PROJECT MANUAL
Including Specifications

DEXTER AREA FIRE DEPARTMENT
NEW FIRE SUB-STATION NO. 2

DEXTER TOWNSHIP
DEXTER, MICHIGAN

SIDOCK ARCHITECTS PROJECT NO. 14049

SIDOCK ARCHITECTS
45650 GRAND RIVER AVENUE
NOVI, MICHIGAN 48374
(248) 349-4500

September 2, 2014

DOCUMENT 00 01 10

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SECTION 00 11 16 – ADVERTISEMENT FOR BIDS

Project: General Contract (All Trades Work) for
New Fire Substation No. 2

Owner: Dexter Township
6880 Dexter Pinckney Road
Dexter, Michigan 48130

Architect/Engineer: Sidock Architects
45650 Grand River Avenue
Novi, Michigan 48374

Dexter Township will receive sealed proposals at the offices of the Township Clerk located at 6880 Dexter Pinckney Road, Dexter, Michigan 48130, until 2:00 p.m., local time, on the 30th day of September, 2014, at which time and place the Bids will be publicly opened and read aloud. Bids not received by the indicated time will not be opened.

Project Description: A General Contract for all trades work for a new, one story fire station of approximately 9,350 sq. ft. with related site work as shown on the Contract Documents dated September 2, 2014, as prepared by Sidock Architects and bearing Project No. 14049.

BIDDING DOCUMENTS

Bidding Documents may be obtained electronically from the office of the Michigan Infrastructure and Transportation Association (MITA). To set up a free account, contact MITA at www.mitaads.com .

BID PROPOSAL GUARANTEE

Each proposal must be accompanied by an acceptable bid security in the form of a certified check, cashiers check or standard form bid bond, made payable to Dexter Township in an amount of not less than five percent (5%) of the base bid submitted. Failure of any accepted Bidder to enter into contract for the Work will cause forfeit of his bid security. After contracts for the work have been signed, all bid securities will be returned.

PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

100% Performance Bond and Labor and Material Payment Bonds will be required on the project. Costs of bonds shall be included in the Base Proposal.

PROPOSAL ACCEPTANCE

Bids may be withdrawn up to the time and date of bid opening. After bid opening, bids may not be withdrawn for a period of 60 days after submission.

TENDERS

Owner reserves the right to waive any irregularities or informality in bids, to reject any and/or all bids, in whole or in part, or to award any Contract to other than the low bidder, should it be deemed in his best interest to do so.

Signed: Harley B. Rider, Township Clerk

END OF DOCUMENT

SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS

1.1 SUMMARY

A. Document Includes:
1. Contract Time.
2. Definitions.
3. Contract Documents identification.
4. Availability of documents.
5. Examination of documents.
6. Inquiries and Addenda.
7. Product substitutions.
8. Site examination.
9. Bidder qualifications.
10. Bidder prequalification.
11. Bid depository.
12. Submission procedure.
13. Bid ineligibility.
14. Bid Security.
15. Performance Assurance.
16. Bid Form requirements.
17. Bid Form signature.
18. Bid opening.
19. Duration of offer.
20. Acceptance of offer.

1.2 CONTRACT TIME

A. The Bidder, if awarded a Contract, will be required to agree to start active work on the Project within seven (7) days after receipt of Notice of Award of Contract and to complete the work described in the Contract Documents within the time stated in the Bid Form.

1.3 DEFINITIONS

A. Bidding Documents: Contract Documents supplemented with Advertisement for Bids, Instructions to Bidders, Information Available to Bidders, Bid Form, including any Addenda issued prior to receipt of bids.

B. Bid: Executed Bid Form and required attachments submitted according to Instructions to Bidders.

C. Bid Sum: Monetary sum identified by the Bidder in the Bid Form.

1.4 CONTRACT DOCUMENTS IDENTIFICATION

A. Contract Documents are identified as Project Number 14049 as prepared by Sidock Architects and identified in the Project Manual.

1.5 AVAILABILITY OF DOCUMENTS

A. Bidding Documents may be obtained as stated in Advertisement for Bids.

B. Partial sets of Bidding Documents will not be issued.

1.6 EXAMINATION OF DOCUMENTS

A. Bidding Documents are available from Michigan Infrastructure and Transportation Association (MITA).

B. Immediately notify Architect/Engineer upon finding discrepancies or omissions in Bidding Documents.

1.7 INQUIRIES AND ADDENDA

A. Direct questions in writing to Mr. Robert Jordan, at the office of the Architect/Engineer.

B. Verbal answers are not binding on any party.

C. Submit questions not less than 10 days before date set for receipt of Bids. Replies will be made by Addenda, which may be issued during Bidding period. Addenda will be posted on the MITA site. Addenda become part of Contract Documents. Include resultant costs in the Bid Sum.

1.8 PRODUCT SUBSTITUTIONS

A. Where Bidding Documents stipulate particular products, substitution requests will be considered by the Architect/Engineer up to 10 days before receipt of Bids.

B. With each substitution request, provide sufficient information for Architect/Engineer to determine acceptability of proposed products.

C. When a request to substitute a product is made, Architect.Engineer may approve the substitution. Approved substitutions will be identified by Addenda.

D. In submission of substitutions to products specified, Bidders shall include in their Bid changes required in the Work and changes to Contract Time, and changes to Contract Sum to accommodate such approved substitutions. Later claims by the Bidder for an addition to the Contract Time or Contract Sum because of changes in Work necessitated by use of substitutions will not be considered.

1.9 SITE EXAMINATION

A. Examine Project Site before submitting a Bid.

1.10 BIDDER QUALIFICATIONS

A. To demonstrate qualification for performing the Work of this Contract, Bidders may be requested to submit written evidence of financial position, previous experience and current commitments.

1.11 SUBMISSION PROCEDURE

A. Submit two copies of executed offer on Bid Forms, signed along with required bid security in a closed opaque envelope, clearly identified with Bidder's name and address, Project name, and Owner's name on the outside.

1.12 BID INELIGIBILITY

A. Bids that are unsigned, improperly signed or sealed, conditional, illegible, and obscure, or Bids that contain arithmetical errors, erasures, alterations, or irregularities of any kind, may be declared unacceptable at Owner's discretion.

1.13 BID SECURITY

A. Bids shall be accompanied by Bid security as follows:
   1. Bid bond of a sum no less than five (5) percent of the Bid Sum on standard surety company form.
   2. Certified check in the amount of no less than five percent of the Bid Sum.

B. Endorse Bid bond in name of the Dexter Township as obligee, signed and sealed by the principal Contractor and surety.

C. Endorse certified check in name of Dexter Township.

D. Bid securities will be returned after delivery to the Owner of required performance and payment bonds by the accepted Bidder.

E. If the accepted Bidder fails to execute the Agreement and the indicated bonds within 21 days after the Notice of Award, the Notice of Award may be annulled and the Bid security of the Bidder will be forfeited.

F. After a Bid has been accepted, Bid security will be returned to the respective Bidders.

G. If no contract is awarded, Bid security will be returned.

1.14 PERFORMANCE ASSURANCE

A. Accepted Bidder: Provide a performance bond and payment bond as described in the Advertisement for Bids and Supplementary Conditions.

B. Include the cost of performance assurance bonds in the Bid Sum and identify the cost when requested by Owner.

1.15 BID FORM REQUIREMENTS

A. Complete requested information in the Bid Form.

1.16 BID FORM SIGNATURE

A. Sign Bid Form as follows:
   1. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Include the words "Sole Proprietor" under the signature.
   2. Partnership: Signature of all partners in the presence of a witness who will also sign. Include the word "Partner" under each signature
   3. Corporation: Signature of at least one duly authorized signing officer. Include the officer's capacity under each signature. Affix the corporate seal. If Bid is signed by officials other than the president, secretary, or treasurer of the company, submit a copy of the bylaws or a resolution of the board of directors authorizing them to do so, with the Bid Form in the Bid envelope.
   4. Joint Venture: Signature of all parties of the joint venture under their respective seals in a manner appropriate to such party as described above, similar to requirements for Partnerships.

1.17 BID OPENING

A. Bids will be opened publicly immediately after time for receipt of Bids. Bidders may be present.

1.18 DURATION OF OFFER

A. Bids shall remain open to acceptance and shall be irrevocable for a period of 60 days after Bid closing date.

1.19 ACCEPTANCE OF OFFER

A. Owner reserves the right to waive irregularities and to accept or reject any or all offers.

B. Notwithstanding delay in the preparation and execution of the Agreement, accepted Bidder shall be prepared, upon written Notice to Proceed, to commence work within seven (7) days following receipt of official written order of Owner to proceed, or on date stipulated in such order.

END OF DOCUMENT

SECTION 00 31 00 - AVAILABLE PROJECT INFORMATION

1.1 SUMMARY

A. Document Includes:
   1. Subsurface investigation report.

B. Available Project information has been furnished by Owner to Architect/Engineer for use in designing this Project.
   1. Each Bidder shall be fully familiar with available Project information, which has been prepared for Owner by separate consultants.
   2. Available Project information is offered solely for reference and shall not be considered part of Contract Documents. Data contained in Documents prepared by Owner's separate consultants is believed to be reliable; however, Owner and Architect/Engineer do not guarantee their accuracy or completeness.
   3. In preparing their Bids, Bidders shall consider and evaluate data contained in available Project information as well as Contract Documents prepared by Architect/Engineer.

1.2 SUBSURFACE INVESTIGATION REPORT

A. A copy of a geotechnical report is included as an attachment to this Document, titled “Preliminary Geotechnical Investigation for Proposed Fire Substation Facility, 12088 North Territorial Raod, Dexter, Michigan” dated June 17, 2014, and prepared by Testing Engineers & Consultants, Inc..

B. The report identifies properties of below-grade conditions and offers recommendations for design of foundations, prepared primarily for use of Architect/Engineer.

C. Recommendations described are not requirements of the Contract unless specifically referenced in Contract Documents.

D. The report, by its nature, cannot reveal all conditions existing on the Site. Should subsurface conditions be found to vary substantially from this report, changes in design and construction of foundations will be made, with resulting changes to Contract Sum and/or Contract Time.

END OF DOCUMENT

Sidock Group, Inc.
45650 Grand River Avenue
Novi, MI 48374

PRELIMINARY GEOTECHNICAL INVESTIGATION

FOR

Proposed Fire Substation Facility
12088 North Territorial Road
Dexter, Michigan

TEC Report: 54544

By:

Testing Engineers & Consultants, Inc.
1343 Rochester Road
P.O. Box 249
Troy, Michigan 48099-0249
(248) 588-6200

June 17, 2014

Testing Engineers & Consultants, Inc.
1343 Rochester Road • PO Box 249 • Troy, Michigan 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G • Fax (248) 588-6232
www.testingengineers.com

TEC Report: 54544
Date Issued: June 17, 2014

Mr. Casey Leach, P.E.
Sidock Group, Inc.
45650 Grand River Avenue
Novi, MI 48374

Re: Preliminary Geotechnical Investigation for
Proposed Fire Substation Facility
12088 North Territorial Road
Dexter Township, Michigan

Dear Mr. Leach:

Please find enclosed the results of a preliminary geotechnical investigation performed at the above referenced site. This geotechnical report presents our field and laboratory results; engineering analysis; and our recommendations for design of foundation and slabs, as well as important construction considerations.

As you may know, Testing Engineers & Consultants, Inc. (TEC) has more than forty-eight years of experience in Quality Control Testing and Construction Inspection. We would be pleased to provide these services on this project.

Should you have any questions regarding this report, please let us know. It has been a pleasure to be of service to you.

Respectfully submitted,

TESTING ENGINEERS & CONSULTANTS, INC.

Carey J. Suhan, P.E.,
Vice President, Geotechnical
& Environmental Services

CJS/ln
Enclosure

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All services undertaken are subject to the following policy. Reports are submitted for exclusive use of the clients to whom they are addressed. Their significance is subject to the adequacy and representative character of the samples and the comprehensiveness of the tests, examinations and surveys made. No quotation from reports or use of TEC's name is permitted except as expressly authorized by TEC in writing.

Testing Engineers & Consultants, Inc.

Mr. Casey Leach, P.E.
Sidock Group, Inc.
June 17, 2014

TEC Report: 54544

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Mr. Casey Leach, P.E.
Sidock Group, Inc.
June 17, 2014

TEC Report: 54544

1.0 INTRODUCTION

This report presents and evaluates the results of a preliminary geotechnical investigation for the fire substation facility to be located at 12088 North Territorial Road, in Dexter Township, Michigan. Authorization to perform this investigation was given on May 16, 2014, in an email from Mr. Casey Leach, to Mr. Gary Putt of TEC. The scope, schedule, and fees are based on TEC Proposal No. 060-13-0280 Revision 1, dated March 10, 2014.

The purpose of this investigation has been to assess subsurface conditions and basic engineering properties of soils at the site through a series of test borings and laboratory tests performed on the soil samples obtained during the field investigation. This information as well as information shown in the February 2, 2014, Site Topographic / Tree Survey prepared by Environmental Engineers, Inc. has been evaluated to provide the general recommendations for site preparations, establish requirements for foundation, floor slab and pavement design and identify possible construction problems.

The proposed development consists of construction of a new fire substation facility. The building will have a fire station and apparatus bay and concrete pavement on the north and south sides. The area around the building will include walks and a patio. The overall development will include paving of an existing gravel drive, construction of a gravel parking area, and construction of a detention pond for storm water management.

The finish floor elevation will be 935.00 feet in the fire station and 934.50 feet in the apparatus bay. The approximate elevations for the drives and parking are, approximately, as follows: the concrete drive on the south side of the building, 932 feet to 934.5 feet; the concrete drive on the north side of the building, 933 feet to 934.5 feet; and the asphalt drive to the east of the building (south end), 929.5 feet to 931 feet. The proposed elevations are not shown for the north end of the drive to the east of the building, but existing elevations are approximately 930 feet to 924 feet, and we assume that the proposed grades will be about the same as the existing ones. The detention pond will be located east of the asphalt drive and is shown as elevation 928 feet at the outer edge and 926 feet in the interior.

