   1. Identification of material, thickness, weight, and finish for each item and location in Project.
   2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.

3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
4. Details of termination points and assemblies, including fixed points.
5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
7. Details of special conditions.
8. Details of connections to adjoining work.

C. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.

D. Qualification Data: For qualified fabricator.

E. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

F. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.6 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Final Substantial.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
   1. As-Milled Finish: Mill finish.
   2. Surface: Smooth, flat Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
   3. Exposed Coil-Coated Finishes:
      a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   4. Color: As selected by Architect from manufacturer's full range.

   5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

C. Stainless-Steel Sheet: ASTM A 240 or ASTM A 666, Type 304, dead soft, fully annealed.
   1. Finish: 2D (dull, cold rolled).
   2. Surface: Smooth, flat

D. Zinc-Tin Alloy-Coated Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper, of minimum uncoated weight (thickness) indicated; coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).
   1. Products: Subject to compliance with requirements, provide the following:
      a. Revere Copper Products, Inc.; FreedomGray.

E. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755.
   1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, G90 coating designation; structural quality.
   2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792, Class AZ50 coating designation, Grade 40; structural quality.
   3. Surface: Smooth, flat and with manufacturer's standard clear acrylic coating on both sides.

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
   1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
      a. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
      b. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
   2. Fasteners for Zinc-Tin Alloy-Coated Copper Sheet: Copper, hardware bronze or Series 300 stainless steel.
   3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

C. Solder:
1. For Stainless Steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
2. For Zinc-Tin Alloy-Coated Copper: ASTM B 32, 100 percent tin.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.3 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Cheney Flashing Company.
b. Fry Reglet Corporation.
c. Heckmann Building Products Inc.
d. Hickman, W. P. Company.
e. Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
f. Keystone Flashing Company, Inc.
2. Material: Aluminum, 0.024 inch thick.
3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
4. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
5. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
6. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
7. Accessories:
a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
8. Finish: Mill.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
   1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
   2. Obtain field measurements for accurate fit before shop fabrication.
   3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
   4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.

F. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.

H. Do not use graphite pencils to mark metal surfaces.

2.5 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.
   1. Gutter Style: SMACNA designation K.
   2. Expansion Joints: Butt type.
   3. Accessories: Continuous removable leaf screen with sheet metal frame and hardware cloth screen and Wire ball downspout strainer and Valley baffles
   4. Gutters with Girth up to 15 Inches: Fabricate from the following materials:
      a. Aluminum: 0.032 inch thick.
      b. Stainless Steel: 0.016 inch thick.
      c. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft..

B. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
   1. Fabricated Hanger Style: SMACNA figure designation 1-35A
   2. Manufactured Hanger Style: SMACNA figure designation 1-34A

3. Fabricate from the following materials:
   a. Aluminum: 0.024 inch thick.
   b. Stainless Steel: 0.016 inch thick.
   c. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft..

2.6 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
   1. Stainless Steel: 0.016 inch thick.
   2. Zinc-Tin Alloy-Coated Copper: 16 oz. /sq. ft.

B. Valley Flashing: Fabricate from the following materials:
   1. Stainless Steel: 0.019 inch thick.
   2. Zinc-Tin Alloy-Coated Copper: 16 oz. /sq. ft.

C. Drip Edges: Fabricate from the following materials:
   1. Aluminum: 0.032 inch thick.
   2. Stainless Steel: 0.016 inch thick.
   3. Zinc-Tin Alloy-Coated Copper: 16 oz. /sq. ft.

D. Eave, Rake[, Ridge, and Hip] Flashing: Fabricate from the following materials:
   1. Aluminum: 0.032 inch thick.
   2. Stainless Steel: 0.016 inch thick.
   3. Zinc-Tin Alloy-Coated Copper: 16 oz. /sq. ft.

E. Counterflashing: Fabricate from the following materials:
   1. Aluminum: 0.032 inch thick.
   2. Stainless Steel: 0.019 inch thick.
   3. Zinc-Tin Alloy-Coated Copper: 16 oz. /sq. ft.

F. Flashing Receivers: Fabricate from the following materials:
   1. Aluminum: 0.032 inch thick.
   2. Stainless Steel: 0.016 inch thick.
   3. Zinc-Tin Alloy-Coated Copper: 16 oz. /sq. ft.

G. Roof-Penetration Flashing: Fabricate from the following materials:
   1. Stainless Steel: 0.019 inch thick.
   2. Zinc-Tin Alloy-Coated Copper: 16 oz. /sq. ft.

2.7 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long sections under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings. Form with 2-inch- high, end dams where flashing is discontinuous. Fabricate from the following materials:
   1. Stainless Steel: 0.016 inch thick.
   2. Zinc-Tin Alloy-Coated Copper: 16 oz. /sq. ft.

B. Opening Flashings in Wood or Cold-Formed Frame Construction: Fabricate head, sill,[jamb,] and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:
   1. Aluminum: 0.032 inch thick.
   2. Stainless Steel: 0.016 inch thick.
   3. Zinc-Tin Alloy-Coated Copper: 16 oz. /sq. ft.

2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:
   1. Stainless Steel: 0.019 inch thick.
   2. Zinc-Tin Alloy-Coated Copper: 16 oz. /sq. ft.

B. Overhead-Piping Safety Pans: Fabricate from the following materials:
   1. Galvanized Steel: 0.040 inch thick.
   2. Aluminum-Zinc Alloy-Coated Steel: 0.040 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
   1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
   2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
   3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
   4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
   5. Install sealant tape where indicated.
   6. Torch cutting of sheet metal flashing and trim is not permitted.
   7. Do not use graphite pencils to mark aluminum surfaces.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
   1. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
   2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection.

D. Fastener Sizes: Use fasteners of sizes as follows:

1. Penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws
2. Penetrate metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints as shown and as required for watertight construction.
1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder metallic-coated steel and aluminum sheet.
2. Pre-tinning is not required for zinc-tin alloy-coated copper.
3. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
4. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

G. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Hanging Gutters: Join sections with riveted and soldered joints or with butt joints and concealed backplates sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter brackets spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
1. Fasten gutter spacers to front and back of gutter.
2. Loosely lock straps to front gutter bead and anchor to roof deck.
3. Anchor and loosely lock back edge of gutter to continuous cleat
4. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
5. Anchor gutter with spikes and ferrules spaced not more than 24 inches apart.
6. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart.
7. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.

C. Downspouts: Join sections with 1-1/2-inch telescoping joints.
1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.
2. Connect downspouts to underground drainage system indicated.

a. Provide elbows at base of downspout to direct water away from building where underground drainage system is not indicated.

D. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in asphalt roofing cement or elastomeric sealant compatible with roofing membrane.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated.
1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 16-inch centers.
2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 20-inch centers.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 04 Section Unit Masonry and Stone Masonry

C. Reglets: Installation of reglets is specified in [Division 03 Section "Cast-in-Place Concrete] [Division 04 Section "Unit Masonry]."

D. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.6 MISCELLANEOUS FLASHING INSTALLATION

A. Overhead-Piping Safety Pans: Suspend pans independent from structure above as indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

B. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.7 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.8 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 62 00

SECTION 07 84 46

FIRESTOPPING

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. Fireproof firestopping, firesafing materials, and accessories.

1.2 REFERENCES

A. Some products and executions are specified in this Section by reference to published specifications or standards of the following (with respective abbreviations used):
   1. The American Society for Testing and Materials (ASTM)
      a. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
      b. ASTM E119 - Method for Fire Tests of Building Construction and Materials.
      c. ASTM E814 - Test Method of Fire Tests of Through- Penetration Firestops.
   2. Underwriters Laboratories, Inc. (UL):
      a. Published Fire-Rated Assemblies - Underwriter Laboratories (UL) runs ASTM E-814 under their designation of UL 1479, and publishes the results in their "Fire Resistance Directory" updated annually.
      b. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

1.3 PERFORMANCE REQUIREMENTS

A. Fireproofing Materials: ASTM E814 or UL 1479 to achieve a fire- rating noted in Schedule at end of this Section.

B. Surface Burning: ASTM E84.

C. For untested conditions, provide specific Engineering Options from Firestop Manufacturer, including how options were developed and the authority of person making them.

1.4 SUBMITTALS

A. Product Data:
   1. Provide data on product characteristics, performance and limitation criteria including documentation of fire-testing by independent fire-testing laboratory.
   2. Submit product data certifying that firestopping products are free of asbestos (ACM).
   3. For each product, provide UL Listing Card to confirm rating for product.

B. Manufacturer's Certificate: Certify that products meet or exceed requirements of the Contract Documents.

C. Close Out Submittals:
   1. Submit affidavit of installation signed by the Installer and the General Contractor indicating that firestopping was installed through all rated enclosures in accordance with the requirements of the Contract Documents.
   2. Provide copies of inspection reports from governing or local authorities.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.

B Applicator: Company specializing in performing the work of this Section with minimum three years documented experience, and approved by Manufacturer of fire-stopping system.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire-resistance ratings and surface-burning characteristics.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of combustibility.

1.7 ENVIRONMENTAL REQUIREMENTS

A Do not apply materials when temperature of substrate-material and ambient-air is below 60° F.

B. Maintain this minimum temperature before, during, and for 3 days after installation of materials.

C. Provide ventilation in areas to receive solvent-cured materials.

1.8 SEQUENCING

A. Sequence Work to permit firestopping materials to be installed after adjacent and surrounding work is complete.

1.9 SUPPLEMENTAL TESTING

A. If required for a particular design or performance requirement, provide non-fire rated testing including compatibility, chemical and pressure-seal resistance, ampacity derating, and material toxicity.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Standard: For purposes of designating type and quality for the Work under this Section, Drawings and Specifications are based on products manufactured or furnished by Hilti Construction Chemicals, Inc.

B. Acceptable: Products of the following manufacturers equivalent to or better than, and complying with the performance standards, design, dimensions, function, and relation to adjacent work of the Standard Manufacturer will be acceptable for use on this Project.
   1. Dow Corning Corporation
   2. 3M Fire Protection Products

2.2 MATERIALS:

A. Penetration Sealants/Putty: Non-combustible for penetrating items (conduit, steel pipe, EMT, copper shall be Hilti CS 240 Firestop Sealant.

B. Intumescent firestop materials for use at openings and sleeves involving combustible penetrating items (plastic pipe, insulated pipe, or P.V.C. coated, flexible cable) shall be Hilti CS 2420 Intumescent Wrap.

C. UL Classification: Provide material classified by UL to provide firestopping equal to time -rating of construction being penetrated.

D. Firestopping materials shall be:
   1. Asbestos-free
   2. Emit no toxic or combustible fumes
   3. Cable of maintaining an effective barrier against flame, smoke, water, and toxic gasses in compliance with referenced standards in Paragraph 1.2 (References) of this Section.

E. Firestopping materials/systems shall be flexible to allow for normal movement of building structure and penetrating item(s) without affecting the adhesion or integrity of the system.

F. Primer: Type recommended by Firestopping Manufacturer for specific substrate surfaces.

2.3 ACCESSORIES

A. Dam Material: As required by the Firestopping Manufacturer.

B. Retainers: Clips to support the dam material as recommended by the Firestopping Manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify Site conditions.

B. Verify that openings are ready to receive the Work of this Section.

3.2 PREPARATION

A. Clean substrate surfaces to make free of dirt, dust, grease, oil, loose material, or other matter which would affect bond of firestopping material.

B. Remove incompatible materials which affect bond.

C. Install backing materials to arrest liquid material leakage.

3.3 APPLICATION

A. Apply primer and materials in accordance with Manufacturer's printed instructions, and in accordance with published "Through Penetration Firestop System" in UL's Fire Resistance Directory.

B. Apply firestopping material in sufficient thickness to achieve rating, and to provide uniform density and texture.

C. Install material at floors, walls, or partition openings which contain penetrating sleeves, piping, ductwork, conduit, and other items requiring firestopping.

D. Remove dam-material after firestopping material has cured.

3.4 CLEANING

A. Clean adjacent surfaces to be free of firestopping materials.

3.5 FIELD QUALITY CONTROL

A. Examine sealed penetrations to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Perform of the work of this Section patching and repairing of firestopping caused by cutting or penetrating by other trades.

3.6 PROTECTION OF FINISHED WORK

A. Protect adjacent surfaces from damage by material installation.

3.7 SCHEDULES

	Penetrating Item	Type of Wall/Floor	Rating (Hrs)	Hilti Drawings	UL System
B.	Steel Pipe(up to 1’- 0” diam.)	Concrete or Concrete Block	3	102	399
D.	Joints (up to 6“ wide)	Concrete of Concrete Block	2, 3, 4	104	214
E.	Cables (Power,	Concrete of	2,3	110	222, 224

Control) Concrete Block

END OF SECTION 07 84 46

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Silicone joint sealants.
2. Latex joint sealants.
3. Acoustical joint sealants.

B. Related Sections:
1. Section 07 84 46 - "Firestopping" for sealing joints in fire-resistance-rated construction.
2. Section 08 80 00 - "Glazing" for glazing sealants.
3. Section 09 29 00 - "Gypsum Board" for sealing penetrations in gypsum board and sealing of perimeter joints.
4. Section 09 51 23 - "Acoustical Panel Ceilings" for sealing edge moldings at perimeters with acoustical sealant.

1.2 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Joint-Sealant Schedule: Include the following information:
1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

1.4 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
   1. Architectural Sealants: 250 g/L.
   2. Sealant Primers for Nonporous Substrates: 250 g/L.
   3. Sealant Primers for Porous Substrates: 775 g/L.

C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Dow Corning Corporation; 790.
      b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
      c. Sika Corporation, Construction Products Division; SikaSil-C990.
      d. Tremco Incorporated; Spectrem 1.

B. Single-Component, Nonsag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use T.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Dow Corning Corporation; 790.
      b. May National Associates, Inc.; Bondaflex Sil 728 NS.
      c. Tremco Incorporated; Spectrem 800.

C. Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. BASF Building Systems; Omniplus.
      b. Dow Corning Corporation; 786 Mildew Resistant.
      c. GE Advanced Materials - Silicones; Sanitary SCS1700.
      d. Tremco Incorporated; Tremsil 200 Sanitary.

2.3 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. BASF Building Systems; Sonolac.
      b. Bostik, Inc.; Chem-Calk 600.
      c. Tremco Incorporated; Tremflex 834.

2.4 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Pecora Corporation; AC-20 FTR or AIS-919.
      b. USG Corporation; SHEETROCK Acoustical Sealant.

2.5 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type O (open-cell material), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
      a. Concrete.
      b. Masonry.
      c. Unglazed surfaces of ceramic tile.
   3. Remove laitance and form-release agents from concrete.
   4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
      a. Metal.
      b. Glass.
      c. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of sealant backings.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
   1. Remove excess sealant from surfaces adjacent to joints.
   2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
   1. Joint Locations:
      a. Isolation and contraction joints in cast-in-place concrete slabs.
      b. Other joints as indicated.
   2. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
   1. Joint Locations:
      a. Construction joints in cast-in-place concrete.
      b. Control and expansion joints in unit masonry.
      c. Joints between different materials listed above.
      d. Perimeter joints between materials listed above and frames of doors, windows and louvers.
      e. Control and expansion joints in overhead surfaces.
      f. Other joints as indicated.
   2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 100/50**.**
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
   1. Joint Locations:
      a. Isolation joints in cast-in-place concrete slabs.
      b. Control and expansion joints in tile flooring.
      c. Other joints as indicated.
   2. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
   1. Joint Locations:
      a. Control and expansion joints on exposed interior surfaces of exterior walls.
      b. Perimeter joints of exterior openings.
      c. Tile control and expansion joints.
      d. Perimeter joints between interior wall surfaces and frames of interior doors.
      e. Other joints as indicated.
   2. Joint Sealant: Latex.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
   1. Joint Sealant Location:
      a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
      b. Tile control and expansion joints where indicated.
      c. Other joints as indicated.
   2. Silicone Joint Sealant: Single component, nonsag, mildew resistant, acid curing.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 07 92 00

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hollow-metal work.

B. Related Requirements:
   1. Section 08 71 00 - "Door Hardware" for door hardware for hollow-metal doors.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, core descriptions, temperature-rise ratings, and finishes.