Foundation loads are not given; however, they are assumed to be fairly light.

The conclusions and recommendations reached as a result of this investigation are briefly summarized below:

- The first item is the scope of the investigation, which consisted of one boring for the building, one boring for the detention pond, one boring for the drive south of the building, one boring for the drive east of the building (near the south end), and one boring for the drive east of the building (near the north end). We recommend additional borings for the building, especially because there will be significant regrading in this area and the surface soil is topsoil fill.

1.0 INTRODUCTION (Cont'd)

- In general, the development will require cut and fill, possibly six feet of cut and five feet of fill. The on-site soil can be used as fill if selective excavation is employed.

- The building can be constructed on shallow foundations that bear on medium compact sand found at an elevation of 929.5 feet in Boring No. 1 (the only boring in the building footprint), and can be designed for an allowable net bearing capacity of 2500 psf.

- The drives on the north and south sides of the building are designed as Portland cement concrete and the recommended thickness is 8 inches with a 6-inch base of MDOT 21AA.

- The drives on the east of the building are designed as hot mix asphalt (HMA) and the recommended thickness is 1 ½ inches of HMA leveling on 2 ½ inches of HMA base with a 10-inch base of MDOT 21AA.

- Stormwater management will include a detention pond, which is shown near the southeast corner of the site. The elevations of the detention pond will be 928 feet at the exterior and 926 feet in the interior. Boring No. 4 was located near the detention pond and the recommendations are based on the soil and groundwater conditions encountered in that soil boring. The ground surface elevation was approximately 927.5 feet.
  - Based on the existing and proposed grades, it appears that a few feet of cut and fill will be required to achieve the design grades.
  - The surface soil consisted of 10 inches of topsoil over 20 inches of clayey sand, which do not provide good drainage.
  - The water table was at 2'6", which corresponds to an elevation of approximately 925 feet. This places the water table about a foot below the bottom elevation of the detention pond.
  - To provide some drainage and storage, the recommendations are to remove the existing topsoil and clayey sand, and to replace that undercut with clean sand such as MDOT Class II.
  - It may be prudent to consider raising the grade of the pond; thereby, providing more unsaturated soil.

The above summary should only be used in the context of the complete report.

2.0 FIELD INVESTIGATION

Five test borings were drilled at the approximate locations shown on the Test Boring Location Plan (Appendix D). The boring locations were selected by the client and staked in the field by TEC. Ground surface elevations at the boring locations have been obtained by TEC and are shown on the

2.0 FIELD INVESTIGATION (Cont'd)

boring logs. The elevations were determined by interpolating values shown in the Site Topographic / Tree Survey. Because the elevations were interpolated from a drawing, the values are reported to the nearest 0.5 feet. The borings were drilled on June 9, 2014 with all-terrain vehicle mounted drilling equipment using hollow stem augers to depths ranging from 10 to 25 feet. Test Boring Logs are included in Appendix E.

Drilling and Standard Penetration Tests were performed in accordance with ASTM D1452 and D1586 procedures, respectively. The standard penetration test is conducted by driving a standard 2-inch O.D. split-barrel sampler by a 140-pound hammer with a free fall of 30 inches. The number of hammer blows required to drive the split-barrel sampler through three successive 6-inch increments is recorded on the Test Boring Log. The first 6-inch increment is used for setting the sampler firmly in the soil and the sum of the hammer blows for the second and third increments is referred to as the "Standard Penetration Index" (N) or the "blow count". N is a good indicator of the density and, by extension, strength and compressibility of granular materials. In the standard penetration test a soil specimen is obtained in the liner sampling (LS) tubes inside the split-barrel sampler. The tubes are removed from the sampler and transported in sealed containers to the laboratory for testing.

3.0 LABORATORY TESTING

The laboratory testing included determination of the natural bulk density and the natural moisture content of the soil recovered in the liner sampling tubes, and the unconfined compressive strength of the cohesive soils. In the unconfined compression tests, the compressive strength (qu) of the soil is determined by axially loading a soil sample until failure is observed or 15% strain, whichever occurs first. The results of the above tests are recorded on the boring logs.

The particle size distribution of two granular soil samples was also determined. The distribution provides estimates of the permeability and permeability-related behavior of the granular soil. The results are included in Appendix F.

The laboratory test results apply to the samples tested and some results may not be representative of the soil mass because of variations in composition and texture, as well as imperfect samples and presence of pebbles and/or sand streaks in cohesive samples, etc.

Samples taken in the field are retained in our laboratory for 60 days and are then destroyed unless special disposition has been agreed upon with the client. Samples retained over a long period of time are subject to moisture loss after which they are no longer representative of the conditions initially encountered.

4.0 GENERALIZED SUBSURFACE CONDITIONS

4.1 Site Conditions

The site is currently developed with two buildings that are accessed by a gravel road. Parking is adjacent to each building and is mostly unpaved. The ground surface elevation varies by about 13 feet within the area of the development and another 18 feet towards the northwest corner of the site.

4.2 Soil Conditions

The subsurface conditions encountered in the test borings are presented on the individual boring logs. Each log shows the soil types encountered at that location as well as field and laboratory test data, groundwater data and other pertinent information. An explanation of the description used in the borings logs are given in Appendix C. Definitions of the terms and symbols utilized in this report may be found in ASTM D653.

The subsurface conditions encountered in the borings may be generalized as follows for purpose of analysis. Please refer to the limitations (Appendix A) regarding the uncertainties involved in such a generalization.

Surface Covering

Boring No. 1 was drilled on a hill, and that hill appears to have been constructed with fill. The surface soil encountered in Boring No. 1 was 5.5 feet of sandy topsoil which was identified as fill. The other borings were drilled on flatter ground, and no fill was encountered in these borings. Boring No. 3 was drilled on an unpaved drive and the surface covering in this boring was 4 inches of crushed stone. In the other borings, the surface covering was topsoil with thicknesses of 8 to 10 inches.

Native Sand and Clay

The underlying native deposits generally consist of layers of very loose to medium compact sand. In Boring No. 1, stiff clay was encountered between 14.5 feet and 22 feet and was underlain by firm clay that extended to the terminal depth of the boring. In Boring No. 3, firm clay was encountered between 7.3 feet and 8 feet and was underlain by stiff clay that extended to the terminal depth of the boring.

Standard penetration values range from 5 to 22 blows per foot with unconfined compressive strengths of 330 to 2060 pounds per square foot (psf). Bulk densities range from 104 to 135 pounds per cubic foot with moisture contents of 5.7 to 19.3 percent of the dry weight of the soil.

4.3 Groundwater Conditions

Groundwater was first encountered at depths ranging from 2'6" to 9'0" in the borings. After the completion of each boring and removal of the hollow-stem augers which act as casing during drilling, water was measured at 3'8" to 13'0" feet below the ground surface. The observed water levels would be expected to represent the current water table. The deepest water, both encountered and at completion, was in Boring No. 1, which also had the highest ground surface elevation of any boring. If the water level readings are converted from depth to elevation, the water encountered was between approximately 925 to 928 feet, and the water at completion was between approximately 922 to 926 feet.

5.0 ENGINEERING ANALYSIS AND RECOMMENDATIONS

5.1 Groundwater Considerations

The position of water levels found in test borings normally vary with seasonal precipitation and runoff. At the levels encountered in the borings, it should present no unusual problems for design or construction of shallow foundations and utilities. Dewatering and special construction procedures will be required for deeper excavations. This will be discussed further in the Foundation Recommendation and in the Construction Consideration sections of the report.

5.2 Site Preparation & Earthwork

A significant amount of cut and fill will be required to achieve the design grade. Up to six feet of cut and up to five feet of fill are anticipated, more where undercuts to remove unsuitable materials will be made. All earthwork operations should be performed under adequate specifications and properly monitored in the field. The following earthwork operations are recommended:

* All vegetation should be grubbed and all existing topsoil and other organic materials should be removed in their entirety within the footprint of the proposed building and pavement areas. Buried objects, if any, should be removed in their entirety. In the area of the building 5 ½ feet of sandy topsoil was encountered in Boring No. 1. This appears to be a berm area and the topsoil could be even thicker.

* The exposed subgrade should be examined by a qualified geotechnical engineer. The suitability of existing fill and other potentially unsuitable materials should be based on composition (i.e. amount of debris and organic material) and stability. Any unsuitable material should be removed and replaced with engineered fill.

* Prior to fill placement in fill areas, and after rough grade has been achieved in cut areas, the subgrade should be thoroughly proof-rolled in the presence of an experienced geotechnical engineer. A heavy rubber-tired vehicle such as a loaded dump truck or scraper should be used for proofrolling.

5.2 Site Preparation & Earthwork (Cont'd)

* Any areas that exhibit excessive pumping and yielding during proof-rolling should be stabilized by aeration, drying and compaction if weather conditions are favorable, or removal and replacement of the unstable materials with engineered fill.

* Following mass earthwork operations, the subgrade to support structural loads and the subgrade to receive pavement base course should be compacted to 95 percent of its Modified Proctor density (ASTM D1557).

Granular Fill materials required for backfill and engineered fill to achieve design grades beneath structures and pavements should preferably be "clean" granular fill. Materials which meet the MDOT Class II grading requirements are preferred. Much of the on-site granular materials should be suitable for use as fill or backfill, provided selective excavation is employed.

Materials required for backfill of undercuts for individual footings should be **crushed stone fill.** Crushed stone or concrete with a nominal diameter of 1 to 3 inches should be suitable.

Engineered fill should be placed in uniform horizontal lifts not exceeding the appropriate loose thickness compatible with the equipment employed:

Compaction Method	Maximum Loose Lift Thickness
Hand operated vibratory plate or light roller in confined areas	4 inches
Hand operated vibratory drum roller weighing at least 1000 pounds	6 inches
Vibratory drum roller, minimum dynamic force, 20,000 pounds	9 inches
Vibratory drum roller, minimum dynamic force, 30,000 pounds	12 inches
Sheeps-foot roller	8 inches

The fill material should be placed and compacted at approximately the optimum moisture content.

The fill should be compacted to achieve the specified maximum dry density as determined by the Modified Proctor compaction test (ASTM D1557). The specified percentage of maximum dry density for fill placed in various areas should be as follows:

5.2 Site Preparation & Earthwork (Cont'd)

Area	Percent Compaction
Within building	95
Below foundations	95
Pavement base course	95
Within one foot of pavement subgrade	95
Below one foot of pavement subgrade	93
Landscaped area	88

Trench backfill should be compacted to the above standards. The building should be considered to extend 10 feet beyond the foundations of the structure. Pavement should be considered to extend five feet beyond the edge plus a one on one slope to the original grade.

5.3 Shallow Foundation

Local building codes and climatic conditions require that exterior shallow footings be based at a minimum depth of 3 ½ feet below finished grade for adequate frost protection. The top of slab elevation will be 934.50 feet or 935.00 feet depending on location in the building. The ground surface elevations within the building footprint vary from about 930 feet to 939.5 feet. The ground surface elevation at Boring No. 1, the only boring near the corner of the area of the building, was approximately 935 feet. In this boring, the existing topsoil fill extended to 5.5 feet, or an elevation of approximately 929.5 feet.

The anticipated grading for the building consists of removing the existing topsoil fill, which could be as much as 10 feet due to the height of the berm, and then filling back up to the desired elevation, which appears to be on the order of 5 feet. The foundations should bear on the medium compact deposits found at elevation 929.5 feet, which should be 4 to 5 feet below finish grade rather than the standard 3 ½' minimum. An allowable net soil bearing capacity of 2500 psf is recommended for design of column footings and continuous wall footings, if they are designed and constructed in accordance with the criteria stated herein. The recommended design bearing pressure should provide a factor of safety of about 2.5 to 3 against shear failure and limit differential settlements between adjacent columns to less than ¾ inch.

Normally, interior footing can be placed at shallower depths because they do not require frost protection; however, the interior footings would need to extend to the medium compact sand or bear on properly placed, compacted and tested engineered fill.

The footing size should be calculated to carry the design loads but should be large enough to permit construction tolerances.

5.3 Shallow Foundation (Cont'd)

The ground should be graded to convey surface water away from the building and surface water and water from roof drains should not be allowed to raise the groundwater table along the building foundations. Perimeter drains should not be necessary.

5.4 Floor Slabs

The subgrade resulting from the site preparation should provide fair support for slabs-on-grade. Based upon the encountered subgrade soils, and the stipulated subgrade preparation procedures, an estimated standard Modulus of Subgrade Reaction (30-inch diameter plate) of 150 pounds per cubic inch may be used for design. To improve the uniformity of support, the slab should be placed on a minimum of four inches of clean compacted granular fill.

The slab performance can be improved through a number of details. Shrinkage cracks can be controlled by installing welded wire fabric in the slab. Cracking can also be reduced through the use of control joints.

If the slab will be treated with a seal coating, a vapor retarder should be installed beneath the slab. To reduce curling the vapor retarder should be placed on a minimum of four inches of compacted fill and another 3 inches of compacted fill should be placed on the vapor retarder.

To permit slab settlement without damaging other structural elements, the slab should be detailed with isolation joints at walls and around footings. As an alternate to constructing isolation joints at column footings, the footings could be separated from the slab with a minimum of six inches of compacted granular fill.

5.5 Pavement Design

The subgrade resulting from the subgrade preparations should provide fair support for a pavement. Given the use of the facility, we expect a small number of passes of vehicles; however, the axle loads will be high due to the weight of the fire trucks. The near surface soils are generally loose sand.