B. Shop Drawings: Include the following:
   1. Elevations of each door type.
   2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
   3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
   4. Locations of reinforcement and preparations for hardware.
   5. Details of each different wall opening condition.
   6. Details of anchorages, joints, field splices, and connections.
   7. Details of moldings, removable stops, and glazing.
   8. Details of conduit and preparations for power, signal, and control systems.

C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

B. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Ceco Door Products; an Assa Abloy Group company.
   2. Curries Company; an Assa Abloy Group company.
   3. de La Fontaine Industries.
   4. Steelcraft; an Ingersoll-Rand company.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
   1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 INTERIOR DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2..
   1. Physical Performance: Level B according to SDI A250.4.
   2. Doors:
      a. Type: As indicated in the Door and Frame Schedule.
      b. Thickness: 1-3/4 inches.
      c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch.
      d. Edge Construction: Model 2, Seamless.
      e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.
      f. Core: Kraft-paper honeycomb.

3. Frames:
   a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
   b. Construction: Full profile welded.
4. Exposed Finish: Prime.

2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2..
1. Physical Performance: Level B according to SDI A250.4.
2. Doors:
   a. Type: As indicated in the Door and Frame Schedule.
   b. Thickness: 1-3/4 inches
   c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum A40 coating.
   d. Edge Construction: Model 2, Seamless.
   e. Core: Polystyrene, Polyurethane or Polyisocyanurate.
      1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
3. Frames:
   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
   b. Construction: Full profile welded.
4. Exposed Finish: Prime.

2.5 FRAME ANCHORS

A. Jamb Anchors:
1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.6 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
   1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

H. Glazing: Comply with requirements in Section 088000 "Glazing."

I. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.7 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:
   1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
   2. Fire Door Cores: As required to provide fire-protection ratings indicated.
   3. Vertical Edges for Single-Acting Doors: Provide beveled or square edges at manufacturer's discretion.
   4. Top Edge Closures: Close top edges of doors with inverted closures, except provide flush closures at exterior doors of same material as face sheets.
   5. Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.
   6. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
   7. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
   8. Fire Door Labeling: All fire rated doors shall receive an applied label. Embossing of door edge to indicate fire rating of door is not acceptable.
      a. At all doors to receive continuous hinges the fire label of the frame shall be affixed to the top of the door as not to be obscured by the continuous hinge.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
5. Jamb Anchors: Provide number and spacing of anchors as follows:
    a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
    b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
        1) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.
        4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
    c. Compression Type: Not less than two anchors in each frame.
    d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
6. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
8. Fire Door Frame Labeling: All fire rated frames shall receive an applied label. Embossing of frames to indicate fire rating of frames is not acceptable
    a. At all doors to receive continuous hinges the fire label of the frame shall be affixed to the head of the frame as not to be obscured by the continuous hinge.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
3. Provide loose stops and moldings on inside of hollow-metal work.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.8 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.9 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
a. At fire-rated openings, install frames according to NFPA 80.

b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install frames with removable stops located on secure side of opening.
d. Install door silencers in frames before grouting.
e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
   a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Steel Doors:
   a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
   b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
   c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
   d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.
2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 11 13

SECTION 08 14 33

STILE AND RAIL WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Interior stile and rail wood doors.

B. Related Sections:
   1. Division 06 Section "Interior Architectural Woodwork" for non-fire-rated wood door frames.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.
   1. Include details of construction and glazing.
   2. Include factory finishing specifications.

B. Shop Drawings: For stile and rail wood doors. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data, including those for stiles, rails, panels, and moldings (sticking); and other pertinent data, including the following:
   1. Dimensions of doors for factory fitting.
   2. Locations and dimensions of mortises and holes for hardware.
   3. Requirements for veneer matching.
   4. Doors to be factory finished, and finish requirements.
   5. Fire ratings for fire-rated doors.

C. Samples for Initial Selection: For factory-finished doors.

D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain stile and rail wood doors from single manufacturer.

B. Safety Glass: Provide products complying with testing requirements in 16 CFR 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's written instructions and requirements of quality standard referenced in Part 2.

B. Package doors individually in opaque plastic bags or cardboard cartons.

C. Mark each door on underside of bottom edge with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship, or have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
   1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
   2. Warranty shall be in effect during the following period of time from date of Final Acceptance:
      a. Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Use only materials that comply with referenced standards and other requirements specified.
   1. Assemble interior doors, frames, and sidelites, including components, with either dry-use or wet-use adhesives complying with ASTM D 5572 for finger joints and with ASTM D 5751 for joints other than finger joints.

B. Panel Products: Any of the following:
   1. Particleboard made from wood particles, complying with ANSI A208.1, Grade M-2.
   2. Medium-density fiberboard made from wood fiber, complying with ANSI A208.2, Grade 130.
   3. Hardboard, complying with AHA A135.4.
   4. Veneer core plywood.

2.2 INTERIOR STILE AND RAIL WOOD DOORS

A. Interior Stile and Rail Wood Doors: Stock interior doors complying with AWI's "Architectural Woodwork Quality Standards," and with other requirements specified.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Algoma Hardwoods, Inc.
      b. Eggers Industries.
      c. Maiman Company (The).
   2. Panel Designs: Indicated by Drawings. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
   3. Grade: Premium.
   4. Finish: Transparent.
   5. Wood Species and Cut for Transparent Finish: Red oak, plain sawed/sliced.
   6. Door Construction for Transparent Finish:
      a. Non-Fire-Rated Doors: 1-3/4-inch-thick stiles and rails and veneered raised panels not less than 1-1/8 inches thick.

1) Stile and Rail Construction: Clear lumber; may be edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
2) Raised-Panel Construction: Veneered, shaped, wood-based panel product with veneer conforming to raised-panel shape.

b. 20-minute Fire-Rated Doors: 1-3/4-inch- thick stiles and rails and veneered raised panels not less than 1-1/8 inches thick.
1) Stile and Rail Construction: Veneered, structural composite lumber. Select veneers for similarity of grain and color, and arrange for optimum match between adjacent pieces.
2) Raised-Panel Construction: Veneered, shaped, wood-based panel product with veneer conforming to raised-panel shape.

c. 45-minute Fire-Rated Doors: 1-3/4-inch- thick, edged and veneered mineral-core stiles and rails and 1-1/8-inch- thick, veneered mineral-core raised panels.
1) Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

7. Stile and Rail Widths: Manufacturer's standard, but not less than the following:
a. Stiles, Top and Intermediate Rails: 5 inches.
b. Bottom Rails: 10 inches.
8. Molding Profile (Sticking): Bead and cove
9. Glass: Uncoated, clear, fully tempered float glass, 5.0 mm thick, complying with Division 08 Section "Glazing."

2.3 STILE AND RAIL WOOD DOOR FABRICATION

A. Fabricate stile and rail wood doors in sizes indicated for field fitting.

B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:
1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide not more than 3/8 inch from bottom of door to top of threshold.
a. Comply with NFPA 80 for fire-rated doors.
2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches on lock edge; trim stiles and rails only to extent permitted by labeling agency.

C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W Series standards, and hardware templates.
1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

D. Glazed Openings: Trim openings indicated for glazing with solid wood moldings, with one side removable. Miter wood moldings at corner joints.
1. Profile: Identical 5/8-inch square bead for non-rated, 20-minute, and 45-minute doors.

E. Transom and Side Panels: Fabricate panels to match adjoining doors in materials, finish, and quality of construction.

2.4 FINISHING

A. Finish wood doors at factory.

B. For doors indicated to be factory finished, comply with AWI's "Architectural Woodwork Quality Standards," and with other requirements specified.
   1. Finish faces and all four edges of doors, including mortises and cutouts. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

C. Transparent Finish:
   1. Grade: Premium.
   2. Finish: AWI conversion varnish.
   3. Effect: Open-grain finish
   4. Sheen: Satin

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and substrates, with Installer present, for suitable conditions where wood stile and rail doors and fire-rated wood door frames will be installed.
   1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
   2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fire-rated wood door frames level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
   1. Countersink fasteners, fill surface flush, and sand smooth.

B. Hardware: For installation, see Division 08 Section "Door Hardware."

C. Install wood doors to comply with manufacturer's written instructions, AWI's "Architectural Woodwork Quality Standards," and other requirements specified.

D. Field-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
   1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold.
      a. Comply with NFPA 80 for fire-rated doors.
   2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
   3. Bevel fire-rated doors 1/8 inch in 2 inches on lock edge; trim stiles and rails only to extent permitted by labeling agency.

E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

F. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 33

SECTION 08 36 13

SECTIONAL DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes electrically operated sectional doors.

B. Related Sections:
   1. Division 26 Sections for electrical service and connections for powered operators and accessories.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.

B. Structural Performance: Exterior sectional doors shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
   1. Wind Loads: As indicated on Drawings.
   2. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components. Deflection of door in horizontal position (open) shall not exceed 1/120 of the door width.

C. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E 283.
   1. Air Infiltration: Maximum rate of 0.08 cfm/sq. ft. at 15 and 25 mph.

D. Operation Cycles: Provide sectional door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.4 SUBMITTALS

A. Product Data: For each type and size of sectional door and accessory. Include the following:
   1. Construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
   2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
   1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

D. Delegated-Design Submittal: For sectional doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   1. Summary of forces and loads on walls and jambs.

E. Qualification Data: For qualified Installer.

F. Maintenance Data: For sectional doors to include in maintenance manuals.

G. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Faulty operation of hardware.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
      d. Delamination of exterior or interior facing materials.
   2. Warranty Period: Five years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 STEEL DOOR SECTIONS

A. Exterior Section Faces and Frames: Fabricate from zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated zinc coating and thickness.
   1. For insulated doors, provide sections with continuous thermal-break construction, separating the exterior and interior faces of door.

B. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than 0.064-inch- nominal coated thickness and welded to door section. Provide intermediate stiles formed from not less than 0.064-inch- thick galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches apart.

C. Reinforce bottom section with a continuous channel or angle conforming to bottom-section profile.

D. Provide reinforcement for hardware attachment.

E. Board Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard polystyrene or polyurethane board insulation, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84; or with glass-fiber-board insulation. Secure insulation to exterior face sheet. Enclose insulation completely within steel sections that incorporate the following interior facing material, with no exposed insulation:
1. Interior Facing Material: Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated thickness.

F. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.

2.2 ALUMINUM DOOR SECTIONS

A. Solid Panels: Fabricate of aluminum sheet, complying with ASTM B 209, alloy and temper standard with manufacturer for type of use and finish indicated, not less than 0.020 inch thick.
1. Provide reinforcement for hardware attachment.
2. Laminate interior and exterior skins to continuous board insulation.
3. Encase panel in an aluminum frame to form a rigid panel.

B. Board Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard polystyrene or polyurethane board insulation, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84.

2.3 TRACKS, SUPPORTS, AND ACCESSORIES

A. Tracks: Manufacturer's standard, galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances shown on Drawings, and complying with ASTM A 653/A 653M for minimum G60 zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced 2 inches apart for door-drop safety device. Slope tracks at proper angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed.

B. Track Reinforcement and Supports: Galvanized-steel track reinforcement and support members, complying with ASTM A 36/A 36M and ASTM A 123/A 123M. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.
1. Vertical Track Assembly: Track with continuous reinforcing angle attached to track and attached to wall with jamb brackets.
2. Horizontal Track Assembly: Track with continuous reinforcing angle attached to track and supported at points from curve in track to end of track by laterally braced attachments to overhead structural members.

C. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.

D. Windows: Manufacturer's standard window units of type and size indicated and in arrangement shown. Set glazing in vinyl, rubber, or neoprene glazing channel for metal-framed doors, as required. Provide removable stops of same material as door-section frames.

2.4 HARDWARE

A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.

B. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch- nominal coated thickness at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges where required, for doors over 16 feet wide unless otherwise recommended by door manufacturer.

C. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch- diameter roller tires for 3-inch- wide track and 2-inch-diameter roller tires for 2-inch- wide track.

D. Push/Pull Handles: For push-up or emergency-operated doors, provide stainless-steel lifting handles on each side of door.

2.5 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded deadbolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
   1. Lock Cylinders: Provide cylinders standard with manufacturer and keyed to building keying system.
   2. Keys: Two for each cylinder.

B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.6 COUNTERBALANCE MECHANISM

A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from steel-spring wire complying with ASTM A 229/A 229M, mounted on torsion shaft made of steel tube or solid steel. Provide springs designed for number of operation cycles indicated.

B. Cable Drums and Shaft for Doors: Cast-aluminum or gray-iron casting cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft. Provide one additional midpoint bracket for shafts up to 16 feet long and two additional brackets at one-third points to support shafts more than 16 feet long unless closer spacing is recommended by door manufacturer.

C. Cables: Galvanized-steel lifting cables with cable safety factor of at least 7 to 1.

D. Cable Safety Device: Include a spring-loaded steel or spring-loaded bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if either lifting cable breaks.

E. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.

F. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.7 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and "operation cycles" requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
   1. Comply with NFPA 70.
   2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door-Operator Type: Unit consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification.
   1. Jackshaft, Side Mounted: Jackshaft operator mounted on the inside front wall on right or left side of door and connected to torsion shaft with an adjustable coupling or drive chain.

D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 11 Section "Common Motor Requirements for Equipment" unless otherwise indicated.
   1. Electrical Characteristics:
      a. Phase: Three phase
      b. Volts: 208 V.
      c. Hertz: 60.
   2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
   3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
   4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
   5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

F. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.
   1. Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
      a. Self-Monitoring Type: Four-wire configured device designed to interface with door-operator control circuit to detect damage to or disconnection of sensor edge.

G. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
   1. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.

I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.8 DOOR ASSEMBLY TYPE 1: STEEL

A. Steel Sectional Door: Sectional door formed with hinged sections.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide "Thermacore Insulated Steel Sectional Doors, 592 Series," by Overhead Door Corporation or comparable product by one of the following:
      a. Fimbel Architectural Door Specialties.
      b. Overhead Door Corporation.
      c. Raynor.
      d. Wayne-Dalton Corp.

B. Operation Cycles: Not less than 100,000.

C. R-Value: 17.5 deg F x h x sq. ft./Btu.

D. Steel Sections: Zinc-coated (galvanized) steel sheet with G90 zinc coating.
   1. Section Thickness: 2 inches.
   2. Exterior-Face, Steel Sheet Thickness: 0.019-inch- nominal coated thickness.
      a. Surface: Flat.
      b. Surface: Manufacturer's standard, ribbed.
   3. Insulation: Board.
   4. Interior Facing Material: Zinc-coated (galvanized) steel sheet of 0.019-inch- nominal coated thickness.

E. Track Configuration: Standard-lift track.

F. Weatherseals: Fitted to bottom and top of door.

G. Windows: Approximately 24 by 7 inches, with square corners, and spaced apart the approximate distance as indicated on Drawings; in one row at height indicated on Drawings; installed with insulated glazing of the following type:
   1. Insulating Glass: Manufacturer's standard.

H. Roller-Tire Material: Case-hardened steel.

I. Locking Devices: Equip door with locking device assembly.
   1. Locking Device Assembly: Single-jamb side locking bars, operable from inside and outside, with cylinders.

J. Counterbalance Type: Torsion spring.

K. Electric Door Operator:
   1. Usage Classification: Heavy duty, 60 to 90 cycles per hour.
   2. Operator Type: Jackshaft, side mounted.
   3. Motor Exposure: Interior, clean, and dry.

4. Emergency Manual Operation: Push-up type.
5. Obstruction-Detection Device: Automatic electric sensor edge on bottom bar; self-monitoring type.
6. Remote-Control Station: Interior.

L. Door Finish:
1. Baked-Enamel or Powder-Coated Finish: Color and gloss as selected by Architect from manufacturer's full range.
2. Finish of Interior Facing Material: Match finish of exterior section face.

2.9 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.10 ALUMINUM FINISHES

A. Baked-Enamel or Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, application, and baking.

2.11 STEEL AND GALVANIZED-STEEL FINISHES

A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Tracks:
1. Fasten vertical track assembly to opening jambs and framing, spaced not more than 24 inches apart.
2. Hang horizontal track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.
3. Repair galvanized coating on tracks according to ASTM A 780.