The design drawings show Portland cement concrete pavement for the drives to the north and south of the building. The following section is recommended:

8 inch air-entrained Portland cement concrete pavement

6 inches untreated aggregate base (MDOT 21AA)

5.5 Pavement Design (Cont'd)

The design drawings show hot mix asphalt pavement for the drives to the east of the building. We assume this will receive small amounts of truck traffic. The following section is recommended:

1 ½ inch bituminous concrete wearing course (MDOT 1100T (36A))

2 ½ inch bituminous concrete leveling course (MDOT 1100L (20AA))

10 inches untreated aggregate base (MDOT 21AA)

The newer asphalt mixes of 13A for the wearing course and 3C for the leveling course could be used in lieu of the older 1100 mixes.

The pavement should be properly crowned and shaped in order to provide effective surface drainage and prevent water ponding. The design drawings show a 2 ½ percent cross-slope, which should provide adequate surface drainage.

The pavement recommendations presented above are intended to provide a serviceable pavement for an extended period of time. However, it should be noted that all pavements require regular maintenance and occasional repairs. The need of such maintenance and repairs is not necessarily indicative of premature pavement failure. If such activities are not performed in an appropriate and timely manner, the serviceable life of the pavement can be substantially reduced.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 Earthwork

The soils to be encountered during construction and at subgrade levels generally consist of loose to medium compact sand. Some of the sand is relatively clean, i.e., less than 10 percent fines, but some of the sand contains over 10 percent fines. Each of these soils presents challenges for earthwork.

When granular soils contain less than 10 percent fines, they tend to be susceptible to rutting from rubber-tired vehicles when the moisture content is low or they tend to bleed when the moisture content is high. In Boring Nos. 3, 4, and 5, the moisture content values were over 10 percent, suggesting they are likely to bleed. These soils should be dried through a combination of dewatering and aeration, and then recompacted. If this is not feasible, the soil should be stabilized with crushed stone or concrete.

When granular soils contain greater than 10 percent fines, their permeability is significantly reduced and their susceptibility to frost heave is greatly increased. If the moisture content is high, the soils will

6.1 Earthwork (Cont'd)

need to be dried or stabilized to effectively execute the earthwork operations. If the excess water is not drained, subgrade instability is expected. It may be possible to scarify, dry, and recompact the soil if several consecutive days of warm, dry weather are expected. If not, these deposits will require either temporary or permanent drainage.

6.2 Utility Excavations

Deeper excavations, such as those for utilities, will extend through newly-placed fill / backfill or existing granular soils and will likely extend below the water table.

Excavation above the water table should be sloped no steeper than 1V:1H, or temporarily shored. Sloped excavation below the water table is not recommended. Construction traffic and excavated material stockpiles should be kept away from excavations a minimum distance equal to the full depth of the excavation.

Excavation and utility construction should be done in the dry and the contractor should be required to control all surface water and any water in the ground. Well points may be required outside the excavation if tight sheeting is to be avoided. Proper grading and pumping from adequately sized sumps or from the subgrade pits should suffice inside the excavation. If subgrade instability is observed, it can be stabilized with crushed stone or concrete.

6.3 Foundation Preparations for Footings

All excavations for footings should be undertaken after the compacted subgrade and engineered fill for slabs-on-grade have been completed.

All footings for the building should bear on the natural sand with the field verified minimum strength of 2500 psf as determined by the Housel test. Footings may also bear on engineered fill, however, fill placed beneath structural footings after excavation/undercut for individual footings should be crushed stone fill. Positive means of drainage should be provided in all undercuts into clayey deposits to be backfilled with crushed stone.

Footings should be excavated and concreted the same day, if at all possible, to minimize disturbance of the subgrade. A mud mat (lean concrete mat) may be placed immediately after inspection and strength verification to protect the subgrade.

All footing excavations should be done in the dry, however, water may be encountered at some locations during excavation. To prevent deterioration of the footing subgrade materials and allow for

6.3 Foundation Preparations for Footings (Cont'd)

proper inspection, the Contractor should be required to control and divert water and surface run-off. If the exposed subgrade is allowed to soften, such softened material should be removed and replaced with lean concrete.

Because the upper soil is primarily sand, excavations above the groundwater table should be sloped no steeper than 1V:1H, or temporarily shored. Sloped excavation below the groundwater table is not recommended. Construction traffic and excavated material stockpiles should be kept away from excavations a minimum distance equal to the full depth of the excavation.

7.0 DESIGN REVIEW AND FIELD MONITORING

The evaluations and recommendations presented in this report relative to site preparation and building foundations have been formulated on the basis of assumed and provided data relating to the location, type and finished grades for the proposed structure and adjacent areas. Any significant change in this data should be brought to our attention for review and evaluation with respect to the prevailing subsoil conditions.

When the building and foundation plans are finalized, a consultation should be arranged with us for a review to verify that the evaluations and recommendations have been properly interpreted. Preferably, additional borings should be performed since there is only one boring near the building footprint.

Soil conditions at the site could vary from those generalized on the basis of test borings made at specific locations. It is therefore recommended that Testing Engineers & Consultants, Inc. be retained to provide soil engineering services during the site preparation, excavation and foundation phases of the proposed project. This is to observe compliance with the design concepts, specifications and recommendations. Also, this provides opportunity for design changes to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction.

James J. Lynch, PhD, P.E.
Senior Project Engineer

Carey J. Suhan, P.E.
Vice President, Geotechnical
& Environmental Services

JJL/CJS/ln
I:\gs\Job Files\54500-54599\54544\54544.doc

Mr. Casey Leach, P.E.
Sidock Group, Inc.
June 17, 2014

TEC Report: 54544

APPENDIX A – LIMITATIONS

Mr. Casey Leach, P.E.
Sidock Group, Inc.
June 17, 2014

TEC Report: 54544

APPENDIX A

LIMITATIONS

Explorations

1. The analyses and recommendations submitted in this report are based in part upon the data obtained from subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear it will be necessary to reevaluate the recommendations of this report.

2. The generalized soil stratigraphy described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more gradual. For specific information, refer to the boring logs.

3. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors occurring since the time measurements were made.

Review

4. In the event that any geotechnically related changes in the nature, design, or location of the proposed structures are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes have been reviewed and conclusions of this report modified or verified in writing by TEC. It is strongly recommended that TEC be given the opportunity for a general review of final design and specifications in order that our earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications.

Construction

5. It is recommended that TEC be retained to provide geotechnical engineering services during the construction phases of the work. This is to observe compliance with the design concepts, specifications, or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to start of construction.

APPENDIX A

LIMITATIONS (Cont'd)

Use of Report

6. This report has been prepared for the exclusive use of Sidock Group, Inc., for specific application to the design of the proposed fire substation facility to be located at 12088 North Territorial Road, in Dexter Township, Michigan, in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made.

7. This geotechnical report has been prepared for this project by TEC. This report is for design purposes only, and may not be sufficient to prepare an accurate bid. Contractors wishing a copy of the report may obtain a copy with the understanding that its scope is limited to design considerations only.

Mr. Casey Leach, P.E.
Sidock Group, Inc.
June 17, 2014

TEC Report: 54544

APPENDIX B – PROCEDURES AND STANDARDS

Mr. Casey Leach, P.E.
Sidock Group, Inc.
June 17, 2014

TEC Report: 54544

APPENDIX B

American Society For Testing and Materials

PROCEDURES AND STANDARDS

Field Exploration

Test borings have been performed in accordance with some or all of the following standards:

ASTM D420-93	Guide for Investigating and Sampling Soil and Rock (1995)
ASTM D1452-80	Practice for Soil Investigation and Sampling by Auger Borings (1992)
ASTM D1586-84*	Method for Penetration Test and Split-Barrel Sampling of Soils
ASTM D1587-94	Practice for Thin-Walled Tube Samplings of Soils

Laboratory Testing

ASTM D2166-91	Test Method for Unconfined Compressive Strength of Cohesive Soil
ASTM D2216-90*	Test Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock and Soil-Aggregate Mixtures (1995)
ASTM D2974-87	Test Method for Moisture, Ash and Organic Matter of Peat and Other Organic Soils
ASTM D4318-95	Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils

The results of test methods marked * are listed in the boring logs.

Mr. Casey Leach, P.E.
Sidock Group, Inc.
June 17, 2014

TEC Report: 54544

APPENDIX C – GENERAL NOTES ON SOIL DESCRIPTION

Testing Engineers & Consultants, Inc.

Mr. Casey Leach, P.E.
Sidock Group, Inc.
June 17, 2014

TEC Report: 54544

SOIL DESCRIPTIONS

In order to provide uniformity throughout our projects, the following nomenclature has been adopted to describe soil characteristics:

CONSISTENCY AND RELATIVE DENSITY

COHESIVE SOILS			GRANULAR SOILS	
UNCONFINED COMPRESSIVE STRENGTH, PSF	"N" VALUES	CONSISTENCY	"N" VALUES	RELATIVE DENSITY
Below 500	0 – 2	Very Soft	0 – 4	Very Loose
500 – 1,000	3 – 4	Soft	5 – 10	Loose
1,000 – 2,000	5 – 8	Plastic	11 – 30	Medium Compact
2,000 – 4,000	9 – 15	Firm	31 – 50	Compact
4,000 – 8,000	16 – 30	Stiff	50+	Dense
8,000 – 16,000	31 – 50	Ex. Stiff		
Over 16,000	51+	Hard		

Material Types By Particle Size	**ASTM D2487**
BOULDERS	Stones Over 12" In Diameter
COBBLES	Stones 3" To 12" In Diameter
GRAVEL	#4 To 3" Diameter
COARSE SAND	#10 To #4 Sieves
MEDIUM SAND	#40 To #10 Sieves

Mr. Casey Leach, P.E.
Sidock Group, Inc.
June 17, 2014

TEC Report: 54544

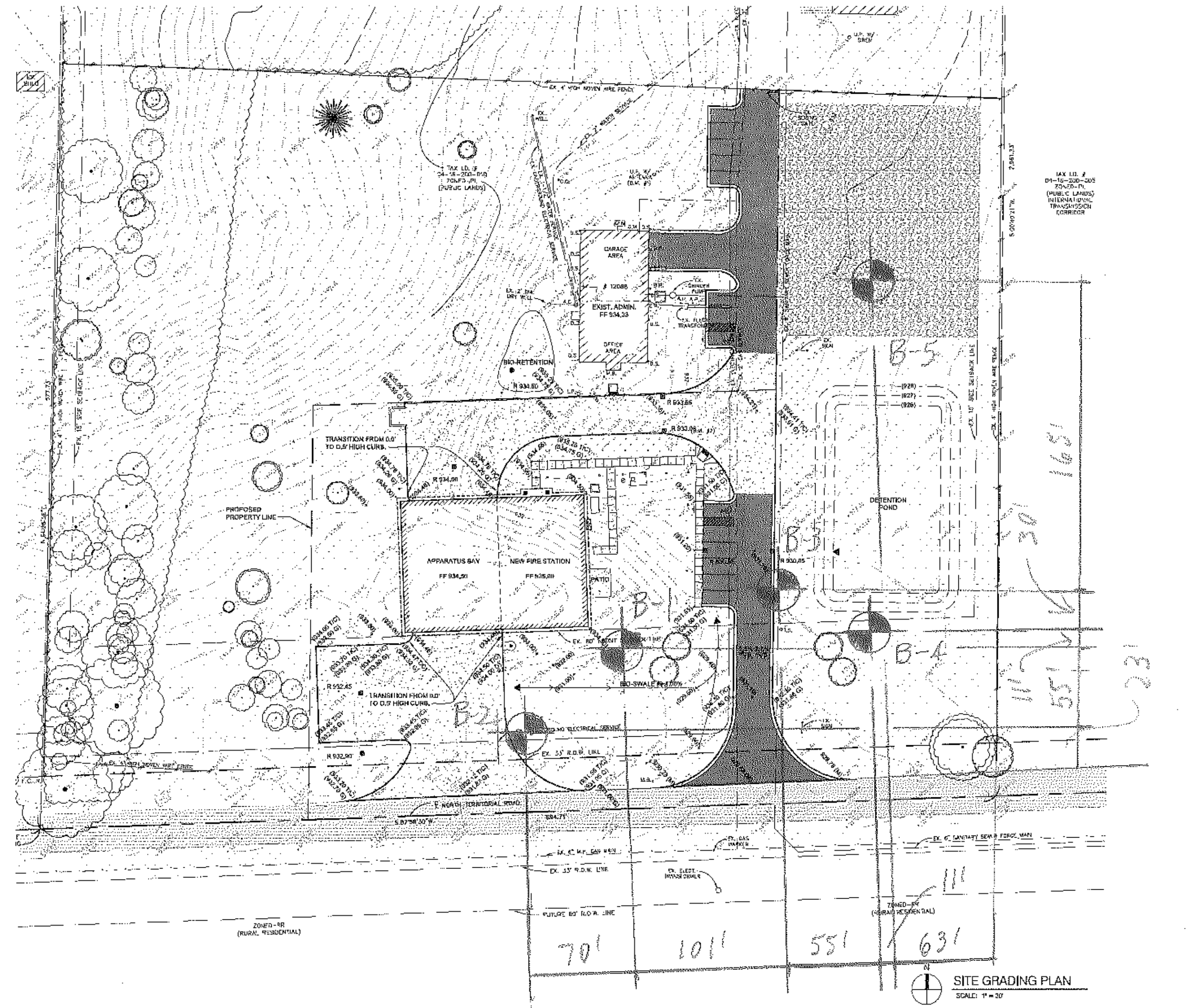
SOIL DESCRIPTIONS (Cont'd)

Material Types By Particle Size	**ASTM D2487**
FINE SAND	#200 To #40 Sieves
SILT	Minus #200 Sieve Material, Fairly Non-Plastic, Falls Below "A"-Line
CLAY	Minus #200 Sieve Material Plastic Material That Has A Tendency To Stick Together, Can Be Rolled Into Fine Rods When Moistened; Falls Above "A"-Line
PEAT	Black Organic Material Containing Partially Decayed Vegetable Matter
MARL	Fresh Water Deposits Of Calcium Carbonate, Often Containing Percentages Of Peat, Clay & Fine Sand
SWAMP BOTTOM DEPOSITS	Mixtures Of Peat, Marl, Vegetation & Fine Sand Containing Large Amounts Of Decayable Organic Material

Mr. Casey Leach, P.E.
Sidock Group, Inc.
June 17, 2014

TEC Report: 54544

APPENDIX D – TEST BORING LOCATION PLAN



Sidock Architects
ARCHITECTS • ENGINEERS • CONSULTANTS
"A Sidock Group Company"

Corporate Headquarters
45650 Grand River Avenue
Novi, Michigan 48374
Ph: (248)349-4500 • Fax: (248)349-1429

Wyandotte Office
4242 Biddle Avenue
Wyandotte, Michigan 48192
Ph: (734)285-1924 • Fax: (734)285-2833

West Michigan Office
370 W. Western Avenue, Suite 260
Muskegon, Michigan 49440
Ph: (231)722-4900 • Fax: (231)722-4955

Lansing Office
1375 S. Washington Ave.
Lansing, Michigan 48910
Ph: (517)580-8225 • Fax: (517)580-8221

Gaylord Office
147 W. Main Street, Suite 303
Gaylord, Michigan 49735
Ph: (989)705-8400 • Fax: (989)705-8403

www.sidockarchitects.com

Key Plan:

Client:
DEXTER TOWNSHIP

Project:
NEW FIRE
SUBSTATION NO. 2

DEXTER, MICHIGAN 48130

Seal:
STATE OF MICHIGAN
CASEY M. LEACH
ENGINEER
No.
56383
LICENSED PROFESSIONAL ENGINEER

Date	Issued For
05/23/14	PRELIMINARY SPA

Drawn: S. MANOS
Checked: C. LEACH
Approved: C. LEACH

Sheet Title:
SITE
GRADING PLAN

Project Number: 14049

Sheet Number: C-220

Mr. Casey Leach, P.E.
Sidock Group, Inc.
June 17, 2014

TEC Report: 54544

APPENDIX E – LOGS OF TEST BORINGS

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 1 **Job No.:** 54544

Client: Sidock Group, Inc.

Type of Rig: All-Terrain Vehicle

Drilling Method: Hollow Stem Augers

Ground Surface Elevation: 935.0

Project: Proposed Fire Substation Facility

Location: Dexter Township, Michigan

Drilled By: I. Mickle

Started: 6/9/2014

Completed: 6/9/2014

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
2.5	LS	3 3 4		Loose Moist Dark Brown Sandy Topsoil-FILL	14.4	115	
5.0	LS	2 2 3	5.5		15.5	108	
7.5	LS	6 5 6		Medium Compact Moist Brown Fine SAND	9.9	125	
10.0	LS	6 10 9	9		17.4	127	910
12.5			12	Medium Compact Wet Brown Clayey SAND With Trace Of Silt & Clay Layers			
15.0	LS	6 6 7	14.5	Medium Compact Wet Gray SAND With Trace Of Gravel	19.6	111	
17.5				Stiff Moist Gray CLAY With Some Silt, Trace Of Gravel & Wet Sand Seams			
20.0	LS	9 8 8			14.2	134	2060
22.5	LS	3 5 6	22	Firm Moist Gray CLAY With Some Silt, Sand & Trace Of Gravel	12.1	135	1150
			25	Bottom of Borehole at 25'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push

Water Encountered: 9'0"

At Completion: 13'0"

Boring No. 1

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 2 **Job No.:** 54544

Client: Sidock Group, Inc.

Type of Rig: All-Terrain Vehicle

Drilling Method: Solid Stem Augers

Ground Surface Elevation: 932.0

Project: Proposed Fire Substation Facility

Location: Dexter Township, Michigan

Drilled By: I. Mickle

Started: 6/9/2014

Completed: 6/9/2014

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.83	Moist Dark Brown Sandy TOPSOIL (10")			
	LS	3 3 3			9.7	105	
2.5				Loose Moist Brown SAND With Trace Of Gravel			
	LS	3 4 5	4		15.4	122	410
5.0				Loose Wet Brown Fine SAND With Occasional Clayey Seam			
	LS	2 3 4			18.4	123	250
7.5							
	LS	3 5 7			19.0		
10.0			10				
				Bottom of Borehole at 10'			
12.5							
15.0							
17.5							
20.0							
22.5							

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push

Water Encountered: 4'0"

At Completion: 5'10"

Boring No. 2

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 3 **Job No.:** 54544

Client: Sidock Group, Inc.

Type of Rig: All-Terrain Vehicle

Drilling Method: Solid Stem Augers

Ground Surface Elevation: 929.0

Project: Proposed Fire Substation Facility

Location: Dexter Township, Michigan

Drilled By: I. Mickle

Started: 6/9/2014

Completed: 6/9/2014

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.33	Crushed STONE (4")			
	LS	8 10 12	3	Medium Compact Moist Brown SAND With Trace Of Gravel	12.5	122	
2.5							
	LS	3 4 6	5.5	Loose Wet Brown SAND With Trace Of Silt & Gravel	19.3	122	
5.0							
	LS	5 7 8	7.3	Medium Compact Wet Brown Fine SAND	16.9		
7.5			8	Firm Moist Brown CLAY With Some Silt			
	LS	3 6 10	10	Stiff Moist Gray CLAY With Some Silt & Wet Sand Seams	12.9	126	1320
10.0				Bottom of Borehole at 10'			
12.5							
15.0							
17.5							
20.0							
22.5							

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push

Water Encountered: 3'0"

At Completion: 4'4"

Boring No. 3

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 4 **Job No.:** 54544

Client: Sidock Group, Inc.

Type of Rig: All-Terrain Vehicle

Drilling Method: Solid Stem Augers

Ground Surface Elevation: 927.5

Project: Proposed Fire Substation Facility

Location: Dexter Township, Michigan

Drilled By: I. Mickle

Started: 6/9/2014

Completed: 6/9/2014

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.83	Moist Dark Brown Sandy TOPSOIL (10")			
	LS	2 2 2	2.5	Very Loose Moist Brown Clayey SAND With Trace Of Gravel	16.6	123	1980
2.5	LS	4 4 3	5.5	Loose Wet Brown Fine SAND	17.5	119	
5.0	LS	5 7 7	8	Medium Compact Wet Brown SAND With Trace Of Gravel	16.4		
7.5	LS	3 4 5	10	Loose Wet Brown Fine SAND	15.9	109	
10.0				Bottom of Borehole at 10'			
12.5							
15.0							
17.5							
20.0							
22.5							

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push

Water Encountered: 2'6"

At Completion: 3'10"

Boring No. 4

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 5 **Job No.:** 54544

Client: Sidock Group, Inc.

Type of Rig: All-Terrain Vehicle

Drilling Method: Solid Stem Augers

Ground Surface Elevation: 929.0

Project: Proposed Fire Substation Facility

Location: Dexter Township, Michigan

Drilled By: I. Mickle

Started: 6/9/2014

Completed: 6/9/2014

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.67	Moist Dark Brown Sandy TOPSOIL (8")			
	LS	2 2 2			12.5	104	
2.5			2.5	Very Loose Moist Brown Fine SAND			
	LS	2 4 5		Loose Wet Brown Fine SAND	16.6	119	
5.0							
	LS	2 4 4			14.3	117	
7.5			8				
	LS	4 7 8		Medium Compact Wet Brown Fine SAND	16.0	119	
10.0			10				
				Bottom of Borehole at 10'			
12.5							
15.0							
17.5							
20.0							
22.5							

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push

Water Encountered: 2'6"

At Completion: 3'8"

Boring No. 5

Mr. Casey Leach, P.E.
Sidock Group, Inc.
June 17, 2014

TEC Report: 54544

APPENDIX F – SIEVE ANALYSIS RESULTS

Testing Engineers and Consultants, Inc.

1343 Rochester Road PO Box 249 Troy, Michigan 48099-0249
248-588-6200 or 313 T-E-S-T-I-N-G
Fax 248-588-6232

MECHANICAL ANALYSIS TEST REPORT

PROJECT: Proposed Fire Substation **TEC REPORT NUMBER: 54544**

LOCATION: Dexter Township, Michigan **DATE: June 17, 2014**
CLIENT: Sidock Group, Inc.

Material Description: Brown Fine SAND with trace of Silt Date Sampled: 6/9/14

Sample Source / Depth: B-3 @ 5 feet Sampled By: I. Mickle

Sample Location: TEC Lab Sample Number: 8957

Intended Use: Remarks:

AGGREGATE ANALYSIS

Sieve No.	Total Weight Retained	Total Percent Retained	Total Percent Passing	Specification Range
3"				
2-1/2"				
1-1/2"				
1"				
3/4"				
1/2"				
3/8"		0.0	100.0	
#4	1.2	0.6	99.4	
#10	5.4	2.7	97.3	
#20	18.2	9.0	91.0	
#30	31.4	15.5	84.5	
#40	57.5	28.3	71.7	
#100	165.3	81.5	18.5	
#200	190.1	93.7	6.3	
Total Sample	202.9	100.0	0.0	

SAMPLE DATA

Initial Sample Weight (g)	202.9
Weight After Wash (g)	190.1
Loss in Weight (g)	12.8
Loss by Wash (%)	6.3%

Tested By: A. Pasciolla
Reviewed By: J. Lynch

Test Method: ASTM C117/C136 _____ AASHTO T11/T27 _____ MTM 108/109 X

Remarks:

Respectfully Submitted:
Testing Engineers and Consultants, Inc.

Testing Engineers and Consultants, Inc.

1343 Rochester Road PO Box 249 Troy, Michigan 48099-0249
248-588-6200 or 313 T-E-S-T-I-N-G
Fax 248-588-6232

MECHANICAL ANALYSIS TEST REPORT

PROJECT: Proposed Fire Substation **TEC REPORT NUMBER: 54544**

LOCATION: Dexter Township, Michigan **DATE: June 17, 2014**
CLIENT: Sidock Group, Inc.

Material Description: Brown Clayey SAND with some Gravel Date Sampled: 6/9/14

Sample Source / Depth: B-4 @ 2 1/2 feet Sampled By: I. Mickle

Sample Location: TEC Lab Sample Number: 8957

Intended Use: Remarks:

AGGREGATE ANALYSIS

Sieve No.	Total Weight Retained	Total Percent Retained	Total Percent Passing	Specification Range
3"				
2-1/2"				
1-1/2"				
1"		0.0	100.0	
3/4"	22.9	13.2	86.8	
1/2"	22.9	13.2	86.8	
3/8"	24.9	14.4	85.6	
#4	33.1	19.1	80.9	
#10	42.4	24.5	75.5	
#20	51.0	29.4	70.6	
#30	56.1	32.4	67.6	
#40	65.9	38.0	62.0	
#100	111.6	64.4	35.6	
#200	124.8	72.0	28.0	
Total Sample	173.4	100.0	0.0	

SAMPLE DATA

Initial Sample Weight (g)	173.4
Weight After Wash (g)	124.8
Loss in Weight (g)	48.6
Loss by Wash (%)	28.0%

Tested By: A. Pasciolla
Reviewed By: J. Lynch

Test Method: ASTM C117/C136 _____ AASHTO T11/T27 _____ MTM 108/109 X

Remarks: One large gravel-sized piece identified in sample (retained on 3/4" sieve)

Respectfully Submitted:
Testing Engineers and Consultants, Inc.

SECTION 00 41 13 - BID FORM - STIPULATED SUM
(GENERAL CONTRACT – All Trades Work)

To: Dexter Township
6880 Dexter Pinckney Road
Dexter, Michigan 48130

Project Title: NEW FIRE SUBSTATION NO. 2
Project No. 14049

Submitted by: _____

_____

1.1 OFFER

Having examined the Place of the Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Sidock Architects for the above-referenced Project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Sum of:

_____Dollars

($_____), in lawful money of the United States of America.
We have included the Bid security as required by the Instructions to Bidders.
All applicable federal, state and local taxes, all insurance specified cash allowances, all insurance specified and fees which are required for the performance of the contract and other General and Supplemental Conditions requirements are included in the foregoing Bid Sum amount.

1.2 CONTRACT TIME

The undersigned proposes and agrees to start work under this Contract within seven (7) days after the date of Notice of Award of Contract, and to substantially complete all Work under this Contract on or before July 31, 2015.

1.3 CHANGES TO THE WORK

When the Owner or Architect establishes that the method of valuation for changes in the Work will be net cost plus a percentage fee according to General Conditions, our percentage fee shall be:
15 percent overhead and profit on the net cost of our own Work;
10 percent on the gross cost of work done by any Subcontractor.
On Work deleted from the Contract, our credit to the Owner shall be the Architect/Engineer-approved net cost plus 50 percent of the overhead and profit percentage noted above.

1.4 ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

1.5 TENDERS

In submitting this bid, it is understood and agreed by the Bidder that the Owner reserves the right to reject any or all bids. The undersigned does hereby declare and stipulate that this Proposal is made in pursuance of and subject to all the terms and conditions of the Instructions to Bidders and the Contract Documents and that it is made in good faith, without collusion or connection with any other person(s) or entity bidding for the same work.

1.6 APPENDICES

A. The following documents are attached to and made a condition of the Bid:
Bid security in form of _____.

B. The following documents shall be submitted by the three (3) lowest Bidders within 24 hours of Bid opening and made a condition of the Bid:
- List of Major Subcontractors
- Cost Breakdown

1.7 BID FORM SIGNATURES

The undersigned agrees to execute a Contract for Work covered by this Proposal provided that he is notified of its acceptance within sixty (60) days after date of Proposal.