3.3 STARTUP SERVICES

A. Engage a factory-authorized service representative to perform startup service.
   1. Complete installation and startup checks according to manufacturer's written instructions.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust doors and seals to provide weathertight fit around entire perimeter.

D. Align and adjust motors, pulleys, belts, sprockets, chains, and controls according to manufacturer's written instructions.

E. Touch-up Painting: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION 08 36 13

SECTION 08 54 13

FIBERGLASS WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 07 92 00 – Joint Sealants: Sill sealant and perimeter caulking.

C. Section 09 91 13 – Exterior Painting

D. Section 09 91 23 – Interior Painting.

1.2 SUMMARY

A. Section includes fiberglass-framed windows.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. C1036: Standard Specification for Flat Glass.
2. E90-09: Standard Test Method for Laboratory Measurement of airborne Sound Transmission Loss of Building Partitions and Elements.
3. E 283: Standard Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors.
4. E 330: Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Door by Uniform Static Air Pressure Difference.
5. E 547: Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
6. E 2190: Standard Specification for Insulating Glass Unit Performance Evaluation.
7. F 2090-10: Standard Specification for Window Fall Prevention Devices with Emergency Escape (Egress) Release Mechanisms.
8. E 2068: Standard Test Method to Determine the Operating and Breakaway Forces of Sliding Windows and Doors.

B. Insulating Glass Manufacturer's Alliance/Insulating Glass Certification Council (IGMA/IGCC)

C. American Architectural Manufacturer's Association/Window and Door Manufacturer's Association/Canadian Standards Association (AAMA/WDMA/CSA):
1. AAMA/WDMA/CSA 101/I.S.2/A440-08: North American Fenestration Standard/Specification for windows, doors, and skylights.
2. AAMA/WDMA/CSA 101/I.S.2/A440-05: Standard/Specification for windows and unit skylights.

D. Window and Door Manufacturer's Association (WDMA): Hallmark Certification Program.

E. American Architectural Manufacturer's Association (AAMA): 624-10: Voluntary Specification, Performance Requirements and Test Procedures for Organic Coatings on Fiber Reinforced Thermoset Profiles.

F. National Fenestration Rating Council (NFRC):

1. 100: Procedures for Determining Fenestration Product U-factors
2. 200: Procedure for Determining Fenestration Product Solar Heat Gain Coefficients and Visible Transmittance at Normal Incidence.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for fiberglass windows.

B. Shop Drawings: For fiberglass windows.
   1. Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

C. Samples: For each exposed product and for each color specified, [2 by 4 inches (50 by 100 mm)

D. Samples for Initial Selection: For units with factory-applied finishes.
   1. Include Samples of hardware and accessories involving color selection.

E. Samples for Verification: For fiberglass windows and components required, prepared on Samples of size indicated below:
   1. Exposed Finishes: [2 by 4 inches (50 by 100 mm).
   2. Exposed Hardware: Full-size units.

F. Product Schedule: For fiberglass windows. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Product Test Reports: For each type of fiberglass window, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For manufacturer's warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating fiberglass windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.

B. Installer Qualifications: An installer acceptable to fiberglass window manufacturer for installation of units required for this Project.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
   1. Build mockup of typical wall area as shown on Drawings.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Final Acceptance.

1.7 SYSTEM DESCRIPTION

Product	Air Tested to psf	Water Tested to psf	Structural Tested to psf	Certification Rating	Max Overall Width		Max Overall Height	
					in	mm	in	mm
Pultruded Fiberglass Double Hung Equal Sash	1.57	7.5	50	LC-PG50-H	47 1/2	(1207)	47 1/2	(1207)
Pultruded Fiberglass Double Hung Equal Sash	1.57	7.5	50	LC-PG50-H	29 1/2	(749)	59 1/2	(1511)
Pultruded Double Hung Equal Sash	1.57	7.5	50	LC-PG50-H	35 1/2	(902)	59 1/2	(1511)
Pultruded Fiberglass Double Hung Equal Sash	1.57	6	40	LC-PG40-H	47 1/2	(1207)	59 1/2	(1511)
Pultruded Fiberglass Double Hung Cottage Sash	1.57	4.5	30	LC-PG30-H	29 1/2	(749)	65 1/2	(1664)
Pultruded Fiberglass Double Hung Equal Sash	1.57	6	40	LC-PG40-H	41 1/2	(1054)	65 1/2	(1664)
Pultruded Fiberglass Double Hung Equal/Cottage Sash	1.57	4.5	30	LC-PG30-H	47 1/2	(1207)	65 1/2	(1664)
Pultruded Fiberglass Double Hung Equal Sash	1.57	6	30	LC-PG30-H	29 1/2	(749)	77 1/2	(1969)
Pultruded Fiberglass Double Hung Equal Sash	1.57	6	40	LC-PG40-H	35 1/2	(902)	77 1/2	(1969)
Pultruded Fiberglass Double Hung Equal Sash	1.57	4.5	30	LC-PG30-H	47 1/2	(1207)	77 1/2	(1969)

1.8 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace fiberglass windows that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Failure to meet performance requirements.
      b. Structural failures including excessive deflection, water leakage, and air infiltration.
      c. Faulty operation of movable sash and hardware.
      d. Deterioration of materials and finishes beyond normal weathering.
      e. Failure of insulating glass.
   2. Warranty Period:
      a. Window: 10 years from date of Final Acceptance.
      b. Glazing Units: Five years from date of Final Acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain fiberglass windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
   1. Window Certification: WDMA certified with label attached to each window.

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
   1. Minimum Performance Class: LC
   2. Minimum Performance Grade: 45

C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.320 Btu/sq. ft. x h x deg F (1.71 W/sq. m x K)

D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.29.

E. Sound Transmission Class (STC): Rated for not less than 30 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.

F. Outside-Inside Transmission Class (OITC): Rated for not less than 30 OITC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.

G. Windborne-Debris-Impact Resistance: Capable of resisting impact from windborne debris based on testing glazed windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 and requirements of authorities having jurisdiction.

2.3 FIBERGLASS WINDOWS

A. Manufacturers
   1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
      a. Pella Windows and Doors
      b. Marvin Windows and Doors.
      c. Pella Corporation.

B. Types: Provide the following operating types in locations indicated on Drawings:
   1. Double hung.

2. Fixed.

C. Frames and Sashes: Pultruded fiberglass complying with AAMA/WDMA/CSA 101/I.S.2/A440 and with exposed exterior fiberglass surfaces finished with manufacturer's standard enamel coating complying with **AAMA 613**
   1. Exterior Color: Bronze exterior.
   2. Interior Finish: Stone White Interior – Field paint for final color.

D. Glass: Clear annealed glass, ASTM C 1036, Type 1, Class 1, q3.
   1. Select quality complying with ASTM C 1036. Insulating glass SIGMA/IGCC when tested in accordance with ASTM E 2190. STC/OITC ratings are tested to the stated performance level in accordance with ASTM E 90-09.

E. Glazing Method: Insulating glass

F. Glass Type: Low E3, Argon gas

G. Glazing Seal: Silicone bedding at exterior and a glazing boot to interior

H. Insulating-Glass Units: ASTM E 2190.
   1. Glass: ASTM C 1036, Type 1, Class 1, q3.
      a. Tint: Clear
      b. Kind: Fully tempered [where indicated on Drawings] <Insert requirements>.
   2. Lites: Two
   3. Filling: Fill space between glass lites with argon.
   4. Low-E Coating:

I. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal

J. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock fiberglass windows, and sized to accommodate sash weight and dimensions.
   1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range

K. Hung Window Hardware:
   1. Counterbalancing Mechanism: Complying with AAMA 902, concealed, of size and capacity to hold sash stationary at any open position.
   2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
   3. Tilt Hardware: Releasing tilt latch allows sash to pivot about horizontal axis to facilitate cleaning exterior surfaces from the interior.

L. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

M. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
   1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 ACCESSORIES

A. Jamb Extensions: Standared 2 inch jambs. Rolled form aluminum frame finish. Bronze

B. Insect Screens. Screen mesh 18x16 Charcoal fiberglass

2.5 INSECT SCREENS

A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
   1. Type and Location: Full, outside for double-hung

B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.
   1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.
   2. Finish for Exterior Screens: Matching color and finish of cladding

C. Aluminum Wire Fabric: 18-by-16 (1.1-by-1.3-mm) mesh of 0.011-inch- (0.28-mm-) diameter, coated aluminum wire.
   1. Wire-Fabric Finish: Natural bright

2.6 FABRICATION

A. Fabricate fiberglass windows in sizes indicated. Include a complete system for installing and anchoring windows.

B. Glaze fiberglass windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units.

E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.

B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

3.3 FIELD QUALITY CONTROL

A. Windows will be considered defective if they do not pass tests and inspections.

B. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

B. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.
   1. Keep protective films and coverings in place until final cleaning.

C. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 08 54 13

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:
   1. Swinging doors.
   2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:
   1. Mechanical door hardware.
   2. Electromechanical door hardware.
   3. Cylinders specified for doors in other sections.

C. Related Sections:
   1. Division 06 Section “Rough Carpentry”.
   2. Division 06 Section “Finish Carpentry”.
   3. Division 08 Section “Operations and Maintenance”.
   4. Division 08 Section “Door Schedule”.
   5. Division 08 Section “Door Hardware Schedule”.
   6. Division 08 Section “Hollow Metal Doors and Frames”.
   7. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
   8. Division 08 Section “Access Control Hardware”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
   1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
   2. ICC/IBC - International Building Code.
   3. NFPA 70 - National Electrical Code.
   4. NFPA 80 - Fire Doors and Windows.
   5. NFPA 101 - Life Safety Code.
   6. NFPA 105 - Installation of Smoke Door Assemblies.
   7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:
   1. ANSI/BHMA Certified Product Standards - A156 Series
   2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door

Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:
    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.
4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
    a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
    b. Complete (risers, point-to-point) access control system block wiring diagrams.
    c. Wiring instructions for each electronic component scheduled herein.
2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Proof of Certification: Provide copy of manufacturer(s) official certification or accreditation document indicating proof of status as a qualified installer of Windstorm assemblies.

E. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

F. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

G. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
   1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
   2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

E. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

F. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
   1. Function of building, purpose of each area and degree of security required.
   2. Plans for existing and future key system expansion.
   3. Requirements for key control storage and software.
   4. Installation of permanent keys, cylinder cores and software.
   5. Address and requirements for delivery of keys.

G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
   1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors.

Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:
1. Ten years for mortise locks and latches.
2. Five years for exit hardware.
3. Twenty five years for manual surface door closer bodies.
4. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

C. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.
1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
    a. Two Hinges: For doors with heights up to 60 inches.
    b. Three Hinges: For doors with heights 61 to 90 inches.
    c. Four Hinges: For doors with heights 91 to 120 inches.
    d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
    a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
    b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.
3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
    a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.

b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:
   a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
5. Acceptable Manufacturers:
   a. Bommer Industries (BO).
   b. Hager Companies (HA).
   c. McKinney Products (MK).
   d. Stanley Hardware (ST).

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
1. Acceptable Manufacturers:
   a. Bommer Industries (BO).
   b. McKinney Products (MK).
   c. Pemko Manufacturing (PE).

2.3 POWER TRANSFER DEVICES

A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
1. Acceptable Manufacturers:
   a. Hager Companies (HA) - ETW-QC (# wires) Option.
   b. McKinney Products (MK) - QC (# wires) Option.

B. Electrified Quick Connect Continuous Geared Transfer Hinges: Provide electrified transfer continuous geared hinges with a 12" removable service panel cutout accessible without de-mounting door from the frame. Furnish with Molex™ standardized plug connectors with sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
1. Acceptable Manufacturers:
   a. Bommer Industries (BO) - SER-QC (# of wires) Option.
   b. McKinney Products (MK) - SER-QC (# wires) Option.
   c. Pemko Manufacturing (PE) - SER-QC (# wires) Option.

2.4 DOOR OPERATING TRIM

A. Door Push Plates and Pulls: ANS/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.

2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
5. Acceptable Manufacturers:
    a. Ives (IV).
    b. Rockwood Manufacturing (RO).
    c. Trimco (TC).

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:
1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
5. Keyway:

D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified cylinders employing a utility patented and restricted keyway requiring the use of patented controlled keys. Provide bump resistant, fixed core cylinders as standard with solid recessed cylinder collars. Cylinders are to be factory keyed where permanent keying records will be established and maintained.
1. Provide a 6 pin multi-level master key system comprised of patented controlled keys and security and high security cylinders operated by one (1) key of the highest level. Geographical exclusivity to be provided for all security and high security cylinders and UL437 certification where specified.
    a. Level 1 Cylinders: Provide utility patented controlled keyway cylinders that are furnished with patented keys available only from authorized distribution.
    b. Level 2 Cylinders: Provide utility patented controlled keyway and side bar locking incorporating unique angled bottom pins for geographical exclusivity. Cylinders constructed to provide protection against bumping and picking.
    c. Level 3 Cylinders: Provide utility patented controlled keyway and side bar locking incorporating unique angled bottom pins for geographical exclusivity. Cylinders to be UL437 certified and constructed to provide protection against bumping, picking, and drilling.
    d. Refer to hardware sets for specified levels.
2. Acceptable Manufacturers:
    a. Sargent Manufacturing (SA) - Degree Series.
    b. Corbin Russwin (RU) – Access 3 Series.

E. Key Quantity: Provide the following minimum number of keys:
1. Change Keys per Cylinder: Two (2)

2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

F. Construction Keying: Provide construction master keyed cylinders.

G. Key Registration List (Bitting List):
1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

H. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
1. Acceptable Manufacturers:
a. Lund Equipment (LU).
b. MMF Industries (MM).
c. Telkee (TK).

2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
1. Acceptable Manufacturers:
a. Corbin Russwin Hardware (RU) – ML2000 Series.
b. Sargent Manufacturing (SA) – 8200 Series.
c. Schlage (SC) – L9000 Series.
d. Yale Locks and Hardware (YA) – 8800FL Series.

2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:
1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
4. Dustproof Strikes: BHMA A156.16.

2.8 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
5. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
7. Vertical Rod Exit Devices: Provide and install interior surface and concealed vertical rod exit devices as Less Bottom Rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
    1. Acceptable Manufacturers:
        a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
        b. Sargent Manufacturing (SA) - 80 Series.
        c. Von Duprin (VD) - 35A/98 XP Series.

2.9 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:
    1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
    2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.
4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt and security type fasteners as required for proper installation.

B. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 certified surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.
   1. Acceptable Manufacturers:
      a. Corbin Russwin Hardware (RU) - DC6000 Series.
      b. LCN Closers (LC) – 1450 Series.
      c. Norton Door Controls (NO) - 8500 Series.
      d. Sargent Manufacturing (SA) - 1431 Series.
      e. Yale Locks and Hardware (YA) - 3500 Series.

2.10 ARCHITECTURAL TRIM

A. Door Protective Trim
   1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
   2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
   3. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
      a. Stainless Steel: 300 grade, 050-inch thick.
   4. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
   5. Acceptable Manufacturers:
      a. Rockwood Manufacturing (RO).
      b. Trimco (TC).

2.11 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated,

unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Acceptable Manufacturers:
    a. Burns Manufacturing (BU).
    b. Rockwood Manufacturing (RO).
    c. Trimco (TC).

2.12 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
    1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
    1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Acceptable Manufacturers:
    1. National Guard Products (NG).
    2. Pemko Manufacturing (PE).
    3. Reese Enterprises, Inc. (RE).

2.13 ELECTRONIC ACCESSORIES

A. Networked Contactless Smart Card Readers: Contactless smart cards reader to securely read access control data from 13.56 MHz contactless smart cards. The contactless smart card reader is designed for use in access control applications by providing:
    1. Secure access control data exchange between the smart card and the reader utilizing key diversification and mutual authentication routines.
    2. Contactless smart card reader to be designed for low current operation to enable migration from most legacy proximity applications without the need to replace existing access control panels and/or power supplies. Operating voltage: 5-16 VDC. Current requirements: 55 mA Avg, 116 mA Peak at 12 VDC.
    3. Universal compatibility with most access control systems and backwards compatibility with legacy 125 KHz proximity access control formats.
    4. Product construction suitable for both indoor and outdoor applications.
    5. Customizable behavior for indicator lights and audible tones.
    6. Acceptable Manufacturers (13.56 MHz iClass):
        a. HID Global (HD) - R10/R40 Series.

b. Sargent Manufacturing (SA) - 6100/6120 Series.

B. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
1. Acceptable Manufacturers:
   a. Security Door Controls (SD) - 630 Series.
   b. Securitron (SU) - BPS Series.

2.14 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.15 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Shop Installation: Install hardware on the doors prior to shipment to the jobsite. Field installed hardware will only be permitted as itemized below. Comply with all other Part 3 installation requirements.
1. Extent of shop installed hardware shall include, but is not limited to:
   a. Hanging devices.
   b. Latching devices.

c. Operating trim.
d. Through-door wiring cables.
e. Door closers and overhead stops.
f. Flush bolts, surface bolts, and coordinating accessories.
g. Protective trim – protection plates, edge guards, trim protectors.
h. Coat hooks, viewers, and all other door mounted accessories.

2. Hardware items which are permitted to be installed in the field include:
   a. Door stops (wall, floor, other mounting).
   b. Frame mounted closer brackets.
   c. Lock and latch strike plates.
   d. Frame wiring cables.
3. Bench test shop installed work. This includes both mechanical and electrical components. Replace defective items.
4. Ship field installed hardware items clearly labeled with the door number and attached to the door using shrink wrap. Include all templates and instructions which are required to complete the installation.

B. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
   1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

C. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
   1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
   2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
   3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
   4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

D. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. Manufacturer’s Abbreviations:
MK - McKinney
SA - Sargent
AD - Adams Rite
RO - Rockwood
PE - Pemko
SU - Securitron

Hardware Schedule

Set: 1.0
Doors: 100A
Description: EXT - ENTRY - ALUM

1	Continuous Hinge	MCK-25HD	CL	MK
1	Deadlatch	4900 x 4591	US26D	AD
1	Cylinder	DG1 as required	US15	SA
2	Door Pull	BF168	US32D	RO
1	Door Closer	1431 PS	EN	SA
1	Mtg Plate	as required	EN	SA
1	Threshold	271A Pemkote MSES25SS		PE
1	Gasketing	by door / frame mfg		

Set: 2.0
Doors: 107A, 108
Description: EXT - KITCHEN - EAC

2	Hinge (heavy weight)	T4A3386 NRP 4-1/2" x 4-1/2"	US32D	MK
1	Hinge (heavy weight)	T4A3386 QCXX NRP 4-1/2" x 4-1/2"	US32D	MK
1	Fail Secure Electric Lock	DG1 RX 8271-24V LNL	US26D	SA
1	Door Closer	1431 PS	EN	SA
1	Armor Plate	K1050 36" X 2" LDW 4BE CSK	US32D	RO
1	Threshold	1715AK MSES25SS		PE
1	Gasketing [Head]	2891APK		PE
1	Gasketing [Jamb]	290APK		PE
1	Rain Guard	346C x LAR		PE
1	Sweep	3452AV		PE
1	ElectroLynx Harness	QC-C1500 [PS to hinge]		MK
1	ElectroLynx Harness	QC-CXXP [Lock / exit to hinge]		MK
1	iClass Reader	provided by owner		SA
1	Power Supply	BPS-Series (Volt & Amp as required)		SU

Set: 3.0
Doors: 110A, 110B, 111A
Description: EXT - SHOP EAC

2	Hinge (heavy weight)	T4A3386 NRP 4-1/2" x 4-1/2"	US32D	MK
1	Hinge (heavy weight)	T4A3386 QCXX NRP 4-1/2" x 4-1/2"	US32D	MK
1	Exit Device	DG1 55 56 8804 ETL	US32D	SA
1	Door Closer	1431 PS	EN	SA
1	Kick Plate	K1050 8" X 2" LDW 4BE CSK	US32D	RO
1	Threshold	271A Pemkote MSES25SS		PE
1	Gasketing [Head]	2891APK		PE
1	Gasketing [Jamb]	290APK		PE
1	Rain Guard	346C x LAR		PE
1	Sweep	3452AV		PE
1	ElectroLynx Harness	QC-C1500 [PS to hinge]		MK
1	ElectroLynx Harness	QC-CXXP [Lock / exit to hinge]		MK
1	iClass Reader	provided by owner		SA
1	Power Supply	BPS-Series (Volt & Amp as required)		SU

Set: 4.0
Doors: 101A
Description: EXT - OFFICE - EAC

2	Hinge (heavy weight)	T4A3386 NRP 4-1/2" x 4-1/2"	US32D	MK
1	Hinge (heavy weight)	T4A3386 QCXX NRP 4-1/2" x 4-1/2"	US32D	MK
1	Fail Secure Electric Lock	DG1 RX 8271-24V LNL	US26D	SA
1	Door Closer	1431 PS	EN	SA
1	Kick Plate	K1050 8" X 2" LDW 4BE CSK	US32D	RO
1	Threshold	271A Pemkote MSES25SS		PE
1	Gasketing [Head]	2891APK		PE

1 Gasketing [Jamb]	290APK		PE
1 Rain Guard	346C x LAR		PE
1 Sweep	3452AV		PE
1 ElectroLynx Harness	QC-C1500 [PS to hinge]		MK
1 ElectroLynx Harness	QC-CXXP [Lock / exit to hinge]		MK
1 iClass Reader	provided by owner		SA
1 Power Supply	BPS-Series (Volt & Amp as required)		SU

Set: 5.0
Doors: 100B
Description: ENTRY - EAC

2 Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Hinge	TA2714 QCXX 4-1/2" x 4-1/2"	US26D	MK
1 Fail Secure Electric Lock	DG1 RX 8271-24V LNL	US26D	SA
1 Closer	1431 Reg / PA	EN	SA
1 Kick Plate	K1050 8" X 2" LDW 4BE CSK	US32D	RO
1 Door Stop	409 / 446 [as required]	US32D	RO
1 Gasketing	S773D		PE
1 ElectroLynx Harness	QC-C1500 [PS to hinge]		MK
1 ElectroLynx Harness	QC-CXXP [Lock / exit to hinge]		MK
1 iClass Reader	provided by owner		SA
1 Power Supply	BPS-Series (Volt & Amp as required)		SU

Set: 6.0
Doors: 109
Description: MECH

3 Hinge	TA2314 NRP 4-1/2" x 4-1/2"	US32D	MK
1 Storeroom Lock	DG1 8204 LNL	US26D	SA
1 Closer	1431 Reg / PA	EN	SA
1 Kick Plate	K1050 8" X 2" LDW 4BE CSK	US32D	RO
1 Door Stop	409 / 446 [as required]	US32D	RO
1 Gasketing	S773D		PE

Set: 7.0
Doors: 111B
Description: WHSE OFFICE - EAC

2 Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Hinge	TA2714 QCXX 4-1/2" x 4-1/2"	US26D	MK
1 Fail Secure Electric Lock	DG1 RX 8271-24V LNL	US26D	SA
1 Closer	1431 Reg / PA	EN	SA
1 Kick Plate	K1050 8" X 2" LDW 4BE CSK	US32D	RO
1 Door Stop	409 / 446 [as required]	US32D	RO
1 Threshold	271A Pemkote MSES25SS		PE
1 Gasketing	S773D		PE
1 Sweep	315CN		PE
1 ElectroLynx Harness	QC-C1500 [PS to hinge]		MK
1 ElectroLynx Harness	QC-CXXP [Lock / exit to hinge]		MK

1 iClass Reader	provided by owner		SA
1 Power Supply	BPS-Series (Volt & Amp as required)		SU

Set: 8.0
Doors: 105
Description: KITCHEN - EAC

2 Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1 Hinge (heavy weight)	T4A3386 QCXX NRP 4-1/2" x 4-1/2"	US32D	MK
1 Fail Secure Electric Lock	DG1 RX 8271-24V LNL	US26D	SA
1 Closer	1431 Reg / PA	EN	SA
1 Mop Plate	K1050 4" X 1" LDW 4BE CSK	US32D	RO
1 Kick Plate	K1050 8" X 2" LDW 4BE CSK	US32D	RO
1 Door Stop	409 / 446 [as required]	US32D	RO
1 Gasketing	S773D		PE
1 ElectroLynx Harness	QC-C1500 [PS to hinge]		MK
1 ElectroLynx Harness	QC-CXXP [Lock / exit to hinge]		MK
1 iClass Reader	provided by owner		SA
1 Power Supply	BPS-Series (Volt & Amp as required)		SU

Set: 9.0
Doors: 107B
Description: KITCHEN - WHSE - RATED - EAC

2 Hinge (heavy weight)	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1 Hinge (heavy weight)	T4A3386 QCXX NRP 4-1/2" x 4-1/2"	US32D	MK
1 Fail Secure Electric Lock	DG1 RX 8271-24V LNL	US26D	SA
1 Closer	1431 Reg / PA	EN	SA
1 Mop Plate	K1050 4" X 1" LDW 4BE CSK	US32D	RO
1 Kick Plate	K1050 8" X 2" LDW 4BE CSK	US32D	RO
1 Door Stop	409 / 446 [as required]	US32D	RO
1 Threshold	271A Pemkote MSES25SS		PE
1 Gasketing	S773D		PE
1 Sweep	315CN		PE
1 ElectroLynx Harness	QC-C1500 [PS to hinge]		MK
1 ElectroLynx Harness	QC-CXXP [Lock / exit to hinge]		MK
1 iClass Reader	provided by owner		SA
1 Power Supply	BPS-Series (Volt & Amp as required)		SU

Set: 10.0
Doors: 102, 106
Description: RESTROOM

3 Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Pull Plate	BF 106x70C	US32D	RO
1 Push Plate	70C	US32D	RO
1 Closer	1431 Reg / PA	EN	SA
1 Mop Plate	K1050 4" X 1" LDW 4BE CSK	US32D	RO
1 Kick Plate	K1050 8" X 2" LDW 4BE CSK	US32D	RO
1 Door Stop	409 / 446 [as required]	US32D	RO

1 Gasketing	S773D		PE

Set: 11.0
Doors: 103
Description: JAN

3 Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Storeroom Lock	DG1 8204 LNL	US26D	SA
1 Mop Plate	K1050 4" X 1" LDW 4BE CSK	US32D	RO
1 Door Stop	409 / 446 [as required]	US32D	RO
1 Gasketing	S773D		PE

Set: 12.0
Doors: 101B, 104A, 104B
Description: OFFICE

3 Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Office Lock	DG1 8205 LNL	US26D	SA
1 Door Stop	409 / 446 [as required]	US32D	RO
1 Gasketing	S773D		PE

END OF SECTION 08 71 00

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
   1. Windows.
   2. Doors.

B. Related Sections:
   1. Division 08 Section "Doors."
   2. Division 08 Section "Windows."

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
   1. Standard: ASTM E 1300.
   2. Design Wind Pressures: As indicated on Drawings.
   3. Design Snow Loads: As indicated on Drawings.
   4. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, glass shall resist design wind pressure based on glass type factors for short-duration load.
   5. Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, glass shall resist each of the following combinations of loads:
      a. Outward design wind pressure minus the weight of the glass, based on glass type factors for short-duration load.
      b. Inward design wind pressure plus the weight of the glass plus half of the design snow load, based on glass type factors for short-duration load.
      c. Half of the inward design wind pressure plus the weight of the glass plus the design snow load, based on glass type factors for long-duration load.
   6. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.

7. Differential Shading: Glass shall resist thermal stresses induced by differential shading within individual glass lites.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.5 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of the following products; 12 inches square.
   1. Coated glass.
   2. Fire-resistive glazing products.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

D. Qualification Data: For installers.

E. Product Certificates: For glass and glazing products, from manufacturer.

F. Warranties: Sample of special warranties.

G. Product testing: Impact testing documentation in accordance to CPSC 16 CFR I201.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Source Limitations for Glass: Obtain tinted float glass, coated float glass, laminated glass and insulating glass from single source from single manufacturer for each glass type.

C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
   1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."

E. Safety Glazing Testing and Impact testing: All safety glass must be tested in accordance CPSC 16 CFR Part I201.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
   1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
   1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
   2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
   3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
   4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
   5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

2.3 GLAZING GASKETS

A. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, EPDM, silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
   1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.4 GLAZING SEALANTS

A. General:
   1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
   2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Dow Corning Corporation; 799.
      b. GE Advanced Materials - Silicones; UltraGlaze SSG4000.
      c. Tremco Incorporated; Proglaze SSG.

C. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

2.5 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
   1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
   2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
   1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
   2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product

manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

2.8 MONOLITHIC-GLASS TYPES

A. Glass Type GL: Clear float glass.

B. Glass Type GL-T: Clear tempered float glass.
1. Thickness: 6.0 mm.
2. Provide safety glazing labeling.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches.
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
   2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding

into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08 80 00

SECTION 08 90 00

LOUVERS AND VENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Fixed, extruded-aluminum louvers.
   2. Adjustable, extruded-aluminum louvers.

B. Related Sections:
   1. Section 08 11 13 - "Hollow Metal Doors and Frames" for louvers in hollow-metal doors.
   2. Section 08 14 16 - "Flush Wood Doors" for louvers in flush wood doors.

1.3 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

B. Horizontal Louver: Louver with horizontal blades; i.e., the axes of the blades are horizontal.

C. Vertical Louver: Louver with vertical blades; i.e., the axes of the blades are vertical.

D. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

E. Storm-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

1.4 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes, without buckling, opening of joints, overstressing of components, failure of connections, or other detrimental effects.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

B. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
   1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
   2. Show mullion profiles and locations.

3. Wiring Diagrams: For power, signal, and control wiring for motorized adjustable louvers.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of metal finish required.

E. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain louvers and vents from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

B. UL and NEMA Compliance: Provide motors and related components for motor-operated louvers that are listed and labeled by UL and comply with applicable NEMA standards.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.

B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Aluminum Castings: ASTM B 26, Alloy 319.

D. Fasteners: Use types and sizes to suit unit installation conditions.
1. Use Phillips flat-head tamper-resistant screws for exposed fasteners unless otherwise indicated.
2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
3. For color-finished louvers, use fasteners with heads that match color of louvers.

E. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.2 FABRICATION, GENERAL

A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Maintain equal louver blade spacing to produce uniform appearance.

C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
   1. Frame Type: Channel unless otherwise indicated.

D. Include supports, anchorages, and accessories required for complete assembly.

E. Provide vertical mullions of type and at spacings indicated, but not more than recommended by manufacturer, or 72 inches o.c., whichever is less.
   1. Fully Recessed Mullions: Where indicated, provide mullions fully recessed behind louver blades. Where length of louver exceeds fabrication and handling limitations, fabricate with close-fitting blade splices designed to permit expansion and contraction.
   2. Semirecessed Mullions: Where indicated, provide mullions partly recessed behind louver blades so louver blades appear continuous. Where length of louver exceeds fabrication and handling limitations, fabricate with interlocking split mullions and close-fitting blade splices designed to permit expansion and contraction.
   3. Exposed Mullions: Where indicated, provide units with exposed mullions of same width and depth as louver frame. Where length of louver exceeds fabrication and handling limitations, provide interlocking split mullions designed to permit expansion and contraction.
   4. Exterior Corners: Prefabricated corner units with mitered and blades with concealed close-fitting splices and with fully recessed mullions at corners.

F. Provide extended sills for recessed louvers.

G. Join frame members to each other and to fixed louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal, Drainable-Blade Louver: (Mechanical Louvers)
   1. Basis-of-Design Product: Subject to compliance with requirements, provide "Model ELF6375DX" by Ruskin Company or comparable product by one of the following:
      a. Airolite Company, LLC (The).
      b. Arrow United Industries; a division of Mestek, Inc.
      c. Construction Specialties, Inc.
      d. Greenheck Fan Corporation.
      e. Ruskin Company; Tomkins PLC.
   2. Louver Depth: 6 inches.
   3. Frame and Blade Nominal Thickness: Not less than 0.080 inch.
   4. Mullion Type: Fully recessed.
   5. Louver Performance Ratings:
      a. Free Area: Not less than 8.5 sq. ft. for 48-inch- wide by 48-inch- high louver.
      b. Point of Beginning Water Penetration: Not less than 1000 fpm.
      c. Air Performance: Not more than 0.10-inch wg static pressure drop at 750-fpm free-area intake velocity.