This Proposal is submitted in the name of:

(Bidder) _____

_____

Signed: _____

By (Name/Title): _____

Date: _____

END OF DOCUMENT

SECTION 00 52 14

AGREEMENT FORM - AIA
(GENERAL CONTRACT)

1.1 AGREEMENT

A. AIA A101 – 2007 Edition, Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment Is a Stipulated Sum forms the basis of Agreement between the Owner and Contractor.

END OF DOCUMENT

SECTION 00 72 14
GENERAL CONDITIONS - AIA (GENERAL CONTRACT)

1.1 GENERAL CONDITIONS

A. AIA A201 - General Conditions of the Contract for Construction – 2007 Edition is the General Conditions of the Contract.

1.2 SUPPLEMENTARY CONDITIONS

A. Refer to Document 00 73 13 - Supplementary Conditions - AIA for modifications to General Conditions.

END OF DOCUMENT

SECTION 00 73 13
SUPPLEMENTARY CONDITIONS–AIA A201

1.1 SUPPLEMENTARY CONDITIONS

A. These Supplementary Conditions modify AIA A201 - General Conditions of the Contract for Construction and other provisions of the Contract Documents as indicated below. All provisions not modified remain in full force.

ARTICLE 1 - GENERAL PROVISIONS

1.1 - BASIC DEFINITIONS

Add the following Subparagraphs:

1.1.8 Products: New material, machinery, components, equipment, fixtures, and systems forming the Work, not including machinery and equipment used for preparation, fabrication, conveying, and erection of the Work. Products may also include existing materials or components required for reuse.

1.1.9 Furnish: To supply, deliver, unload, and inspect for damage.

1.1.10 Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, and make ready for use.

1.1.11 Provide: To furnish and install.

ARTICLE 3–CONTRACTOR

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

Add the following Subparagraphs:

3.2.5 Working dimensions taken from drawings (Contract Documents) shall be taken from figured dimensions and in no case by scaling of the drawings. Large scale details shall take precedence over small scale details. Verify all measurements, lines and levels of existing conditions of the project site. When figured dimensions are not in agreement with field measurements, notify the Architect immediately in writing, requesting clarification.

3.2.6 Should a conflict occur in the documents, the Contractor is deemed to have elected to proceed in the more expensive manner unless he shall have asked for and received written decision as to which method or materials will be required prior to submission of proposal.

3.4 LABOR AND MATERIALS

Add the following Subparagraphs:

3.4.1.1 The term "approved", "approval of" or "as approved" shall mean "as approved by the Architect in writing" and when used shall require proof of conformance to the specified material, equipment or system or process that the Contractor may wish to submit as a substitute for that specified. .Burden of proof shall rest with the Contractor. Contractor shall pay all costs for inclusion of any accepted substitution.

3.4.1.2 Substitutions will not be considered if:

1. They are indicated or implied on shop drawing submissions without prior formal request and documented proof of conformance.
2. For their implementation they require a substantial revision of the Contract Documents in order to accommodate their use.

3.7 PERMITS, FIEES, NOTICES, AND COMPLIANCE WITH LAWS

3.7.1 Delete the paragraph in its entirety and substitute the following:

"The General Contractor shall secure the General Building Permit. The General Building Permit fee will be paid by the Owner. The Mechanical and Electrical Subcontractors shall secure the mechanical and electrical permits, respectively. The Permit fees will be paid by the Owner. All sewer tap fees will be paid by the Owner. All sewer and water inspection fees will be paid by the Contractor. All other required permits, licenses, fees, all certificates for partial and complete occupancy by the Owner, inspections and/or approvals, required for the proper and legal execution and completion of the Work shall be secured and/or paid for by the contractor installing work, subject to such respective permits, licenses, inspections and/or approvals, which are applicable at the time the bids are received."

ARTICLE 7 - CHANGES IN THE WORK

7.3 - CONSTRUCTION CHANGE DIRECTIVES

Add the following Subparagraphs:

7.1.4 The following fees apply to changes in the Work:
7.1.4.1 15 percent overhead and profit on the net cost of Work performed by Contractor;
7.1.4.2 10 percent overhead and profit on the cost of Work performed by any Subcontractor;
7.1.4.3 On Work deleted from the Contract, credit to Owner shall be Architect-approved net cost plus 1/2 of the overhead and profit percentage noted above.

ARTICLE 8–TIME

8.1 DEFINITIONS

Add the following Subparagraphs:

8.1.5 Contract Time commences on the date established in the Notice of Award of Contract and Notice to Proceed and continues until on or before July 31, 2015.

8.3 DELAYS AND EXTENSIONS OF TIME

Add the following Subparagraph

8.3.1 Claims for delays and extensions of time shall be made in reference to the Contract Time as defined in paragraph 8.1.5. No claim for delay or extensions of time shall be allowed in reference to Contractor generated progress schedule dates.

ARTICLE 9 - PAYMENTS AND COMPLETION

9.6–PROGRESS PAYMENTS
Add the following Subparagraph to Subparagraph 9.6.1:

9.6.1.1 Unless otherwise stated in the Agreement, the Owner will retain, until Final Payment, 10% of the amount due the Contractor on account of Progress Payments. If the manner of completion of the work and its progress are and remain satisfactory to the Architect and in the absence of other good and sufficient reason, (and upon presentation by the Contractor of Consent of the Surety) for each work category shown to be 50% or more complete on the application for payment, the Architect shall, without reduction of previous retainage, certify any remaining progress payments for such work categories to be paid in full. The full contract retainage may be reinstated if the manner of completion of the work and its progress do not remain satisfactory to the Architect or if the Surety withholds its consent to any payment, or for other good and sufficient reason.

Add the following Paragraph and Subparagraph:

9.11 **PENALTY/BONUS FOR COMPLETION**

9.11.1 The Owner will suffer financial loss if the project is not substantially complete on the date set forth in the Contract Documents. The Owner and Contractor agree that they shall be liable for and shall pay the sums hereinafter stipulated for delay or early substantial completion related to the building and sitework shown or specified in the Contract Documents (with the exception of the landscaping work): For each calendar day of delay until the Work is Substantially Complete, the Contractor shall pay $1,000.00 to the Owner. For each calendar day prior to the specified Date for Substantial Completion, the Owner shall pay $500.00 up to a maximum amount of $15,000.00 to the Contractor**. DEFINITION OF DATE OF SUBSTANTIAL COMPLETION**: The Date of Substantial Completion of the Work or designated portion thereof is the Date certified by the Architect when construction is sufficiently complete, in accordance with the Contract Documents, so the Owner can occupy or utilize the Work or designated portion thereof for the use for which it is intended, as expressed in the Contract Documents.

ARTICLE 11 - INSURANCE AND BONDS

11.1 - CONTRACTOR'S LIABILITY INSURANCE

11.1.1 Add the following:

The Contractor shall either (a) require each of his Subcontractors to procure and maintain during the life of his subcontract, the type and amount of insurance as outlined in Subparagraphs 11.1.1 and 11.1.13 on their employees and operations, or (b) insure the activities of his subcontractors in his own policy.

11.1.1.1 Contractor's and Subcontractor's Insurance
The Contractor shall not commence work under this contract until he has obtained the insurance required under this paragraph. All coverages shall be with the insurance companies licensed and admitted to do business in the State of Michigan. All coverages shall be with insurance carriers acceptable to the Township.

11.1.2 Add the following:

The following types of insurance, limits of liability and policy extensions required of the Contractor and all subcontractors:

1. Workmen's Compensation and Employer's Liability Insurance:

   Coverage A - Statutory
   Coverage B - $100,000 per Accident

2. Broad Form Comprehensive General Liability Insurance (Including Operations - Premises, Elevators, Contractor's Protective Liability - Subcontractor's Operations, Products -Completed Operations for two (2) years after Substantial Completion and the Contractual liabilities).

Bodily Injury including	$2,000,000.00 Each Person $2,000,000.00 Each Occurrence $2,000,000.00 Aggregate, Products and Completed Operations
Property Damage	$2,000,000.00 Each Occurrence $2,000,000.00 Aggregate

   Policy Extensions:

   Explosion, Collapse and Underground Damage Coverage; Broad Form Property Damage Coverage;
   Contractual Liability (Hold Harmless Coverage):

Bodily Injury	$2,000,000.00 Each Occurrence
Property Damage	$2,000,000.00 Each Occurrence $2,000,000.00 Aggregate

   Personal Injury, with Employment Exclusion deleted:
   $2,000,000.00 Aggregate

3. Comprehensive Automobile Liability Insurance

Bodily Injury	$2,000,000.00 Each Person $2,000,000.00 Each Occurrence
Property Damage	$2,000,000.00 Each Occurrence

   Policy Extensions:

   Occurrence Coverage for both Bodily Injury and Property Damage; Coverage for Owned, Hired and Non-Owned Vehicles.

4. Aircraft and Watercraft Liability insurance (owned and non-owned) when applicable, with limits proposed by Contractor for Owner's approval.

5. Coverages for Broad Form Comprehensive General Liability and Comprehensive Automobile Liability Insurance may be certified using Excess or Umbrella policies which shall then be subject to Article 11.1.2.

6. The Owner, Architect, Washtenaw County Road Commission, Multi-Lakes Water & Sewer Authority and OHM-Advisors shall be designated as an additional insured. The APersons Insured≅ provision shall include Aelected and appointed officials and employees acting within the scope of their duties.≅

7. Contractor shall furnish Owner with Owner's and Contractor's Protective Liability Policy with limits not less than $1,000,000.00 for Bodily Injury and Property Damage. Designate as Insured, Owner and Architect-Engineer only. The "Persons Insured" provision shall include "elected and appointed officials and employees acting within the scope of their duties.

11.1.3 Add the following:

". . . . The Contractor shall give written notice to the Owner if he discontinues Completed Operations coverage during the period of his Guarantee. Unless otherwise specifically approved by the owner, and as minimum criteria for acceptance, Contractor's insurance carriers shall have a minimum criteria for acceptance, Contractor's insurance carriers shall have a minimum "A" Key Rating in the "Best Insurance Guide", and either be licensed in the State of Michigan or policies shall contain a "Service of Suite" clause. Prior to execution of the Agreement for any portion of the work, ACORD "Certificate of Insurance", shall be used by the Contractor and all subcontractors to confirm insurance coverage, and two (2) copies of each certificate shall be forwarded to the Owner and Architect. Owner may, at his option, require a certified copy of Contractor's insurance policies in addition to insurance certificates Contractor shall file new certificates should original or renewed policies expire prior to completion of the work."

11.1.4 The Contractor shall not commence work under this Contract until he has obtained all insurance required under Article 11 of the General Conditions.

11.1.5 The Contractor shall not allow any subcontractor to commence work on this project until all similar insurance required of the subcontractor has been obtained and approved.

11.3 - PROPERTY INSURANCE

11.3.1 Add the following:

11.3.1.5 The Contractor shall secure and maintain insurance which will protect him against losses for all on-site stored materials not incorporated into the permanent work, whether paid for by the Owner or not, including tools and equipment used by him and his subcontractors.

11.3.1.6 If by the terms of this insurance any mandatory deductibles are required, or if the Owner should elect to increase the mandatory deductible amounts or purchase this insurance with voluntary deductible amounts, the Contractor shall be responsible for the first $5,000.00 of the deductible amount, and the Owner shall be responsible for payment of the remaining amount of the deductible in the event of a paid claim.

11.3.7 Amend this paragraph as follows:

In the first sentence, after the words ". . .(2) the Architect", insert the words: "his consultants". After the words ". . .separate contractors, if any", and insert the words: "any of".

11.5 - PERFORMANCE BOND AND PAYMENT BOND

11.4.1 Delete in its entirety and substitute the following:

Performance and Labor and Material Payment Bonds are required. The accepted Contractor shall qualify for a satisfactory Performance Bond and a Labor and Materials Payment Bond, in an amount equal to 100% of this Contract Sum and the premiums for such bonds shall be included in the Base Bid Contract Sum. Simultaneously with the execution and delivery of the Contract Agreement Between Owner and Contractor designated by the Owner the said Contractor shall qualify for, sign, pay for the premium and deliver to the Owner an executed Performance Bond and an executed Labor and Materials Payment Bond secured by a Surety Company approved by the Owner, each in the amount of one hundred (100%) percent of the Contract Agreement. All of these Bonds shall be attached to and made a part of the Agreement Between the Owner and the Contractor. The costs of the aforementioned Bonds shall be included in the Base Proposal.

The Bonding Company shall be licensed in the State of Michigan and either carry a minimum A-Rating, or be listed in the Federal Register as an approved Surety.

The Contractor shall deliver the required Bonds to the Owner not later than the date of execution of the Contract, or if the Work is commenced prior thereto in response to a Letter of Intent, the Contractor shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such Bonds will be issued.

The Contractor shall require the attorney in fact who executes the required bonds on behalf of the surety to affix thereto a certified and correct copy of his power of attorney indicating the monetary limit of such power.

The costs of any additional bonding required by the General Contractor's Surety Company for bonding Subcontractors to the General Contractor shall be paid for by the General Contractor.

Performance Bond and Labor and Material Bond, on forms acceptable to the Owner, will be used on the Project and must be submitted as per the Contract Documents requirements.

ARTICLE 13 - MISCELLANEOUS PROVISIONS

13.8 Add the following paragraphs:

13.8.1 The Contractor shall organize meetings at regular times for coordinating and expediting the Work. The Architect-Engineer shall be notified of these meetings, and when he directs, the Contractor shall hold additional meetings as required.

13.8.2 The invited Subcontractors shall be required to have qualified representatives at these meetings, empowered to act in their behalf.