B. Specialty Louvers, Drainable-Blade Louver: (Gable Louvers)
   1. Basis-of-Design Product: Subject to compliance with requirements, provide "Model ELR- Round" by Ruskin Company or comparable product by one of the following:
      a. Airolite Company, LLC (The).
      b. Arrow United Industries; a division of Mestek, Inc.
      c. Construction Specialties, Inc.

d. Greenheck Fan Corporation.
e. Ruskin Company; Tomkins PLC.

2. Louver Depth: 6 inches.
3. Frame and Blade Nominal Thickness: Not less than 0.080 inch.
4. Mullion Type: Fully recessed.
5. Louver Performance Ratings:
   a. Free Area: Not less than 8.5 sq. ft. for 48-inch- wide by 48-inch- high louver.
   b. Point of Beginning Water Penetration: Not less than 1000 fpm.
   c. Air Performance: Not more than 0.10-inch wg static pressure drop at 750-fpm free-area intake velocity.

2.4 LOUVER SCREENS

A. General: Provide screen at each exterior louver.
   1. Screen Location for Fixed Louvers: Interior face.
   2. Screen Location for Adjustable Louvers: Interior face unless otherwise indicated.
   3. Screening Type: Bird screening and insect screening.

B. Secure screen frames to louver frames with machine screws with heads finished to match louver, spaced a maximum of 6 inches from each corner and at 12 inches o.c.

C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
   1. Metal: Same kind and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
   2. Finish: Mill finish unless otherwise indicated.
   3. Type: Rewirable frames with a driven spline or insert.

D. Louver Screening for Aluminum Louvers:
   1. Bird Screening: Aluminum, ¾- by ½-inch or ½-inch square mesh, 0.063-inch wire.
   2. Insect Screening: Aluminum, 18-by-16 mesh, 0.012-inch wire.
   3. =

2.5 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.6 ALUMINUM FINISHES

A. Finish louvers after assembly.

B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
   1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Form closely fitted joints with exposed connections accurately located and secured.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

F. Protect unpainted galvanized and nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 07 Section "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

A. Test operation of adjustable louvers and adjust as needed to produce fully functioning units that comply with requirements.

B. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.

C. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

D. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 08 90 00

SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.
3. Tile backing panels.
4. Indentifying and labeling of partitions.

B. Related Requirements:
1. Section 06 16 00 "Sheathing" for gypsum sheathing for exterior walls.
2. Section 09 31 00 "Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For the following products:
1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.3 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.4 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.[

2.2 GYPSUM BOARD, GENERAL[

A. Regional Materials: Gypsum panel products shall be manufactured within 500 miles of Project site.

B. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements,
1. Georgia-Pacific Gypsum LLC.
2. National Gypsum Company.
3. USG Corporation.

B. Gypsum Wallboard: ASTM C 1396.
1. Thickness: 1/2 inch.
2. Long Edges: Tapered

C. Gypsum Board, Type X: ASTM C 1396.
1. Thickness: 5/8 inch.
2. Long Edges: Tapered

D. Flexible Gypsum Board: ASTM C 1396. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
1. Thickness: 1/4 inch.
2. Long Edges: Tapered.

E. Gypsum Ceiling Board: ASTM C 1396.
1. Thickness: 1/2 inch.
2. Long Edges: Tapered.[

F. Abuse-Resistant Gypsum Board: ASTM C 1629 Level 4.
1. Core: 5/8 inch, Type X
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

G. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
1. Core: [5/8 inch, Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.
1. Products: Subject to compliance with requirements,
   a. Georgia-Pacific Gypsum LLC; Dens-Glass Gold.
   b. National Gypsum Company; Gold Bond, e(2)XP.
   c. USG Corporation; Securock Glass Mat Sheathing.
2. Core: 5/8 inch, Type X

2.5 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.
   1. Products: Subject to compliance with requirements,
      a. CertainTeed Corp.; GlasRoc Tile Backer.
   2. Core: 5/8 inch, Type X.
   3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

B. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.
   1. Products: Subject to compliance with requirements,
      a. CertainTeed Corp.; FiberCement Underlayment
      b. James Hardie Building Products, Inc.; Hardiebacker
      c. National Gypsum Company, Permabase Cement Board.
      d. USG Corporation; DUROCK Cement Board.
   2. Thickness: 5/8 inch
   3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

C. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.
   1. Manufacturers: Subject to compliance with requirements,
      a. CertainTeed Corp.
      b. Georgia-Pacific Gypsum LLC.
      c. USG Corporation.

   2. Core: 5/8 inch, Type X

2.6 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
   1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet
   2. Shapes:
      a. Cornerbead.
      b. Bullnose bead.
      c. LC-Bead: J-shaped; exposed long flange receives joint compound.
      d. L-Bead: L-shaped; exposed long flange receives joint compound.
      e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
      f. Expansion (control) joint.
      g. Curved-Edge Cornerbead: With notched or flexible flanges.

B. Exterior Trim: ASTM C 1047.
   1. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc
   2. Shapes:
      a. Cornerbead.
      b. LC-Bead: J-shaped; exposed long flange receives joint compound.
      c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
      a. Fry Reglet Corp.

b. Gordon, Inc.
c. Pittcon Industries.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified

2.7 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
1. Interior Gypsum Board: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use setting-type, sandable topping
4. Finish Coat: For third coat, use setting-type, sandable topping

D. Joint Compound for Exterior Applications:
1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:
1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
2. Cementitious Backer Units: As recommended by backer unit manufacturer.
3. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.8 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
   1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
   1. Products: Subject to compliance with requirements, provide one of the following
      a. Pecora Corporation; [AC-20 FTR] [AIS-919].
      b. USG Corporation; SHEETROCK Acoustical Sealant.
      c. <Insert manufacturer's name; product>.
   2. Acoustical joint sealant shall have a VOC content of [250] g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   3. Acoustical joint sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

G. Vapor Retarder: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.[

I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
1. Type X: As indicated on Drawings
2. Flexible Type: As indicated on Drawings
3. Ceiling Type: Ceiling surfaces
4. Abuse-Resistant Type: As indicated on Drawings
5. Moisture- and Mold-Resistant Type: Bathrooms, mechanical areas

B. Single-Layer Application:
1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
   a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
   b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:
1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to

framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.

2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

E. Curved Surfaces:
1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

A. Apply panels perpendicular to supports, with end joints staggered and located over supports.
1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
2. Fasten with corrosion-resistant screws.

3.5 APPLYING TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at restrooms, mechanical areas. Install with 1/4-inch gap where panels abut other construction or penetrations.

B. Cementitious Backer Units: ANSI A108.11, at [showers, tubs, and where indicated] [locations indicated to receive tile].

C. Water-Resistant Backing Board: Install where indicated with 1/4-inch gap where panels abut other construction or penetrations.

D. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints [at locations indicated on Drawings] [according to ASTM C 840 and in specific locations approved by Architect for visual effect].

C. Interior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners unless otherwise indicated.
   2. Bullnose Bead: Use at outside corners
   3. LC-Bead: Use at exposed panel edges

D. Exterior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners.

3.7 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints[, rounded or beveled edges,] and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
   2. Level 4: Through-out the building
      a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.8 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 31 00

TILE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Porcelain floor tile.
   2. Ceramic wall tile
   3. Stone thresholds installed as part of tile installations.
   4. Waterproof membrane for tile installations.

1.2 RELATED DOCUMENTS

A. The following sections contain requirements that relate to this section:
   1. Interior Drawings (I series)

1.3 DEFINITIONS

A. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

1.4 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
   1. Level Surfaces: Minimum 0.6.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

C. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

D. Product Certificates: For each type of product, signed by product manufacturer.

E. Qualification Data: For Installer.

F. Material Test Reports: For each tile-setting and -grouting product.

1.6 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.
   1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:

1. Stone thresholds.
2. Waterproofing.
3. Joint sealants.
4. Cementitious backer units.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store liquid latexes in unopened containers and protected from freezing.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Products: Subject to compliance with requirements, provide one of the products specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
   1. Provide tile complying with Standard grade requirements, unless otherwise indicated.
   2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.

C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
   1. As selected by Architect from manufacturer's full range.

D. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless otherwise indicated.

1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 TILE PRODUCTS

A. Basis of Design Product: Subject to compliance with requirements, provide Ceramic Tile referenced in the Finishes List on the I200 drawing which includes "Owner approved", manufacturers, styles, colors and remarks, by Daltile, or comparable product by one of the following manufacturers:
1. Crossville, Inc.
2. American Olean

B. Products: Tile products to have the following characteristics:
1. Water Absorbstion :≤ 20%
2. Bond Strength: ≥ 50 psi
3. Facial Dimension: Sides ≤ 4% and Range ≤ 6 %
4. Range of Thickness: ≤ 0.031 inch
5. Actual thickness: 0.21-0.37 inch
6. Warpage : Edge -0.3≤ x ≤ 0.4 % , Diagonal : ≤ 0.5 %
7. Crazing: 150 psi
8. Thermal shock: No evidence

C. Glazed Wall Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes as selected from manufacturer's full range of standard shapes.

2.4 WATERPROOFING MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.10.

B. Chlorinated-Polyethylene-Sheet Product: Nonplasticized, chlorinated polyethylene faced on both sides with high-strength, nonwoven polyester fabric, for adhering to latex-portland cement mortar; 60 inches wide by 0.030-inch nominal thickness.
1. Product:
   a. Noble Company (The); Nobleseal TS.
   b. Dow Chemical Company Tyrin 7110
   c. Laticrete 3159 Laticrete
   d. Accessories: Manufacturers standard seaming cement and waterproofing sealant.

2.5 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
1. Bevel edges as indicated on the drawings, aligning lower edge of bevel with adjacent floor finish.
2. Marble Thresholds: ASTM C 503 with a minimum abrasion resistance of 12 per ASTM C 1353 or ASTM C 241 and with honed finish.
3. Description: Uniform, fine- to medium-grained white stone with gray veining.

2.6 SETTING AND GROUTING MATERIALS

A. Available Manufacturers:
1. Custom Building Solutions
2. MAPEI Corporation.

3. LATICRETE International Inc.
4. Hydroment

B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, consisting of the following:
   1. Prepackaged dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive.
      a. For wall applications, provide nonsagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.

C. Polymer-Modified Tile Grout: ANSI A118.7, color as indicated
   1. Polymer Type: Either ethylene vinyl acetate, in dry, redispersible form, prepackaged with other dry ingredients, or acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.
      a. Unsanded grout mixture for joints 1/8 inch and narrower.
      b. Sanded grout mixture for joints 1/8 inch and wider.

2.7 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

C. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, half-hard brass exposed-edge material.

2.8 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
   1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
   2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
   3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
   1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.

F. Lay out tile wainscots to next full tile beyond dimensions indicated.

G. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
   1. Locate joints in tile surfaces directly above joints in concrete substrates.
   2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

H. Grout tile to comply with requirements of the following tile installation standards:
   1. For ceramic tile grouts (sand-portland cement; dry-set, commercial portland cement; and latex-portland cement grouts), comply with ANSI A108.10.

3.4 WATERPROOFING INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.

B. Install waterproofing membrane to cured thickset bed with thinset mortar.

C. Where required seam individual sheets of membrane together using manufacturers recommended seaming products and procedures.

D. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 FLOOR TILE INSTALLATION

A. General: Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.

B. Joint Widths: Install tile on floors with the following joint widths:
   1. Ceramic Mosaic Tile: 1/16 inch.

C. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.
   1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent nontile floor finish.

3.6 WALL TILE INSTALLATION

A. Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.

B. Joint Widths: Install tile on walls with the following joint widths:
   1. Ceramic Mosaic Tile: 1/16 inch.

3.7 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
   1. Remove grout residue from tile as soon as possible.
   2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
   3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.8 FLOOR TILE INSTALLATION SCHEDULE

A. Tile Installation : Interior floor installation over concrete; thin-set mortar; TCA F113-03, A108.1B tile installation.

1. Tile Type: Unglazed Ceramic mosaic tile, Glazed Ceramic mosaic tile, Unglazed Quarry tile and Unglazed Paver tile.
2. Thin-Set Mortar: Latex-Portland cement mortar.
3. Grout: Polymer-modified sanded grout. ANSI A118.7, A108.10 grout installation

3.9 WALL TILE INSTALLATION SCHEDULE

A. Tile Installation: Interior wall installation over gypsum board; thin-set mortar; TCA W243-03 and ANSI A108.5tile installation.
1. Tile Type: Glazed ceramic mosaic tile.
2. Thin-Set Mortar: Latex- Portland cement mortar.
3. Grout: Polymer-modified unsanded grout ANSI A118.7, A108.10 grout installation

END OF SECTION 09 31 00

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for ceilings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including proposed hanger wire anchors.

B. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

C. Samples for Initial Selection: For components with factory-applied color finishes.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
   1. Acoustical Panel: Set of 6-inch- square Samples of each type, color, pattern, and texture.
   2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- long Samples of each type, finish, and color.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Suspended ceiling components.
   2. Structural members to which suspension systems will be attached.
   3. Size and location of initial access modules for acoustical panels.
   4. Items penetrating finished ceiling including the following:
      a. Lighting fixtures.
      b. Air outlets and inlets.
      c. Speakers.
      d. Sprinklers.
      e. Access panels.
   5. Perimeter moldings.

B. Evaluation Reports: For each acoustical panel ceiling suspension system, from ICC-ES.

C. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

   1. Acoustical Ceiling Panels: Full-size panels equal to 2 percent of quantity installed.
   2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
   3. Hold-Down Clips: Equal to 2 percent of quantity installed.

4. Impact Clips: Equal to 2 percent of quantity installed.

1.6 QUALITY ASSURANCE

A. Test reports: Manufacturer will provide test certification for minimum requirements as tested in accordance with applicable industry standards and/or to meet performance standards specified by various agencies.

B. Changes from system: System performance following any substitution of materials or change in assembly design must be certified by the manufacturer.

C. All ceiling panel cartons must contain UL label for acoustical compliance.

D. All suspension system cartons must contain UL label for load compliance per ASTM C635.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
   1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to Seismic Category C.
   1. Provide manufacturer’s approved and tested seismic assembly complying with:
      a. American Society of Civil Engineers 7-05: Minimum Design Loads for Buildings and Other Structures.
      b. CISCA: Guidelines for Seismic Restraint Direct Hung Suspended Ceiling Assemblies Seismic Zones 3 & 4.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
   2. Smoke-Developed Index: 50 or less.

C. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ACOUSTICAL PANELS, GENERAL

A. Low-Emitting Materials: Acoustical panel ceilings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Source Limitations:
1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
2. Suspension System: Obtain each type from single source from single manufacturer.

C. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.

D. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

E. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.

F. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 ACOUSTICAL PANELS - ACT-1

A. Basis-of-Design Product: Subject to compliance with requirements, provide “Optima Tegular” by Armstrong World Industries or comparable product by one of the following:
1. USG Corp..
2. CertainTeed Corp.

B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
1. Type and Form: Type IV, Form 2.
2. Pattern: E (lightly textured).

C. Fire Rating : Class A

D. Color: White.

E. LR: Not less than 0.89.

F. NRC: Not less than 0.95.

G. CAC: Not less than 35.

H. Edge/Joint Detail: Beveled Tegular.

I. Thickness: 1 inch.

J. Modular Size: 24 by 24 inches.

2.4 ACOUSTICAL PANELS - ACT-2

A. Basis-of-Design Product: Subject to compliance with requirements, provide "Optima Clean Room" by Armstrong World Industries or comparable product by one of the following:
   1. USG Corp.
   2. CertainTeed Corp.

B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
   1. Type and Form: Type III, mineral base with painted finish; Form 2, water felted.
   2. Pattern: C (perforated, small holes) E (lightly textured).

C. Fire Classification: Class A.

D. Color: Tech Black.

E. NRC: Not less than 0.55.

F. CAC: Not less than 33.

G. Edge/Joint Detail: Square.

H. Thickness: 1 inch.

I. Modular Size: 24 by 24 inches.

J. Cleanable and washable for the kitchen

2.5 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
   1. High-Humidity Finish: Comply with ASTM C 635/C 635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
   1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
      a. Type: Postinstalled expansion anchors.
      b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
      c. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchor.
      d. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.

   2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by

testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
3. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
4. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.

D. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

E. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.

F. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

G. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

H. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in place.

I. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.

J. Impact Clips: Where indicated, provide manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.

K. Clean-Room Gasket System: (Sterile Areas) Where indicated, provide manufacturer's standard system, including manufacturer's standard gasket and related adhesives, tapes, seals, and retention clips, designed to seal out foreign material from and maintain positive pressure in clean room.

2.6 METAL SUSPENSION SYSTEM

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Armstrong World Industries, Inc.
2. CertainTeed Corp.
3. Chicago Metallic Corporation.
4. USG Interiors, Inc.; Subsidiary of USG Corporation.

B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation; with prefinished 15/16-inch- wide metal caps on flanges.
1. Structural Classification: Heavy-duty system.
2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
3. Face Design: Flat, flush.
4. Cap Material: Steel or aluminum cold-rolled sheet.
5. Cap Finish: Painted white or flat black to match panel color.
6. Basis of Design: Prelude

2.7 SUSPENSION SYSTEMS STERILE AREAS

A. Components: Clean Room Grid System, as manufactured by Armstrong World Industries.
   1. Main Beams: All main beams shall be commercial-quality 3105-H24 aluminum chassis co-extruded with polyvinyl chloride.
      a. EA7900 Main Beams are 1-11/16 inch web height with 15/16 inch exposed flange with integral flexible gasket.
      b. End detail: Stainless steel splice clips.
      c. Structural Classification: ASTM C 635 Intermediate Duty.
   2. Cross Tees: All cross tees shall be commercial-quality 3105-H24 aluminum chassis co-extruded with polyvinyl chloride.
      a. Cross tees have 2 inch web height with 1-1/2 inch exposed flange with integral flexible gasket.
      b. End detail: Hook type with holes available to accept #6 self-tapping screws for seismic installations.
      c. EA7940 - 4 foot cross tees
      d. EA7920 - 2 foot cross tees
   3. Wall Molding, EA7801 - 15/16 inch commercial-quality 3105-H24 aluminum chassis co-extruded with polyvinyl chloride with integral flexible gasket.
   4. Hold Down Clip - Extruded polyvinyl chloride clip to work with 1/16 inch to 3/4 inch panels.

B. Finish: Lightly textured white polyvinyl chloride and match the actual color of the selected ceiling tile, unless noted otherwise.

C. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

D. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge

2.8 METAL EDGE MOLDINGS AND TRIM

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Armstrong World Industries, Inc.
   2. CertainTeed Corp.
   3. Chicago Metallic Corporation.
   4. USG Interiors, Inc.; Subsidiary of USG Corporation.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
   1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
   2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
   3. Outside Corner: Prefabricated corner cap; formed to 90° angle; hemmed edge; size and finish to match wall molding.

2.9 ACOUSTICAL SEALANT

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   1. Acoustical Sealant for Exposed and Concealed Joints:
      a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
      b. USG Corporation; SHEETROCK Acoustical Sealant.
   2. Acoustical Sealant for Concealed Joints:
      a. Henkel Corporation; OSI Pro-Series SC-175 Acoustical Sound Sealant.
      b. Pecora Corporation; AIS-919.
      c. Tremco, Inc.; Tremco Acoustical Sealant.

B. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
   1. Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.
   2. Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant.
   3. Acoustical sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
   1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

B. Suspend ceiling hangers from building's structural members and as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post installed anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Ceiling Perimeter (Seismic Considerations): Install edge moldings (7/8" minimum) and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Tee ends shall be tied together with manufacturer supplied Stabilizer Bars or other approved means to prevent the tees from spreading apart.
2. Maintain a 3/8" clearance between the ends of the suspension members and the wall. The unattached ends of the suspension members shall rest upon and be free to slide perpendicularly to the perimeter molding.
3. Alternate Perimeter Attachment: When approved by local code officials install 7/8" edge molding with grid manufacturers Seismic Clip accessory in lieu of stabilizer bars.

F. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

G. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
2. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
3. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
5. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions unless otherwise indicated.
6. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
7. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

SECTION 09 67 23

RESINOUS FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Industrial resinous flooring systems.

B. Related Sections:
   1. Section 07 92 00 "Joint Sealants" for sealants installed at joints in resinous flooring systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.

B. Samples for Initial Selection: For each type of exposed finish required, from manufacturer’s full range.

C. Samples for Verification: For each resinous flooring system required, 6 inches square, applied to a rigid backing by Installer for this Project.

1.4 INFORMATIONAL SUBMITTALS

A. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

B. Material Certificates: For each resinous flooring component, from manufacturer.

C. Material Test Reports: For each resinous flooring system.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of flooring systems required for this Project.
   1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.

B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.

C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Dur-A-Flex, Inc.
2. Epoxy Systems, Inc.
3. Key Resin Company.
4. Marbelite International Corp.
5. Stonhard, Inc.
6. Tufco International Inc.

2.2 INDUSTRIAL RESINOUS FLOORING-ERF-1

A. Resinous Flooring: Abrasion, impact, and chemical-resistant, industrial-aggregate-filled, resin-based, monolithic floor surfacing designed to produce a seamless floor and integral cove base.

B. System Characteristics:
1. Color and Pattern: As selected by Architect from manufacturer's full range.
2. Wearing Surface: Manufacturer's standard wearing surface.
3. Overall System Thickness: 1/8 inch.

C. Body Coats:
1. Resin: Epoxy.
2. Formulation Description: 100 percent solids.
3. Application Method: Self-leveling slurry with broadcast aggregates.
   a. Thickness of Coats: 1/16” inch.
   b. Number of Coats: Two.
4. Aggregates: Colored quartz (ceramic-coated silica).

D. Topcoat: Sealing or finish coats.
1. Resin: Epoxy.
2. Formulation Description: 100 percent solids.
3. Type: Pigmented.
4. Finish: Matte.
5. Number of Coats: One.

E. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:
1. Compressive Strength: 9000 psi per ASTM C 579.
2. Tensile Strength: 1600 psi per ASTM C 307.
3. Flexural Modulus of Elasticity: 1.0 x 10(6) per ASTM C 580.
4. Water Absorption: 0.1% per ASTM C 413.
5. Coefficient of Friction: > 1.0 per ASTM F-1679.
6. Cure Rate: 12 hours for foot traffic at 77 degrees).
7. Abrasion Resistance: 0.06 gm maximum weight loss per ASTM D 4060.
8. Flammability: Self-extinguishing per ASTM D 635.
9. Hardness: 85 to 90 Shore D per ASTM D 2240.
10. Bond Strength: > 400psi 100 percent concrete failure per ACI 503R.

F. System Chemical Resistance: Test specimens of cured resinous flooring system are unaffected when tested according to ASTM D 1308 for 50 percent immersion.

G. Primer: Type recommended by manufacturer for substrate and body coats indicated.
1. Formulation Description: High solids.

H. Waterproofing Membrane: Type recommended by manufacturer for substrate and primer and body coats indicated.
1. Formulation Description: High solids.

I. Reinforcing Membrane: Flexible resin formulation that is recommended by manufacturer for substrate and primer and body coats indicated and that prevents substrate cracks from reflecting through resinous flooring.
1. Formulation Description: High solids.
a. Provide fiberglass scrim embedded in reinforcing membrane.

J. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry substrate for resinous flooring application.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
1. Roughen concrete substrates as follows:
a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
b. Comply with ASTM C 811 requirements unless manufacturer's written instructions are more stringent.
2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written instructions.
3. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. of slab area in 24 hours.

4. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.

3.2 APPLICATION

A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
3. At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.

B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.

C. Apply waterproofing membrane, where indicated, in manufacturer's recommended thickness.

1. Apply waterproofing membrane to integral cove base substrates.

D. Apply reinforcing membrane to entire substrate surface.

E. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.

1. Integral Cove Base: 4 inches high.

F. Apply self-leveling slurry body coats in thickness indicated for flooring system.

1. Broadcast aggregates at rate recommended by manufacturer and, after resin is cured, remove excess aggregates to provide surface texture indicated.

3.3 PROTECTION

A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

END OF SECTION 09 67 23

SECTION 09 91 13

EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on exterior substrates
   1. Steel. (Guardrail system)
   2. Wood.
   3. Exterior gypsum board.

B. Related Requirements:
   1. Section 09 91 23 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.
   2. Section 09 93 00 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on exterior wood substrates.

1.2 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523, a matte flat finish.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, a high-side sheen flat, velvet-like finish.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, an eggshell finish.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523, a satin-like finish.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523, a semi-gloss finish.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523, a gloss finish.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
   1. Submit Samples on rigid backing, 8 inches square.
   2. Step coats on Samples to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:
   1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
   2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
   3. VOC content.

1.4 CLOSEOUT SUBMITTALS

A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint: **5**percent, but not less than [**1 gal.**] of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
      a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
      b. Other Items: Architect will designate items or areas required.
   2. Final approval of color selections will be based on mockups.
      a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Final Acceptance.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacture’s label with the following information:
   1. Product name and type (description).
   2. Batch date.
   3. Color number.
   4. VOC content.
   5. Environmental handling requirements.
   6. Surface preparation requirements.
   7. Application instructions.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company products indicated or comparable product from one of the following:
1. Benjamin Moore & Co.
2. Devoe
3. Glidden Professional, Division of PPG Architectural Finishes, Inc.
4. M.A.B. Paints.
5. PPG Architectural Finishes, Inc.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:
1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

D. Colors: As indicated on the I Series drawings.

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.

1. Report, in writing, conditions that may affect application, appearance, or performance of paint.

B. Substrate Conditions:
   1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
      a. Wood: 15 percent.

C. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.
   1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer
   1. SSPC-SP 2, "Hand Tool Cleaning."
   2. SSPC-SP 3, "Power Tool Cleaning."
   3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
   4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:
   1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
   2. Sand surfaces that will be exposed to view, and dust off.
   3. Prime edges, ends, faces, undersides, and backsides of wood.

4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Paint entire exposed surface of window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed to view:
a. Equipment, including panelboards
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Cementitious Siding
   1. Latex System:
      a. Prime Coat: Primer sealer, latex, exterior S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.
      b. Prime Coat: Latex, exterior, matching topcoat.
      c. Intermediate Coat: Latex, exterior, matching topcoat.
      d. Topcoat: Latex, exterior, flat S-W A-100 Exterior Latex Flat, A6 Series, at 4.0 mils wet, 1.2 mils dry, per coat.
      e. Topcoat: Latex, exterior, low-sheen: S-W A-100 Exterior Latex Low Sheen, A12 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
      f. Topcoat: Latex, exterior, satin: S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
      g. Topcoat: Latex, exterior, semi-gloss S-W Solo Acrylic Semi-Gloss, A76 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
      h. Topcoat: Latex, exterior, gloss[, : S-W A-100 Exterior Latex Gloss, A8 Series, at 4.0 mils wet, 1.3 mils dry, per coat.
   2. Latex Aggregate/Latex System:
      a. Prime Coat: Block Filler, Latex, Interior/Exterior S-W Loxon Block Surfacer, A24W200, at 50 to 100 sq ft/gal.
      b. Topcoat: Latex, exterior flat texture: S-W UltraCrete Textured Masonry Topcoat, A44-800 Series, at 50 to 80 sq ft/gal.
   3. Concrete Stain System (Water-based):
      a. First Coat: Low-luster opaque finish matching topcoat.
      b. Topcoat: Low-luster opaque finish: S-W H&C Concrete Stain Solid Color Water

B. Ferrous Metal, Galvanized-Metal, and Aluminum Substrates:
   1. Water-Based Light Industrial Coating System:
      a. Prime Coat: Primer, water-based, anti-corrosive for metal S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.
      b. Prime Coat: Shop primer specified in Section where substrate is specified.
      c. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
      d. Topcoat: Light industrial coating, exterior, water based, eggshell S-W Pro Industrial Eg-Shel Acrylic B66-660 Series, at 2.5 to 4.0 mils dry, per coat.
      e. Topcoat: Light industrial coating, exterior, water based, semi-gloss: S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils dry, per coat.

f. Topcoat: Light industrial coating, exterior, water based, gloss S-W Pro Industrial Acrylic Gloss Coating, B66-600 Series, at 2.5 to 4.0 mils dry, per coat.

C. Wood Substrates: Including exposed wood items not indicated to receive shop-applied finish.
1. Latex System:
a. Prime Coat: Primer, latex for exterior wood
a. Intermediate Coat: Latex, exterior, matching topcoat.
b. Topcoat: Latex, exterior, flat S-W A-100 Exterior Latex Flat, A6 Series, at 4.0 mils wet, 1.2 mils dry, per coat.
c. Topcoat: Latex, exterior, low-sheen S-W A-100 Exterior Latex Low Sheen, A12 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
d. Topcoat: Latex, exterior, satin, S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
e. Topcoat: Latex, exterior, semi-gloss: S-W Solo Acrylic Semi-Gloss, A76 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
f. Topcoat: Latex, exterior, gloss[,]: S-W A-100 Exterior Latex Gloss, A8 Series, at 4.0 mils wet, 1.3 mils dry, per coat.

D. Exterior Gypsum Board Substrates:
1. Latex System:
a. Prime Coat: Primer, bonding, water-based S-W PrepRite ProBlock Latex Primer/Sealer.
b. Prime Coat: Latex, exterior, matching topcoat.
c. Intermediate Coat: Latex, exterior, matching topcoat.
d. Topcoat: Latex, exterior, flat : S-W A-100 Exterior Latex Flat, A6 Series, at 4.0 mils wet, 1.2 mils dry, per coat.
e. Topcoat: Latex, exterior, low-sheen S-W A-100 Exterior Latex Low Sheen, A12 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
f. Topcoat: Latex, exterior, satin: S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
g. Topcoat: Latex, exterior, semi-gloss S-W Solo Acrylic Semi-Gloss, A76 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
h. Topcoat: Latex, exterior, gloss S-W A-100 Exterior Latex Gloss, A8 Series, at 4.0 mils wet, 1.3 mils dry, per coat.

END OF SECTION 09 91 13

SECTION 09 91 23

INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on interior substrates
   1. Aluminum (not anodized or otherwise coated).
   2. Wood.
   3. Gypsum board.

B. Related Requirements:
   1. Section 09 91 13 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.
   2. Section 09 93 00 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.

1.2 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523, a matte flat finish.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, a high-side sheen flat, velvet-like finish.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, an eggshell finish.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523, a satin-like finish.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523, a semi-gloss finish.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523, a gloss finish.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
   1. Submit Samples on rigid backing, 8 inches square.
   2. Step coats on Samples to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:
   1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.4 CLOSEOUT SUBMITTALS

A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint: [**5**] percent, but not less than **1 gal.** of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
      a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
      b. Other Items: Architect will designate items or areas required.
   2. Final approval of color selections will be based on mockups.
      a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Final Acceptance.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacturer’s label with the following information:
   1. Product name and type (description).
   2. Batch date.
   3. Color number.
   4. VOC content.
   5. Environmental handling requirements.
   6. Surface preparation requirements.
   7. Application instructions.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
   1. Use Lead Safe Work Practices in accordance with US Dept.of Housing and Urban Development. All employees working with Lead based paint Materials shall have HUD approved training.
   2. Do not disturb lead paint or items suspected of containing hazardous materials except under procedures specified.
   3. Perform preparation for painting of substrates known to include lead paint in accordance with EPA Renovation, Repair and Painting Rule and additional requirements of authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company products indicated or comparable product from one of the following:
   1. Benjamin Moore & Co.
   2. Devoe
   3. Glidden Professional, Division of PPG Architectural Finishes, Inc.
   4. Pratt & Lambert.