13.8.3 The Contractor shall conduct the meeting and keep minutes of all discussions and decisions. The Contractor shall be responsible for the typing, duplication and distribution of the minutes to all parties in attendance and to those absent, if their work is affected.

END OF DOCUMENT

SECTION 01 00 00

GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Summary:
1. Contract description.
2. Work by Owner.
3. Contractor’s use of premises.
4. Future work.
5. Specification conventions.

B. Price and Payment Procedures:
1. Cash allowances.
2. Contingency allowances.
3. Testing and inspection allowances.
4. Schedule of values.
5. Applications for payment.
6. Change procedures.
7. Unit prices.
8. Alternates.

C. Administrative Requirements:
1. Coordination.
2. Field engineering.
3. Meetings.
4. Progress meetings.
5. Equipment electrical characteristics and components.
6. Cutting and patching.

D. Submittals:
1. Submittal procedures.
2. Construction progress schedules.
3. Proposed products list.
4. Product data.
5. Shop drawings.
6. Samples.
7. Manufacturer’s instructions.
8. Manufacturer’s certificates.

E. Quality Requirements:
1. Quality control.
2. Tolerances.
3. References.
4. Labeling.

5. Mock-ups.
6. Testing and inspection laboratory services.
7. Manufacturer's field services and reports.
8. Examination.
9. Preparation.

F. Temporary Facilities and Controls:
1. Temporary electricity.
2. Temporary lighting for construction purposes.
3. Temporary heating and cooling.
4. Temporary ventilation.
5. Telephone and facsimile service.
6. Temporary water service.
7. Temporary sanitary facilities.
8. Field offices and sheds.
9. Access roads.
10. Parking.
11. Progress cleaning and waste removal.
12. Project identification.
13. Fire prevention facilities.
14. Barriers and fencing.
15. Enclosures.
16. Protection of installed work.
17. Security.
18. Water control.
19. Pollution and environmental control.
20. Removal of utilities, facilities, and controls.

G. Product Requirements:
1. Products.
2. Delivery, handling, storage, and protection.
3. Product options.
4. Substitutions.

H. Execution Requirements:
1. Closeout procedures.
2. Final cleaning.
3. Starting of systems.
4. Demonstration and instructions.
5. Testing, adjusting and balancing.
6. Protecting installed construction.
7. Project record documents.
8. Operation and maintenance data.
9. Spare parts and maintenance materials.
10. Warranties.

1.2 CONTRACT DESCRIPTION

A. Construction of a 9,348 SF, single story Fire Substation, and related site work, as indicated in these contract documents.

B. Perform Work of Contract under a stipulated sum contract with General Contractor in accordance with Conditions of Contract.

1.3 WORK BY OWNER

A. Owner will furnish and install equipment and furnishings, unless indicated otherwise in these contract documents.

1.4 CONTRACTOR'S USE OF PREMISES

A. Limit use of premises to allow:
1. Work by others and work by Owner.

1.5 FUTURE WORK – NOT USED

1.6 SPECIFICATION CONVENTIONS

A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.

1.7 CASH ALLOWANCES – NOT USED

1.8 CONTINGENCY ALLOWANCES – NOT USED

1.9 TESTING AND INSPECTION ALLOWANCES

A. Testing and Inspection Allowances: The Owner will pay for the costs through the General Contractor and employ a testing and inspection firm, OHM Advisors, 34000 Plymouth Road, Livonia, Michigan 48154, Attention: Mr. Matthew Parks. Telephone: 734-522-6711. Testing and inspection firm shall follow these requirements and requirements with-in individual sections for bidding the work to the Owner.

B. Included in General Contractor's Allowance: Cost of engaging testing or inspection firm, execution of tests or inspection, and reporting of results.

C. Testing and inspection shall include all items as required by the 2009 Michigan Building Code as presented in chapter 17, "Structural Tests and Special Inspections".

D. Items by Contractor:
1. Incidental labor and facilities required to assist testing or inspection firm.
2. Costs of re-testing upon failure of previous tests as determined by Architect/Engineer.

E. Reports will be submitted by independent firm to Architect/Engineer, Contractor, Owner, and authority having jurisdiction, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
   1. Submit final report indicating correction of Work previously reported as non-compliant.

F. Agency Reports: After each test, promptly submit copies of report to Architect/Engineer, General Contractor, Owner, and authority having jurisdiction. When requested by Architect/Engineer, provide interpretation of test results. Include the following:
   1. Date issued.
   2. Project title and number.
   3. Name of inspector.
   4. Date and time of sampling or inspection.
   5. Identification of product and specifications section.
   6. Location in Project.
   7. Type of inspection or test.
   8. Date of test.
   9. Results of tests.
   10. Conformance with Contract Documents.

1.10 SCHEDULE OF VALUES

A. Submit schedule on AIA Form G703. Contractor's standard form or electronic media printout will be considered.

B. Submit Schedule of Values in duplicate within 15 days after date of Contractor Agreement.

1.11 APPLICATIONS FOR PAYMENT

A. Submit three copies of each application on AIA Form G702 and G703 or Construction Manager’s standard equivalent form.

B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

C. Payment Period: As provided in the General Conditions (Document AIA A201) and Supplementary Conditions.

1.12 CHANGE PROCEDURES

A. Stipulated Sum/Price Change Order: Based on Proposal Request, and Contractor's fixed price quotation or Contractor's request for Change Order as approved by Architect/Engineer/Owner.

B. Change Order Forms: AIA G701 or equivalent form.

1.13 UNIT PRICES – NOT USED

1.14 ALTERNATES – NOT USED

1.15 COORDINATION

A. Coordinate scheduling, submittals, and Work of various sections of specifications to ensure efficient and orderly sequence of installation of interdependent construction elements.

B. Verify utility requirement characteristics of operating equipment are compatible with building utilities.

C. Coordinate space requirements and installation of mechanical and electrical work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable.

D. In finished areas, conceal pipes, ducts, and wiring within construction.

1.16 FIELD ENGINEERING

A. The General Contractor will employ a land surveyor to locate reference datum, provide layout and construction staking.

B. Subcontractors are to protect survey control and reference points.

C. Establish elevations, lines, and levels and certify elevations and locations of the Work conform with Contract Documents.

D. Verify field measurements are as indicated on shop drawings or as instructed by manufacturer.

1.17 MEETINGS

A. Contactor shall schedule preconstruction meeting after Notice of Award for affected parties.

B. When required in individual specification section, convene pre-installation meeting at Project site prior to commencing work of section.

1.18 PROGRESS MEETINGS

A. Contractor shall schedule and administer meetings throughout progress of the Work at a maximum of 2 week intervals or as agreed upon with Owner.

B. Contractor shall preside at meetings, record minutes, and distribute copies within five days to those affected by decisions made, Architect, and Owner.

1.19 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Motors: NEMA MG1 Type; specific motor type is specified in individual specification sections.

B. Wiring Terminations: Terminal lugs to match branch circuit conductor; size terminal lugs to NFPA 70.

C. Cord and Plug: Minimum 6 foot cord and plug including grounding connector; cord of longer length is specified in individual sections.

1.20 CUTTING AND PATCHING

A. Employ original installer to perform cutting and patching new Work; restore Work with new Products.

B. Submit written request in advance of cutting or altering structural or building enclosure elements.

C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
1. Fit several parts together, to integrate with other Work.
2. Uncover Work to install or correct ill-timed Work.
3. Remove and replace defective and non-conforming Work.
4. Remove samples of installed Work for testing.
5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

D. Cut masonry and concrete materials using masonry saw or core drill. Restore Work with new Products in accordance with requirements of Contract Documents.

E. Fit Work tight to adjacent elements. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

F. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. Refinish surfaces to match adjacent finishes.

1.21 SUBMITTAL PROCEDURES

A. Submittal form to identify Project, General Contractor, subcontractor or supplier; and pertinent Contract Document references.

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

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

D. Revise and resubmit submittals as required; identify changes made since previous submittal.

E. Submittals to be in Electronic PDF format, unless otherwise approved.

1.22 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial progress schedule after date of Owner-Contractor Agreement.

1.23 PROPOSED PRODUCTS LIST

A. Within 15 days after date of the Owner-Contractor Agreement, submit list of major Products proposed for use, with name of manufacturer, trade name, and model number of each product.

1.24 PRODUCT DATA

A. Product Data:
1. Submitted to General Contractor & Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes as specified.

B. Electronic submittals in PDF format are acceptable and preferred over any paper copies.

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer’s standard data to provide information unique to this project.

1.25 SHOP DRAWINGS

A. Shop Drawings:
1. Submitted to General Contractor & Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes as specified.

B. When required by individual specification sections, provide shop drawings signed and sealed by professional engineer responsible for designing components shown on shop drawings.
1. Include signed and sealed calculations to support design.
2. Submit drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
3. Make revisions and provide additional information when required by authorities having jurisdiction.

1.26 SAMPLES

A. Samples for Review:
1. Submitted to General Contractor & Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes as specified.

B. Samples For Selection:
1. Submitted to Architect/Engineer for aesthetic, color, or finish selection.
2. Submit samples of finishes from full range of manufacturer’s standard colors, textures, and patterns for Architect/Engineer selection.
3. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes as specified.

C. Submit samples to illustrate functional and aesthetic characteristics of Product.

D. Submit samples of finishes from full range of manufacturer’s standard colors, textures, and patterns for Architect/Engineer's selection.

1.27 MANUFACTURER’S INSTRUCTIONS

A. When specified in individual specification sections, submit manufacturer printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

1.28 MANUFACTURER’S CERTIFICATES

A. When specified in individual specification sections, submit certifications by manufacturer to Architect/Engineer, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.29 QUALITY CONTROL

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturer’s instructions.

C. Comply with specified standards as minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.30 TOLERANCES

A. Monitor fabrication and installation tolerance control of installed Products over suppliers, manufacturers, Products, site conditions, and workmanship, to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply fully with manufacturer’s tolerances.

1.31 REFERENCES

A. Conform to reference standards by date of issue current as of date of Contract Documents.

B. When specified reference standard conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

1.32 LABELING

A. Attach label from agency approved by authority having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.

B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label.
1. Model number.
2. Serial number.
3. Performance characteristics.

1.33 MOCK-UPS – NOT USED

1.34 TESTING AND INSPECTION LABORATORY SERVICES

A. The Owner through the General Contractor will appoint, employ, and pay for specified services of independent firm to perform testing and inspection. See paragraph 1.9 for more information on required services.

B. Independent firm will perform tests, inspections, and other services as required.

C. Cooperate with independent firm; furnish samples as requested.

D. Re-testing required because of non-conformance to specified requirements will be charged to Contractor.

1.35 MANUFACTURER’S FIELD SERVICES AND REPORTS

A. When specified in individual specification sections, require material or Product suppliers or manufacturers to furnish qualified staff personnel to observe site conditions and to initiate instructions when necessary.

B. Report observations and site decisions or instructions that are supplemental or contrary to manufacturer's written instructions.

1.36 EXAMINATION

A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify utility services are available, of correct characteristics, and in correct location.

1.37 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

1.38 TEMPORARY ELECTRICITY

A. Temporary power will be provided by General Contractor from the Electrical Utility.

B. Provide temporary electricity and power outlets for construction operations, connections, branch wiring, distribution boxes, and flexible power cords as required.

1.39 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain temporary lighting for construction operations.

B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

C. Permanent building lighting may be utilized during construction. Repair, clean, and replace lamps at end of construction.

1.40 TEMPORARY HEATING AND COOLING

A. Provide heating and cooling devices and heat and cool as needed to maintain specified conditions for construction operations.

B. Until new HVAC equipment is up and running, the Contractor will pay cost of energy as needed. New HVAC equipment shall not be used for temporary heating, cooling, and ventilation, until all dust producing operations are complete, included finishing of drywall surfaces, general clean-up is complete, and approval of Architect/Engineer and Commissioning Agent are received in writing. The cost for cleaning of ductwork will be paid for by the General Contractor if required after the construction is complete.

C. All openings in ductwork shall be sealed off during dust producing construction activities.

D. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

E. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.41 TEMPORARY VENTILATION

A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.42 TELEPHONE AND FACSIMILE SERVICE – NOT USED

1.43 TEMPORARY WATER SERVICE

A. Contractor to furnish and pay for temporary water service from water utility company. Maintain access to service for use during construction, until permanent service is installed.

1.44 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. New building facilities may not be used.

B. Maintain in clean and sanitary condition.

1.45 FIELD OFFICES AND SHEDS

A. Office: Weather tight, with lighting, electrical outlets, heating, cooling and ventilating equipment, and equipped with sturdy furniture and drawing display table.

B. Provide space for Project meetings, with table and chairs to accommodate 8 people.

1.46 ACCESS ROADS

A. Use existing roads accessing public streets to serve construction area, as designated by Owner.

1.47 PARKING

A. Arrange for temporary parking areas to accommodate construction personnel in areas as designated by Owner.

1.48 PROGRESS CLEANING AND WASTE REMOVAL

A. Collect and maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.

1.49 PROJECT IDENTIFICATION

A. Provide 8 foot wide x 6 foot high project sign of exterior grade plywood and wood frame construction, painted, to Architect/Engineer's design and colors.

B. Erect on site at location established by Architect/Engineer and approved by Owner.

1.50 FIRE PREVENTION FACILITIES

A. This is a smoke-free environment. Prohibit smoking within buildings under construction and on the Owners property.

B. Establish fire watch for cutting and welding and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.

C. Portable Fire Extinguishers: NFPA 10; 10 pound capacity, 4A-60B: C UL rating.
1. Provide one fire extinguisher on each floor of buildings under construction.
2. Provide minimum one fire extinguisher in every construction trailer and storage shed.
3. Provide minimum one fire extinguisher on roof during roofing operations using heat producing equipment.