B. Colors: as indicated on the I Series drawings.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:
   1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction[and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24)].
   1. Flat Paints and Coatings: 50 g/L.
   2. Nonflat Paints and Coatings: 150 g/L.
   3. Dry-Fog Coatings: 400 g/L.
   4. Primers, Sealers, and Undercoaters: 200 g/L.
   5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
   6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
   7. Pretreatment Wash Primers: 420 g/L.
   8. Floor Coatings: 100 g/L.
   9. Shellacs, Clear: 730 g/L.
   10. Shellacs, Pigmented: 550 g/L.

D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Colors: As indicated in a color schedule

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
   1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
   2. Testing agency will perform tests for compliance with product requirements.
   3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.
   1. Report, in writing, conditions that may affect application, appearance, or performance of paint.

B. Substrate Conditions:
   1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
      a. Concrete: 12 percent.
      b. Masonry (Clay and CMU): 12 percent.
      c. Wood: 15 percent.
      d. Gypsum Board: 12 percent.
      e. Plaster: 12 percent.
   2. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
   3. Plaster Substrates: Verify that plaster is fully cured.
   4. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

C. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.
   1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
   1. Concrete Floors: Remove oil, dust, grease, dirt, and other foreign materials. Comply with SSPC-SP-13/NACE 6 or ICRI 03732.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer**.**
   1. SSPC-SP 2, "Hand Tool Cleaning."
   2. SSPC-SP 3, "Power Tool Cleaning."
   3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
   4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:
   1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
   2. Sand surfaces that will be exposed to view, and dust off.
   3. Prime edges, ends, faces, undersides, and backsides of wood.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
   1. Paint the following work where exposed in equipment rooms:
      a. Equipment, including panelboards
      b. Uninsulated metal piping.
      c. Uninsulated plastic piping.
      d. Pipe hangers and supports.
      e. Metal conduit.
      f. Plastic conduit.
      g. Tanks that do not have factory-applied final finishes.
      h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
   2. Paint the following work where exposed in occupied spaces:
      a. Equipment, including panelboards.
      b. Uninsulated metal piping.
      c. Uninsulated plastic piping.
      d. Pipe hangers and supports.
      e. Metal conduit.
      f. Plastic conduit.
      g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
      h. Other items as directed by Architect.
   3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
   1. Contractor shall touch up and restore painted surfaces damaged by testing.
   2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces
   1. Latex System:
      a. Prime Coat: Primer sealer, latex, interior S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.
      b. Intermediate Coat: Latex, interior, matching topcoat.
      c. Topcoat: Latex, interior, flat : S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
      d. Topcoat: Latex, interior, low sheen: S-W ProMar 200 Zero VOC Latex Low Sheen Enamel, B24-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
      e. Topcoat: Latex, interior, eggshell S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
      f. Topcoat: Latex, interior, semi-gloss S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
      g. Topcoat: Latex, interior, gloss : S-W ProMar 200 Latex Gloss, B11-2200 Series, at 4.0 mils wet, 1.5 mils dry, per coat..
   2. Water-Based Light Industrial Coating System:
      a. Prime Coat: Primer sealer, latex, interior S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.
      b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
      c. Topcoat: Light industrial coating, interior, water based, eggshell S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
      d. Topcoat: Light industrial coating, interior, water based, semi-gloss S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
   3. Concrete Stain System (Water-based) for Vertical Surfaces:
      a. First Coat: S-W H&C Concrete Stain Solid Color Water Based, at 50 to 300 sq. ft. per gal.
      b. Second Coat: S-W H&C Concrete Stain Solid Color Water Based, at 50 to 300 sq. ft. per gal.

B. Metal Substrates (Aluminum, Steel, Galvanized Steel):
   1. Latex System:
      a. Prime Coat: Primer, rust-inhibitive, water base S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
      b. Intermediate Coat: Water-based acrylic, interior, matching topcoat.
      c. Topcoat: Water-based acrylic, semi-gloss S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils dry, per coat.
      d. Topcoat: Water-based acrylic, gloss S-W Pro Industrial Acrylic Gloss Coating, B66-660 Series, at 2.5 to 4.0 mils dry, per coat.
   2. Water-Based Dry-Fall System:

a. Top Coat: Dry-fall latex, flat: S-W Pro Industrial Waterborne Acrylic Dryfall Flat, B42-80 Series, at 6.0 mils wet, 1.7 mils dry.
b. Top Coat: Dry-fall latex, eggshell: S-W Pro Industrial Waterborne Acrylic DryFall Eg-Shel, B42-2 Series, at 6.0 mils wet, 1.9 mils dry.
c. Top Coat: Dry-fall latex, semi-gloss: S-W Pro Industrial Waterborne Acrylic DryFall Semi-Gloss, B42-80 Series, at 5.8 mils wet, 2.3 mils dry.

3. Water-Based Light Industrial Coating System:
a. Prime Coat: Primer, rust-inhibitive, water based: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based, eggshell S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
d. Topcoat: Light industrial coating, interior, water based, semi-gloss S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

4. Acrylic/Alkyd System:
a. Prime Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.
b. Intermediate Coat: Water-based acrylic-alkyd, interior, matching topcoat.
c. Topcoat: Water-based acrylic-alkyd, semi-gloss, interior: S-W ProMar 200 Waterbased Acrylic-Alkyd Semi-Gloss, B34-8200 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
d. Topcoat: Water-based acrylic-alkyd, gloss, interior: S-W ProMar 200 Waterbased Acrylic-Alkyd Gloss, B35-8200 Series, at 4.0 mils wet, 1.7 mils dry, per coat.

C. Wood Substrates: Including exposed wood items not indicated to receive shop-applied finish.
1. Latex System:
a. Prime Coat: Primer sealer, latex, interior S-W PrepRite ProBlock Primer Sealer, B51-620 Series, at 4.0 mils wet, 1.4 mils dry.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, eggshell: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
d. Topcoat: Latex, interior, semi-gloss S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
e. Topcoat: Latex, interior, gloss S-W ProMar 200 Latex Gloss, B11-2200 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

2. Acrylic/Alkyd System:
a. Prime Coat: Primer sealer, latex, interior: S-W Premium Wall & Wood Primer, B28W8111, at 4.0 mils wet, 1.8 mils dry.
b. Intermediate Coat: Water-based acrylic-alkyd, interior, matching topcoat.
c. Topcoat: Water-based acrylic-alkyd, semi-gloss, interior: S-W ProMar 200 Waterbased Acrylic-Alkyd Semi-Gloss, B34-8200 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
d. Topcoat: Water-based acrylic-alkyd, gloss, interior: S-W ProMar 200 Waterbased Acrylic-Alkyd Gloss, B35-8200 Series, at 4.0 mils wet, 1.7 mils dry, per coat.

3. Water-Based Light Industrial Coating System:
a. Prime Coat: Primer sealer, latex, interior: S-W PrepRite ProBlock Primer Sealer, B51-620 Series, at 4.0 mils wet, 1.4 mils dry.

b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based, eggshell S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
d. Topcoat: Light industrial coating, interior, water based, semi-gloss S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

D. Wood Substrates, Pedestrian Traffic Surfaces:
1. Latex Floor Enamel System:
a. First Coat: Floor paint, latex, slip-resistant, matching topcoat.
b. Topcoat: Floor paint, latex, slip-resistant, low gloss S-W ArmorSeal Tread-Plex, B90 Series, at 1.5 to 2.0 mils dry per coat.

E. Gypsum Board Substrates:
1. Latex System:
a. Prime Coat: Primer, latex, interior: S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.5 mils dry.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
d. Topcoat: Latex, interior, low sheen S-W ProMar 200 Zero VOC Latex Low Sheen Enamel, B24-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
e. Topcoat: Latex, interior, eggshell S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
f. Topcoat: Latex, interior, semi-gloss S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
g. Topcoat: Latex, interior, gloss S-W ProMar 200 Latex Gloss, B11-2200 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
2. Water-Based Light Industrial Coating System:
a. Prime Coat: Primer sealer, latex, interior: S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.5 mils dry.
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based, eggshell: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
d. Topcoat: Light industrial coating, interior, water based, semi-gloss: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

END OF SECTION 09 91 23

SECTION 09 93 00

STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and the application of wood finishes on the following substrates:
   1. Exterior Substrates:
      a. Heavy Timber.
      b. Exposed wood decking
   2. Interior Substrates:
      a. Wood flooring (Alternate 3)

B. Related Sections include the following:
   1. Division 09 91 13 Section "Exterior Painting" for surface preparation and application of standard paint systems on exterior substrates.
   2. Division 09 91 23 Section "Interior Painting" for surface preparation and application of standard paint systems on interior substrates.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: For each type of finish system and in each color and gloss of finish indicated.
   1. Submit Samples on representative samples of actual wood substrates, 8 inches square.
   2. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:
   1. Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules.
   2. Printout of MPI's current "MPI Approved Products List" for each product category specified in Part 2, with the product proposed for use highlighted.

1.4 QUALITY ASSURANCE

A. MPI Standards:
   1. Products: Complying with MPI standards indicated and listed in its "MPI Approved Products List."
   2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and finish systems indicated.

B. Mockups: Apply benchmark samples of each finish system indicated and each color selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.
   a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
   b. Other Items: Architect will designate items or areas required.
2. Final approval of stain color selections will be based on benchmark samples.
   a. If preliminary stain color selections are not approved, apply additional benchmark samples of additional stain colors selected by Architect at no added cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply exterior finishes in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Benjamin Moore & Co.
2. Cabot Incorporated, Samuel.
3. California Paints.
4. Coronado Paint.
5. ICI Paints.
6. Insl-x.
7. PPG Architectural Finishes, Inc.
8. Sherwin-Williams Company (The)

2.2 MATERIALS, GENERAL

A. Material Compatibility:
1. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.

B. Stain Colors: As selected by Architect from manufacturer's full range.

2.3 WOOD FILLERS

A. Wood Filler Paste: MPI #91.

2.4 PRIMERS AND SEALERS

A. Exterior Oil Wood Primer: MPI #7.

B. Alkyd Sanding Sealer: MPI #102.

2.5 STAINS

A. Exterior Solid-Color Stain (Solvent Based): MPI #14.

B. Interior Wood Stain (Semitransparent): MPI #90.

2.6 VARNISHES

A. Interior Varnish (Semigloss): MPI #74, Gloss Level 5, alkyd type.

B. Interior Varnish (Gloss): MPI #75, Gloss Level 6, alkyd type.

2.7 POLYURETHANE FINISHES

A. Interior, Oil-Modified, Clear Urethane (Satin): MPI #57, Gloss Level 4.

B. Interior, Oil-Modified, Clear Urethane (Gloss): MPI #56, Gloss Level 6.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
   1. Maximum Moisture Content of Wood Substrates: 15 percent when measured with an electronic moisture meter.
   2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes.
   3. Begin finish application only after unsatisfactory conditions have been corrected and surfaces are dry.
   4. Beginning application of finish system constitutes Contractor's acceptance of substrate and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be finished. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
   1. After completing finishing operations, reinstall items that were removed; use workers skilled in the trades involved. Remove surface-applied protection if any.

C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Remove surface dirt, oil, or grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
3. Countersink steel nails, if used, and fill with putty tinted to final color to eliminate rust leach stains.

D. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.

3.3 APPLICATION

A. Apply finishes according to manufacturer's written instructions.
1. Use applicators and techniques suited for finish and substrate indicated.
2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 EXTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Heavy Timber and Exposed wood decking
1. Solid-Color, Solvent-Based Stain System: MPI EXT 6.6C.
a. Prime Coat: Exterior oil wood primer.
b. Two Stain Coats: Exterior solid-color stain (solvent based).

3.6 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Finish Carpentry Substrates: Wood Base
1. Polyurethane Varnish Over Stain System: MPI INT 6.3E.
a. Stain Coat: Interior wood stain (semitransparent).
b. Three Finish Coats: Interior, oil-modified, clear urethane satin

END OF SECTION 09 93 00

SECTION 10 21 13

TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Solid-polymer toilet compartments configured as toilet enclosures, entrance screens and urinal screens.

B. Related Sections:
   1. Section 10 28 00 Toilet Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.
   1. Show locations of cutouts for compartment-mounted toilet accessories.
   2. Show locations of reinforcements for compartment-mounted grab bars.
   3. Show locations of centerlines of toilet fixtures.

C. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.

D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
   1. Each type of material, color, and finish required for units, prepared on 6-inch- square Samples of same thickness and material indicated for Work.
   2. Each type of hardware and accessory.

E. Product Certificates: For each type of toilet compartment, from manufacturer.

F. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: **25** or less.
   2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Castings: ASTM B 26.

B. Aluminum Extrusions: ASTM B 221.

C. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.

D. Stainless-Steel Castings: ASTM A 743.

2.2 STAINLESS-STEEL UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Accurate Partitions Corporation.
   2. General Partitions Mfg. Corp.
   3. Global Steel Products Corp.
   4. Sanymetal; a Crane Plumbing company.
   5. Weis-Robart Partitions, Inc.

B. Toilet-Enclosure Style: Overhead braced.

C. Entrance-Screen Style: Overhead braced.

D. Urinal-Screen Style: Overhead braced.

E. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.
   1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch for doors and panels and 1-1/4 inches for pilasters.
   2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.
   3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.

F. Urinal-Screen Construction:
   1. Flat-Panel Urinal Screen: Matching panel construction.

G. Facing Sheets and Closures: Stainless-steel sheet of nominal thicknesses as follows:
   1. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than 0.038 inch.
   2. Panels: Manufacturer's standard thickness, but not less than 0.031 inch.
   3. Doors: Manufacturer's standard thickness, but not less than 0.031 inch.
   4. Flat-Panel Urinal Screens: Thickness matching the panels.

H. Pilaster Shoes and Sleeves (Caps): Stainless-steel sheet, not less than 0.031-inch nominal thickness and 3 inches high, finished to match hardware.

I. Urinal-Screen Post: Manufacturer's standard post design of 1-3/4-inch- square, aluminum tube with satin finish; with shoe and sleeve (cap) matching that on the pilaster.

J. Brackets (Fittings):
1. Stirrup Type: Ear or U-brackets; stainless steel.

K. Stainless-Steel Finish: Manufacturer's standard textured finish on exposed faces. Protect exposed surfaces from damage by application of strippable, temporary protective covering before shipment.

2.3 SOLID-POLYMER UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Accurate Partitions Corporation.
2. General Partitions Mfg. Corp.
3. Global Steel Products Corp.
4. Santana Products, Inc.
5. Sanymetal; a Crane Plumbing company.
6. Weis-Robart Partitions, Inc.

B. Toilet-Enclosure Style: Overhead braced.

C. Entrance-Screen Style: Overhead braced.

D. Urinal-Screen Style: Overhead braced.

E. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.
1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
2. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum or stainless-steel strip fastened to exposed bottom edges of solid-polymer components to prevent burning.
3. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range.

F. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; polymer
1. Polymer Color and Pattern: Matching pilaster

G. Urinal-Screen Post: Manufacturer's standard post design of 1-3/4-inch- square, aluminum tube with satin finish; with shoe and sleeve (cap) matching that on the pilaster.

H. Brackets (Fittings):
1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

2.4 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
1. Material: Stainless steel.
2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
a. Provide integral hinge for solid-polymer doors.
3. Latch and Keeper: Manufacturer's standard recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.

4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors and entrance-screen doors.
6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

2.5 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.

C. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, in-swinging doors for standard toilet compartments and 36-inch- wide, out-swinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
1. Maximum Clearances:
   a. Pilasters and Panels: 1/2 inch.
   b. Panels and Walls: 1 inch.
2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.
   a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
   b. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.2 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open

approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and doors in entrance screens to return doors to fully closed position.

END OF SECTION 10 21 13

SECTION 10 28 00

TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Public-use washroom accessories.

B. Related Sections:
   1. Section 09 31 00 "Tile" for ceramic toilet and bath accessories.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:
   1. Construction details and dimensions.
   2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
   3. Material and finish descriptions.
   4. Features that will be included for Project.
   5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.5 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: 15 years from date of Final Acceptance.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.