1.51 BARRIERS AND FENCING

A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage. Maintain access to existing adjacent Multi-Lakes Water & Sewer Authority Building. Coordinate with Owner.

B. Construction: Contractor's option.

1.52 ENCLOSURES

A. Provide temporary insulated weather tight closures to exterior openings to permit acceptable working conditions and protection of the Work.

1.53 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Prohibit traffic or storage upon waterproofed or roofed surfaces.

1.54 SECURITY

A. Provide security and facilities to protect Work from unauthorized entry, vandalism, or theft.

1.55 WATER CONTROL

A. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Provide erosion control in accordance with authority having jurisdiction.

1.56 POLLUTION AND ENVIRONMENTAL CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

B. Provide dust control, erosion and sediment control, noise control, pest control and rodent control to allow for proper execution of the Work.

1.57 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion review.

B. Remove underground installations. Grade site as indicated on Drawings.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore permanent facilities used during construction to specified condition.

1.58 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work.

1.59 DELIVERY, HANDLING, STORAGE, AND PROTECTION

A. Deliver, handle, store, and protect Products in accordance with manufacturer's instructions.

1.60 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for manufacturers not named.

1.61 SUBSTITUTIONS

A. Instructions to Bidders specify time for submitting requests for Substitutions during bidding period to requirements specified in this section.

B. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

1.62 CLOSEOUT PROCEDURES

A. Submit written certification Contract Documents have been reviewed, Work has been inspected, and Work is complete in accordance with Contract Documents and ready for Architect/Engineer's inspection.

B. Submit final Application for Payment identifying total adjusted Contract Sum/Price, previous payments, and amount remaining due.

1.63 FINAL CLEANING

A. Execute final cleaning prior to final inspection.

B. Clean interior and exterior surfaces exposed to view. Vacuum carpeted and soft surfaces.

C. Clean debris from site, roofs, gutters, downspouts, and drainage systems.

D. Replace filters of operating equipment.

E. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.64 STARTING OF SYSTEMS

A. Provide seven days notification prior to start-up of each item.

B. Ensure each piece of equipment or system is ready for operation.

C. Execute start-up under supervision of responsible persons in accordance with manufacturer’s instructions.

D. Submit written report stating equipment or system has been properly installed and is functioning correctly.

1.65 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Substantial Completion.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at equipment location.

1.66 TESTING, ADJUSTING, AND BALANCING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

B. Contractor will appoint, employ, and pay for services of independent firm to perform testing, adjusting, and balancing.

C. Reports will be submitted by independent firm to General Contractor, Architect/Engineer and Owner indicating observations and results of tests and indicating compliance or non-compliance with specified requirements and with requirements of Contract Documents.

D. Cooperate with independent firm; furnish assistance as requested.

E. Re-testing required because of non-conformance to specified requirements will be charged to Contractor.

1.67 PROTECTING INSTALLED CONSTRUCTION

A. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

B. Protect finished floors, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

C. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

D. Prohibit traffic from landscaped areas.

1.68 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of Contract Documents to be utilized for record documents.

B. Record actual revisions to the Work. Record information concurrent with construction progress.

C. Specifications: Legibly mark and record at each Product section description of actual Products installed.

D. Record Documents and Shop Drawings: Legibly mark each item to record actual construction.

E. Submit documents to Architect/Engineer and Owner with claim for final Application for Payment.

1.69 OPERATION AND MAINTENANCE DATA

A. Submit two sets prior to final inspection, bound in 8-1/2 x 11 inch text pages, three D side ring binders.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS" and title of project.

C. Internally subdivide binder contents with permanent page dividers, logically organized, with tab titles legibly printed under reinforced laminated plastic tabs.

D. Contents:
1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Owner, subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions, arranged by system.
3. Part 3: Project documents and certificates.

1.70 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide Products, spare parts, maintenance and extra materials in quantities specified in individual specification sections.

B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

1.71 WARRANTIES

A. Provide duplicate notarized copies.

B. Execute and assemble transferable warranty documents from subcontractors, suppliers, and manufacturers.

C. Submit prior to final Application for Payment.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Formwork.
2. Reinforcement.
3. Accessories.
4. Cast-in place concrete.
5. Finishing and curing.

1.2 SYSTEM DESCRIPTION

A. Design, engineer and construct formwork, shoring and bracing in accordance with ACI 301 and ACI 318 to conform to design and the 2009 Michigan Building Code requirements to achieve concrete shape, line and dimension as indicated on Drawings.

B. Vapor Retarder Permeance: Maximum 1 perm when tested in accordance with ASTM E96, Procedure A.

1.3 SUBMITTALS

A. Shop Drawings:
1. Indicate pertinent dimensioning, form materials, arrangement of joints and ties, location of bracing and temporary supports, schedule of erection and stripping.
2. Indicate reinforcement sizes, spacing, location, and quantities, bending and cutting schedules, supporting and spacing devices.
3. Indicate sidewalks, and slabs-on-grade.

B. Product Data: Indicate admixtures, anchors, and bonding agents.

C. Design Data: Submit mix designs.

1.4 QUALITY ASSURANCE

A. Construct and erect concrete formwork in accordance with ACI 301 and ACI 318.

B. Perform concrete reinforcing work in accordance with ACI 301, ACI 315, ACI 318 and CRSI Manual of Practice.

C. Perform cast-in-place concrete work in accordance with ACI 301, ACI 318, ACI 305, and ACI 306.1.

PART 2 PRODUCTS

2.1 FORM MATERIALS AND ACCESSORIES

A. Form Materials: At discretion of Contractor.

B. Form Release Agent: Colorless mineral oil not capable of staining concrete or impairing natural bonding characteristics of coating intended for use on concrete.

C. Slab Edge Joint Filler: ASTM D1751, Premolded asphaltic board, 1/2 inch thick.

D. Vapor Retarder: ASTM E1745 Class A; 10 mil thick clear polyethylene film; type recommended for below grade application. Furnish joint tape recommended by manufacturer.

2.2 REINFORCEMENT MATERIALS

A. Deformed and Plain Reinforcement: ASTM A615/A615M; 60 ksi yield strength, steel bars, unfinished.

B. Welded Deformed Wire Fabric: ASTM A497; in flat sheets; unfinished.

C. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for support of reinforcing; plastic tipped or non-corroding for supports in slabs forming finished ceilings or where supports are exposed to weather.

D. Fabricate concrete reinforcement in accordance with CRSI Manual of Practice, ACI 301, ACI 318 and applicable code.

E. Weld reinforcement in accordance with AWS D1.4.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, Normal-Type I Portland type.

B. Fine and Coarse Aggregates: ASTM C33.

C. Water: Clean and not detrimental to concrete.

D. Air Entrainment Admixture: ASTM C260.

E. Bonding Agent: Polymer resin emulsion; Resi-bond as manufactured by Dayton Superior.

F. Non-shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.

2.4 COMPOUNDS, HARDENERS AND SEALERS

A. Absorptive Mats: ASTM C171, Cotton Fabric or Burlap-Polyethylene.

B. Sealer: only where indicated on drawings and as specified in Section 09 90 00.

2.5 CONCRETE MIX

A. Mix and deliver concrete in accordance with ASTM C94/C94M, Option C.

B. Furnish concrete footings, piers, walls, and exterior slabs of the following strength:
1. Compressive Strength 4500 psi (28 day) for slabs and footings.
2. Slump four inches maximum.
3. Maximum water-cement ratio: 0.45.

C. Furnish concrete interior slabs of the following strength:
1. Compressive Strength 3000 psi (28 day) for slabs.
2. Slump four inches maximum.
3. Maximum water-cement ratio: 0.45.

D. Select admixture proportions for normal weight concrete in accordance with ACI 301.

E. Add air entraining agent to concrete mix for all concrete work exposed to freezing and thawing cycles. (5% +/-1).

PART 3 EXECUTION

3.1 FORMWORK ERECTION

A. Erect formwork, shoring and bracing to achieve design requirements.

B. Provide bracing to ensure stability of formwork.

C. Apply form release agent to formwork prior to placing form accessories and reinforcement.

D. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings affected by agent.

E. Clean forms as erection proceeds, to remove foreign matter.

3.2 INSERTS, EMBEDDED COMPONENTS, AND OPENINGS

A. Provide formed openings where required for work to be embedded in and passing through concrete members.

B. Coordinate work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

C. Install concrete accessories straight, level, and plumb.

D. Place joint filler at perimeter of floor slab, penetrations, and isolation joints.

3.3 REINFORCEMENT PLACEMENT

A. Place reinforcement, supported and secured against displacement.

B. Ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings.

C. Weld reinforcement in accordance with AWS D1.4.
1. Do not weld crossing reinforcement bars for assembly except as permitted by Architect/Engineer.

D. Space reinforcement bars with minimum clear spacing in accordance with ACI 301 and ACI 318 of one bar diameter, but not less than 1 inch.
1. Where bars are indicated in multiple layers, place upper bars directly above lower bars.

E. Maintain concrete cover around reinforcement in accordance with ACI 301 and ACI 318 and 2009 Michigan Building Code.

3.4 PLACING CONCRETE

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent.

B. Install vapor retarder under interior slabs on grade in accordance with ASTM E1643. Lap joints minimum 6 inches and seal watertight.

C. Repair damaged vapor retarder with vapor retarder material, lap over damaged areas minimum 6 inches and seal watertight.

D. Separate slabs-on-grade from vertical surfaces with 1/2 inch thick joint filler, extended from bottom of slab to within 1/4 inch of finished slab surface.

E. Place concrete continuously between predetermined expansion, control and construction joints. Do not break or interrupt successive pours creating cold joints.

F. Place floor slabs in every-other lane-placement or saw cut pattern indicated.

G. Where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and apply Epoxy Adhesive for bonding.

H. Screed floors, and slabs-on-grade level. Slope slabs to floor drains where indicated on drawings.

3.5 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Remove formwork progressively and in accordance with code requirements.

3.6 FLOOR FINISHING

A. Finish concrete floor slab surfaces in accordance with ACI 301 and ACI 302.1.

B. Uniformly spread, screed, and float concrete.

C. Steel trowel surfaces receiving carpeting, resilient flooring, seamless flooring, thin set quarry tile, thin set ceramic tile, or remaining exposed to view in finished construction.

D. Maintain surface flatness, with maximum variation of 1/8 inch in 10 ft.

E. In areas with floor drains, maintain floor level at walls and slope surfaces uniformly to drains.

3.7 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
   1. Protect concrete footings from freezing for minimum 5 days.
   2. Concrete placed in temperatures below 32 degrees F shall be placed in accordance with ACI 306.1-90 (R2002) Cold Weather Concrete Specifications.

B. Place absorptive matting, moisten, and keep damp.

C. Immediately after placement, protect concrete from premature drying.

D. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete for not less than 7 days.

3.8 FORMED SURFACES

A. Provide concrete surfaces to be left exposed, and concrete walls with smooth rubbed finish.

3.9 ERECTION TOLERANCES

A. Install reinforcement within tolerances required by ACI 301 and ACI 318 and 2009 Michigan Building Code.

3.10 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with ACI 301 and the 2009 Michigan Building Code Chapter 17.

B. Reinforcement Inspection:
   1. Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.

C. Strength Test Samples:
   1. Sample concrete and make one set of four cylinders for every 75 cubic yards or less of each class of concrete placed each day and for every 5,000 square feet of surface area for slabs and walls.

D. Field Testing:
   1. Measure slump and temperature for each compressive strength concrete sample.
   2. Measure air content in air entrained concrete for each compressive strength concrete sample.

E. Cylinder Compressive Strength Testing:
   1. Test Method: ASTM C39.
   2. Test Acceptance: In accordance with ACI 301 and 2009 Michigan Building Code.
   3. Test one cylinder each at 7 days, 17 days, and 28 days.
   4. Retain one cylinder for days for testing when requested by Architect/Engineer.
   5. Dispose remaining cylinders when testing is not required.

3.11 DEFECTIVE CONCRETE

A. Modify or replace concrete not conforming to required lines, details and elevations, as directed by Architect/Engineer.

END OF SECTION

SECTION 04 27 00

SINGLE WYTHE MASONRY ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes multi wythe and single wythe concrete masonry unit assemblies; and accessories as follows:
1. Concrete masonry units (CMU).
2. Mortar and grout.
3. Flashing.
4. Insulation materials.
5. Masonry accessories.
6. Cleaning materials.

B. All exterior masonry walls are typically 8 inch single wythe assemblies, unless otherwise indicated.

C. The Interior masonry walls are typically 6 inch or 8 inch CMU single wythe.

1.2 PERFORMANCE REQUIREMENTS

A. Concrete Masonry Compressive Strength (f'm): 2,000 psi; determined by the prism test method.

B. Concrete Masonry Weight: Normal Weight, 115 pcf.

C. Brick Masonry Compressive Strength (fm): 17,000 psi; determined by unit strength method.

1.3 RELATED WORK:

A. Section 01 00 00 General Requirements: Testing and inspection requirements.

B. Section 05 12 00 Structural Steel for steel lintels.

C. Section 07 90 00 Joint Protection for sealants and backer rods.

1.4 PRODUCTS INSTALLED BUT NOT FURNISHED.

A. Steel lintels and shelf angles for unit masonry are specified in Section 05 12 00 – Structural Steel Framing

B. Hollow metal frames are specified in Section 08 11 13 – Hollow Metal Doors and Frames.

1.5 SUBMITTALS

A. Product Data: For each indicated product.

B. Samples: For types and colors of masonry units and pigmented mortar.

C. Material Certificates: For each type of indicated product (including self-consolidating grout), include statement of properties and compliance with these Specifications. Include mix design for mortar and grout.