B. Brass: ASTM B 19, flat products; ASTM B 16, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.

C. Steel Sheet: ASTM A 1008, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.

D. Galvanized-Steel Sheet: ASTM A 653, with G60 hot-dip zinc coating.

E. Galvanized-Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.

B. Toilet Tissue (Roll) Dispenser:
1. Basis-of-Design Product: Bobrick B-686.
2. Description: Double-roll dispenser.
3. Mounting: Surface mounted.
4. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

C. Paper Towel (Folded) Dispenser:
1. Basis-of-Design Product: Bobrick No. B-262
2. Mounting: Surface mounted.
3. Minimum Capacity: 400 C-fold or 525 multifold towels.
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type.

D. Liquid-Soap Dispenser:
1. Basis-of-Design Product: Bobrick No. B-2111
2. Description: Designed for dispensing soap in liquid or lotion form.
3. Mounting: Horizontally oriented, surface mounted.
4. Capacity: 40 oz. minimum
5. Materials: Stainless steel, Type 304.
   a. Finish: Smooth, No. 4, satin finish.
6. Lockset: Tumbler type.
7. Refill Indicator: Window type.

E. Grab Bar:
1. Basis-of-Design Product: Bobrick B-5806 Series
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
   a. Finish: Smooth, No. 4, satin finish.
4. Outside Diameter: 1-1/4 inches.
5. Configuration and Length: As indicated on Drawings.

F. Vendor:
1. Basis-of-Design Product: Bobrick No. B-2800
2. Type: Sanitary napkin and tampon.
3. Mounting: Surface mounted.
4. Capacity: 32 napkins and 22 tampons.
5. Operation: Single coin (25 cents).
6. Exposed Material and Finish: Stainless steel, No. 4 finish (satin)
7. Lockset: Tumbler type with separate lock and key for coin box.

G. Sanitary-Napkin Disposal Unit:
1. Basis-of-Design Product: Bobrick No. B-354.
2. Mounting: Partition mounted, dual access.
3. Door or Cover: Self-closing disposal-opening cover and hinged face panel with tumbler lockset.
4. Receptacle: Removable.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

H. Mirror Unit:
1. Basis-of-Design Product: Bobrick No. B-290.
2. Frame: Stainless-steel angle, 0.05 inch thick.
   a. Corners: Welded and ground smooth.
3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
   a. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
   b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
4. Size: 24 by 36 inches.

2.3 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10 28 00

SECTION 10 44 13

FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fire-protection cabinets for the following:
      a. Portable fire extinguishers.

B. Related Requirements:
   1. Section 10 44 16 "Fire Extinguishers."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.

B. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Product Schedule: For fire-protection cabinets. Indicate whether recessed. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

1.5 SEQUENCING

A. Apply vinyl lettering on field-painted fire-protection cabinets after painting is complete.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

2.2 FIRE-PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.
   1. Products: Subject to compliance with requirements:
      a. JL Industries, Inc.; a division of the Activar Construction Products Group.
      b. Larsens Manufacturing Company.
      c. Potter Roemer LLC.

B. Cabinet Construction: Nonrated

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch- thick cold-rolled steel sheet lined with minimum 5/8-inch- thick fire-barrier material. Provide factory-drilled mounting holes.

C. Cabinet Material: Cold-rolled steel sheet.

D. Recessed Cabinet:
1. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

E. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
1. Rolled-Edge Trim: **2-1/2-inch** backbend depth.

F. Cabinet Trim Material: Steel sheet.

G. Door Material: Steel sheet.

H. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
1. Provide manufacturer's standard
2. Provide manufacturer's standard hinge permitting door to open 180 degrees.

I. Accessories:
1. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated
a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER
1) Location: Applied to location indicated on Drawing.
2) Application Process: Decals Lettering Color: White.
3) Orientation: Vertical

J. Materials:
1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
a. Finish: Baked enamel
b. Color: As selected by Architect from full range of industry colors and color densities

2.3 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.
3. Prepare doors and frames to receive locks.
4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Fabricate door frames of one-piece construction with edges flanged.
3. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where [**recessed**] [**and**] [**semirecessed**] cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated
   1. Fire-Protection Cabinets: **54 inches** above finished floor to top of cabinet.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
   1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semirecessed fire-protection cabinets.
   2. Provide inside latch and lock for break-glass panels.
   3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Identification: Apply vinyl lettering at locations indicated.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 13

SECTION 10 44 16

FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

B. Product Schedule: For fire extinguishers. Coordinate final fire extinguisher schedule with fire protection cabinet schedule to ensure proper fit and function.

C. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Failure of hydrostatic test according to NFPA 10.
      b. Faulty operation of valves or release levers.
   2. Warranty Period: Six years from date of Final Acceptance.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each mounting bracket indicated.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
      b. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
      c. Larsen's Manufacturing Company.
      d. Potter Roemer LLC.
   2. Valves: Manufacturer's standard.
   3. Handles and Levers: Manufacturer's standard.

4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.2 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.
1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10 44 16

SECTION 10 51 13

METAL LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Heavy-duty metal lockers.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker and bench.

B. Shop Drawings: For metal lockers. Include plans, elevations, sections, details, and attachments to other work.
   1. Show locker trim and accessories.
   2. Include locker identification system and numbering sequence.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Qualification Data: For qualified Installer.

E. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

F. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain metal lockers, locker benches, and accessories from single source from single manufacturer.

C. Regulatory Requirements: Where metal locker are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of recessed openings by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate sizes and locations of bases for metal lockers.

B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures.
      b. Faulty operation of latches and other door hardware.
   2. Damage from deliberate destruction and vandalism is excluded.
   3. Warranty Period for Knocked-Down Metal Lockers: Two years from date of Final Acceptance.
   4. Warranty Period for All-Welded Metal Lockers: Lifetime from date of Final Acceptance.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with A60 zinc-iron, alloy (galvannealed) coating designation.

C. Plastic Laminate: NEMA LD 3, Grade HGP.

D. Extruded Aluminum: ASTM B 221, alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated.

E. Steel Tube: ASTM A 500, cold rolled.

F. Particleboard: ANSI A208.1, Grade M-2.

G. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.

H. Anchors: Material, type, and size required for secure anchorage to each substrate.
   1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls, and elsewhere as indicated, for corrosion resistance.
   2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.2 HEAVY-DUTY METAL LOCKERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide List Industries Inc. “Marquis Protector” or comparable product by one of the following: Size 18” x 18 “x 72”.
   1. Art Metal Products.
   2. ASI Storage Solutions Inc.
   3. Hadrian Manufacturing Inc.
   4. List Industries Inc.
   5. Republic Storage Systems Company.

B. Locker Arrangement: As indicated on Drawings.

C. Material: Cold-rolled steel sheet.

D. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
   1. Tops, Bottoms, and Sides: 0.060-inch nominal thickness.
   2. Backs: 0.048-inch nominal thickness.
   3. Shelves: 0.060-inch nominal thickness, with double bend at front and single bend at sides and back.

E. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.
   1. Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.

F. Doors: One piece; fabricated from 0.075-inch nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
   1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
   2. Door Style:
      a. Louvered Vents: No fewer than six louver openings at top and bottom for single-tier; three louver openings at top and bottom for double-tier lockers.

G. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
   1. Continuous Hinges: Manufacturer's standard, steel, full height.

H. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry and vandal resistant.
   1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks or padlocks; positive automatic latching and prelocking.
      a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 inches high with two latch hooks; fabricated from 0.120-inch nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.
      b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

I. Combination Padlocks: Provided by Owner.

J. Equipment: Equip each metal locker with identification plate and the following unless otherwise indicated:
   1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
   2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.

K. Accessories:
   1. Recess Trim: Fabricated from 0.048-inch nominal-thickness steel sheet.
   2. Filler Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.

L. Finish: Baked enamel
   1. Color(s): As selected by Architect from manufacturer's full range.

2.3 FABRICATION

A. Fabricate metal lockers square, rigid, and without warp and with metal faces flat and free of

dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.

1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.

C. All-Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds flush.

D. Accessible Lockers: Fabricate as follows:

1. Locate bottom shelf no lower than 15 inches above the floor.
2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.

E. Hooks: Manufacturer's standard ball-pointed type, aluminum or steel; zinc plated.

F. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.

G. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.

1. Sloping-top corner fillers, mitered.

H. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.

2.4 STEEL SHEET FINISHES

A. Factory finish steel surfaces and accessories except stainless-steel and chrome-plated surfaces.

1. Minimum Dry Film Thickness: 2.0 mil.

B. Baked-Enamel Finish: Immediately after cleaning, pretreating, and phosphatizing, apply manufacturer's standard thermosetting baked-enamel finish. Comply with paint manufacturer's written instructions for application, baking, and minimum dry film thickness.

C. Powder-Coat Finish: Immediately after cleaning and pretreating, electrostatically apply manufacturer's standard, baked-polymer, thermosetting powder finish. Comply with resin manufacturer's written instructions for application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install level, plumb, and true; shim as required, using concealed shims.

1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more

than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.

2. Anchor single rows of metal lockers to walls near top and bottom of lockers.
3. Anchor back-to-back metal lockers to floor.

B. All-Welded Metal Lockers: Connect groups together with standard fasteners, with no exposed fasteners on face frames.

C. Equipment and Accessories: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

1. Attach hooks with at least two fasteners.
2. Attach door locks on doors using security-type fasteners.
3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
   a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
   b. Attach plates to upper shelf of each open-front metal locker, centered, with a least two aluminum rivets.
4. Attach recess trim to recessed metal lockers with concealed clips.
5. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
6. Attach sloping-top units to metal lockers, with closures at exposed ends.

3.3 ADJUSTING, CLEANING, AND PROTECTION

A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding.

B. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.

C. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 10 51 13

SECTION 11 52 13

PROJECTION SCREENS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Electrically operated projection screens and controls.

B. Related Sections:
   1. Section 06 10 00 “Rough Carpentry" for wood backing for screen installation.
   2. Division 26 Sections for electrical service and connections including device boxes for switches.

1.3 DEFINITIONS

A. Gain of Front-Projection Screens: Ratio of light reflected from screen material to that reflected perpendicularly from a magnesium carbonate surface as determined per SMPTE RP 94.

B. Half-Gain Angle: The angle, measured from the axis of the screen surface to the most central position on a perpendicular plane through the horizontal centerline of the screen where the gain is half of the peak gain.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For projection screens. Show layouts and types of projection screens. Include the following:
   1. For manually operated projection screens:
      a. Drop lengths.
      b. Anchorage details.
      c. Accessories.
   2. For electrically operated projection screens and controls:
      a. Location of screen centerline relative to ends of screen case.
      b. Location of wiring connections for electrically operated units.
      c. Drop lengths.
      d. Anchorage details, including connection to supporting structure for suspended units.
      e. Details of juncture of exposed surfaces with adjacent finishes.
      f. Accessories.
      g. Wiring diagrams.

C. Samples for Initial Selection: For finishes of surface-mounted screen cases.

D. Maintenance Data: For projection screens to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Source Limitations for Projection Screens: Obtain each type of projection screen from single manufacturer. Obtain accessories, including necessary mounting hardware, from screen manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Environmental Limitations: Do not deliver or install projection screens until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.7 COORDINATION

A. Coordinate layout and installation of projection screens with adjacent construction, including ceiling suspension systems, light fixtures, HVAC equipment, and partitions.

PART 2 - PRODUCTS

2.1 ELECTRICALLY OPERATED PROJECTION SCREENS

A. General: Manufacturer's standard units consisting of case, screen, motor, controls, mounting accessories, and other components necessary for a complete installation.
   1. Controls: Remote, key-operated, three-position control switch installed in recessed device box with flush cover plate matching other electrical device cover plates in room where switch is installed.
      a. Provide two control switches for each screen.
      b. Provide power supply for low-voltage systems if required.
   2. Motor in Roller: Instant-reversing motor of size and capacity recommended by screen manufacturer; with permanently lubricated ball bearings, automatic thermal-overload protection, preset limit switches to automatically stop screen in up and down positions, and positive-stop action to prevent coasting. Mount motor inside roller with vibration isolators to reduce noise transmission.
   3. Screen Mounting: Top edge securely anchored to rigid metal roller and bottom edge formed into a pocket holding a 3/8-inch- diameter metal rod with ends of rod protected by plastic caps.
      a. Roller for motor in roller supported by vibration- and noise-absorbing supports.

B. Surface-Mounted, Metal-Encased, Electrically Operated Screens: Motor-in-roller units designed and fabricated for surface mounting on wall or ceiling, fabricated from formed-steel sheet not less than 0.027 inch thick or from aluminum extrusions; with flat back design and vinyl covering or baked-enamel finish. Provide with matching end caps and concealed mounting.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Motor in Roller:
         1) BEI Audio-Visual Products; Laminar XL.
         2) Da-Lite Screen Company; Cosmopolitan Electrol.
         3) Draper Inc.; Silhouette/Series E.
         4) Stewart Filmscreen Corporation; Model A ElectriScreen.

2.2 FRONT-PROJECTION SCREEN MATERIAL

A. Matte-Gray Viewing Surface: Peak gain not less than 0.8, and half-gain angle of not less than 50 degrees from the axis of the screen surface.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Da-Lite Screen Company; High Contrast Da-Mat.
      b. Draper Inc.; HiDefGrey.
      c. Stewart Filmscreen Corporation; GrayHawk.

B. Mildew-Resistance Rating: 0 or 1 when tested according to ASTM G 21.

C. Flame Resistance: Passes NFPA 701.

D. Flame-Spread Index: Not greater than 75 when tested according to ASTM E 84.

E. Seamless Construction: Provide screens, in sizes indicated, without seams.

F. Edge Treatment: Black masking borders.

G. Size of Viewing Surface: 72 by 96 inches.

PART 3 - EXECUTION

3.1 FRONT-PROJECTION SCREEN INSTALLATION

A. Install front-projection screens with screen cases in position and in relation to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered.
   1. Install low-voltage controls according to NFPA 70 and complying with manufacturer's written instructions.
      a. Wiring Method: Install wiring in raceway except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.
   2. Test electrically operated units to verify that screen controls, limit switches, closures, and other operating components are in optimum functioning condition.
   3. Test manually operated units to verify that screen-operating components are in optimum functioning condition.

END OF SECTION 11 52 13

SECTION 12 48 13

ENTRANCE FLOOR MATS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Entrance mats in recessed frames.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

1.4 QUALITY ASSURANCE

A. Accessibility Requirements: Provide installed floor mats that comply with Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)" and Sections 302 and 303 in ICC A117.1.

1.5 PROJECT CONDITIONS

A. Field Measurements: Indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 ENTRANCE MATS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. American Floor Products Company, Inc.
   2. Musson, R. C. Rubber Co.
   3. Pawling Corporation; Architectural Products Division.

B. Rubber Mats: 3/8-inch- thick mats; with square edges for recessed installations and with perforated style, 3/16 by 3/4 inch on standard spacing, standard pyramid design top profile, and standard knob-base bottom surface.
   1. Color: As selected by Architect from manufacturer's full range.
   2. Mat Size: As indicated.

C. Recessed Frames:
   1. Extruded Aluminum: ASTM B 221, Alloy 6061-T6 or Alloy 6063-T5, T6, or T52.
   2. Color: Clear

2.2 CONCRETE FILL AND GROUT MATERIALS

A. Provide concrete grout and fill equivalent in strength to cast-in-place concrete slabs for recessed mats and frames. Use aggregate no larger than one-third fill thickness.

2.3 FABRICATION

A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes.
   1. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.

B. Recessed Frames: As indicated, for permanent recessed installation, complete with corner pins or reinforcement and anchorage devices.
   1. Fabricate edge-frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

C. Coat surfaces of aluminum frames that will contact cementitious material with manufacturer's standard protective coating.

2.4 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and floor conditions for compliance with requirements for location, sizes, and other conditions affecting installation of floor mats and frames.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate top of mat surfaces with bottom of doors that swing across mats to provide clearance between door and mat.
   1. Install necessary shims, spacers, and anchorages for proper location and secure attachment of frames.
   2. Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level.

B. Install surface-type units to comply with manufacturer's written instructions at locations indicated; coordinate with entrance locations and traffic patterns.

3.3 PROTECTION

A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Final Acceptance

END OF SECTION 12 48 13