D. Masonry Material Cleaning Plan: Include products and techniques for each masonry product of the assembly and the combined masonry assembly. Prior to submission, the plan shall be signed and approved by:
1. General Contractor
2. Mason Contractor
3. All Masonry Unit Manufacturers
4. Cleaning Materials Supplier and Manufacturer
5. Cleaning Subcontractor

E. Construction procedures for cold and hot weather.

F. Wall Bracing Plan showing braces and delineating the restricted zones.

1.6 QUALITY ASSURANCE

A. Masonry Inspection:
1. Level B. Periodic inspection.

B. Masonry construction and materials shall conform to the requirements of "Specifications for Masonry Structures (ACI 530.1/ASCE 6/TMS 602)" published by The Masonry Society, the American Concrete Institute, and the American Society of Civil Engineers, except as modified by the requirements of these contract documents.

C. Pre-construction Testing: Contractor shall employ a qualified independent masonry testing agency to perform the following tests and pay testing agency from Contractor's Testing Allowance. Contractor shall provide materials in reasonable quantities for testing. Laboratory Technician shall be certified per ASTM C 1093.
1. Grout: Compressive strength tests per ASTM C 1019. Additionally, grout samples shall be obtained using molds that simulate the units used in the construction (cardboard forms shall not be utilized).
2. Self-consolidating grout: Compressive strength tests per ASTM C1019 and slump flow and visual stability index per ASTM C1611.
3. Mortar: Mortar aggregate ratio tests per ASTM C780, Annex 4.

D. Fire Ratings: Fire rated masonry units shall be in compliance when:
1. The masonry has been certified through the equivalent thickness method contained in Chapter 3 of ACI 216.1 for concrete masonry, and Chapter 5 for effects of finish materials.

E. Temporary Bracing: Comply with Mason Contractors Association of America's Standard Practice for Bracing Masonry Walls Under Construction, and Masonry Wall Bracing Design Handbook, published by the Mason Contractors Association of America. (www.masoncontractors.org)

F. Fire Rated Wall Construction: Rating at locations as indicated on Drawings one hour rating.
   1. Tested Rating: Determined in accordance with ASTM E119.
   2. Prescriptive Rating: Item Number 3-1.3; determined in accordance with table 720.1(2) of the 2009 Michigan Building Code.

G. Surface Burning Characteristics:
   1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

H. Perform Work in accordance with the 2009 Michigan Building Code.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store aggregates on grades such that site drainage will not contaminate aggregates.

B. Store masonry units, cementitious materials and accessories on elevated platforms in a dry location. Materials shall be kept covered with weatherproof sheeting and secured from the wind. Do not use saturated concrete masonry per NCMA TEK Note 3-1B.

1.8 PROJECT CONDITIONS

A. Cold Weather Requirements: When ambient temperature is below 40 degrees Fahrenheit, implement cold weather procedures. Comply with ACI 530.1/ASCE 6/TMS 602 Specification requirements. Provide approved admixtures only.

B. Hot Weather Requirements: When ambient temperatures during construction or during the protection period are greater than 100 degrees Fahrenheit, or are greater than 90 degrees Fahrenheit with a wind velocity greater than 8 miles per hour, comply with ACI 530.1/ASCE 6/TMS 602 Specification requirements. Provide approved admixtures only.

PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Concrete Masonry Units (CMU): ASTM C 90, normal weight.
   1. Size: Specified size to be 3/8 inches less than the nominal width, height and length.
   2. Provide special shapes for lintels, corners, jambs, sashes, movement joints, bond beams, and other special conditions as indicated on the Drawings.

B. Masonry Lintels: Field assembled CMU in color, pattern, size and texture matching adjacent CMU wall with reinforcing bars as indicated, placed and filled with grout; or as otherwise noted.

C. Precast Masonry Lintels: Precast units matching concrete unit masonry and with reinforcing bars indicated or required to support intended loads, ASTM C1623.

D. Water Repellent Admixture: All concrete masonry exposed to the exterior shall be manufactured with a liquid water-repellent block admixture intended for use with concrete masonry.

1. Products: Dry-Block Admixture as manufactured by Grace Construction Products, a unit of W.R. Grace & Co. or approved equal.

E. Precast Concrete Lintels: Precast concrete lintels with reinforcing bars indicated or required to support intended loads, ACI 318.

2.2 MORTAR AND GROUT MATERIALS

A. Contractor shall select one of the following cement options for mortar:
1. Masonry Cement: ASTM C 91.
2. Mortar Cement: ASTM C 1329.
3. Portland Cement-Lime:
a. Portland Cement: ASTM C150, Types I or II, except Type III may be used when temperature is below 40 degrees Fahrenheit during construction. Provide natural (gray) or white colored cement as required to produce mortar color indicated.
b. Blended Cement: ASTM C595, Types IS(<70) or IP.
c. Hydraulic Cement: ATM C1157, Type GU, except Type HE may be used when temperature is below 40 degrees Fahrenheit during construction.
d. Hydrated Lime: ASTM C 207, Type S.

B. Contractor shall select one of the following cement options for grout:
1. Portland cement: ASTM C150, Types I or II, except Type III may be used when the temperature is below 40 degrees Fahrenheit during construction.
2. Blended cement: ASTM C595, Types IS(<70) or IP .
3. Hydraulic cement: ASTM C1157, Type GU, except Type HE may be used when the temperature is below 40 degrees Fahrenheit during construction.
4. Combinations of cementitious materials that include Portland cement and supplementary cementitious materials (SCMs) in accordance with the following:
a. Ground Granulated Blast Furnace Slag (GGBFS or Slag Cement): ASTM C989. The cement slag replacement may be equal to up to 95% slag cement. The slag cement shall consist of either Grades 80, 100 or 120.
b. Fly Ash: ASTM C618. The fly ash replacement may be equal to up to 40% fly ash replacement. The fly ash shall consist of either Class C or F.
c. SCM’s shall not be blended by the ready mixed grout supplier without the purchaser’s approval. The SCM percentage(s) shall be indicated on the batch ticket(s).

C. Mortar Pigments: ASTM C 979, mineral oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.
1. Concrete Masonry Unit Mortar: Natural Gray color with no added pigment.

D. Aggregate for Mortar: ASTM C 144.

E. Aggregate for Grout: ASTM C 404.

F. Admixtures: Comply with ASTM C 1384, containing not more than 0.2 percent chloride ions, and as recommended by the manufacturer:
   1. Admixture for Grout: As approved by Architect.
   2. Other Admixtures: As approved by Architect.

G. Water Repellent Admixture: Liquid water repellent mortar admixture intended for use with concrete masonry units, conaining integral water repellent by same manufacturer.

   1. Products: Grace Construction Products a unit of W.R.Grace & Co.; Dry-Block Mortar Admixture or Master Builders, Inc.; Rheomix Rheopel.

H. Water: Potable, clean and free of deleterious materials.

2.3 REINFORCEMENTS

A. Deformed Reinforcing Bars: ASTM A 615/A 615M, Grade 60.

B. Masonry Joint Reinforcement, General: ASTM A 951
   1. Interior Walls: Mill galvanized, ASTM A 641 (0.10 ounces per square foot), carbon steel.
   2. Exterior Walls: Hot dip galvanized, ASTM A153 Class B-2 (1.50 ounces per square foot), carbon steel.
   3. Wire Size and Side Rods: W1.7 or 0.148 inch diameter (9 gauge).
   4. Wire Size for Cross Rods: W1.7 or 0.148 inch diameter (9 gauge).
   5. Spacing for Cross Rods: 16 inches on center.
   6. Provide in lengths of not less than 10 feet.

2.4 EMBEDDED FLASHING SYSTEM MATERIALS

A. Metal Drip Edges at Steel lintels: ASTM A 167, Type 304, stainless steel, 0.0156 inches thick.
   1. Metal Configuration: Extend at least 3 inches horizontally into wall and 1/2 inch out from exterior face of wall with outer edge bent down 30 degrees and hemmed.
   2. Sealant: One-part non-skinning butyl sealant conforming to ASTM C 1311.

B. Weep/Vent:
   1. Mesh Weep/Vent: Free-draining polyethylene strand mesh, veneer height and depth by 3/8 inch wide. Color to match mortar.

C. Cavity Drainage Material: Provide one of the following:
   1. Pea Gravel: Clean, hard, durable free-flowing naturally rounded particle of rock, free of clay, silt, and fine particles, with 100 percent passing a 3/8 inch sieve and not over 5 percent passing a No. 8 sieve.
   2. Free-Draining Mesh: Free-draining polyethylene strand mesh designed to catch mortar droppings and prevent weep holes from being clogged.

2.5 INSULATION MATERIALS

A. Insulation for cavity:

1. Extruded-Polystyrene Board Insulation: ASTM C 578, closed-cell product extruded with an integral skin.
   i. Type IV 2 1/2 inch thickness, R-14.
   ii. Dow Styrofoam Brand Cavitymate Ultra

2.6 MISCELLANEOUS ACCESSORIES

A. Connectors at Intersecting Shear Walls (not applicable at corners):

1. Rigid Z-Strap Anchors: Fabricate from ASTM A 36 steel bars, 1-1/2 inches by 1/4 inch by 24 inches long with ends turned up 2 inches (total 28 inches in length).

B. Connectors for Interior Non-Load Bearing Non-Shear Walls (not applicable at corners):

1. Wire Mesh Ties: Fabricate from 1/2 inch by 1/2 inch mesh, 16 gauge, in width 2 inches less than nominal thickness of the CMU wythe and length not less than 14 inches. Hot dip galvanized, ASTM A 153 Class B-2.

C. Flexible Anchors: Where masonry is to be laterally supported from structural steel provide flexible anchors consisting of two different components as follows:

1. Receiver Component: 1/4 inch diameter steel rod with 3/8 inch offset or 12 gauge galvanized steel straps and 4 inch adjustment for ties specified below. Zinc coated, ASTM A 641 (0.10 ounces per square foot, carbon steel).
2. Triangular Ties: 3/16 inch diameter steel wire, ASTM A 82. Tie length shall extend at least halfway through facing wythe but with at least 5/8 inch cover on outside face. Closed end shall be 1 inch wide and split-end opening shall be 1/2 inch. Hot dip galvanized, ASTM A 153 Class B-2 (1.5 ounces per square foot, carbon steel).

D. Preformed Control Joint Gasket: Cross shape of flexible rubber or PVC with shear key to fit into sash block grooves and minimum 1 inch flanges. (Optional)

1. PVC complying with ASTM D 2287 (Type PVC 654-4).
2. Rubber complying with ASTM D 2000 M2AA-805.

E. Bond-Breaker Strips: Asphalt saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt). (As typically used in the “Michigan Control Joint”).

F. Grout Retainer: Mesh screen, width of CMU less 1 inch. Use at bottom of horizontal grout cell to retain grout without the use of special shaped CMUs, and without breaking mortar bond.

G. Masonry Cleaners: Proprietary cleaner(s) for the appropriate masonry surface as recommended by the masonry material manufacturers and as stated in the approved Masonry Material Cleaning Plan.

2.7 MORTAR AND GROUT MIXES

A. General: Specified admixtures may be provided as indicated below. If admixture is used, add at same rate for all exposed mortar to ensure consistent mortar color, regardless of weather. Test for compatibility with other products and assemblies.

B. Mortar Mix: ASTM C 270, Proportion Specification.
1. Type M or S for masonry below grade or in contact with earth.
2. Type S for unreinforced masonry.
3. Type S for reinforced masonry.
4. Admixture: Specified mortar admixtures.
5. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce selected color. Do not add pigments to colored cement products.
   a. Pigments shall not exceed 10 percent of Portland cement by weight.
   b. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.

C. Standard Grout Mix: ASTM C 476, slump of 8 to 11 inches measured per ASTM C 143.
1. Provide fine or coarse grout per ACI 530/ASCE 5/TMS 402, Table 1.15.1, Grout Space Requirements, based upon height and grout space.
2. ASTM C 476 grout mix shall be determined by the following method:
   a. By specified compressive strength tested in accordance ASTM C 1019, minimum compressive strength of 2,500 pounds per square inch.
3. Approved grout admixtures.

D. Self-Consolidating Grout Mix: Conforms to material requirements of ASTM C 476.
   a. Provide fine or coarse self consolidating grout.
   b. Attains the specified compressive strength or 2,500 pounds per square inch, whichever is greater, at 28 days when tested in accordance with ASTM C1019.
   ~~c.~~ Has a slump flow of 24 to 30 inches per ASTM C 1611.
   d. Has a Visual Stability Index (VSI) less than or equal to 1 per ASTM C 1611, Appendix X.1.
   e. Job-Site proportioning of self-consolidating grout is NOT PERMITTED.
   f. Field addition of water and admixtures NOT PERMITTED.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify field conditions are acceptable and are ready to receive Work.

3.2 INSPECTION

A. Inspect concrete foundations for compliance with tolerances of ACI 117, and verify reinforcing dowels are positioned in accordance with the Drawings.

B. Foundation and/or Load-Bearing Masonry Wall Discrepancies:

1. Notify the Architect/Engineer, the General Contractor in writing of discrepancies.
2. Do not proceed with masonry work until conditions have been corrected.

3.3 PREPARATION

A. Coordinate placement of anchors supplied by other sections.

B. Contractor shall prepare the foundation surface for adequate masonry bond.

C. Do not wet CMUs before placing.

D. Place steel reinforcement free of mud and debris in grout spaces prior to grouting.

E. Provide cleanouts in CMU walls to be grouted when height of constructed wall exceeds 5 feet in height.

F. Protect non-masonry adjacent surfaces during construction until cleaned.

3.4 FIELD QUALITY CONTROL

A. Testing for Grout: When the grout compressive strength is specified, test in accordance with ASTM C 1019.

B. Testing for Self-Consolidating Grout:
1. Grout compressive strength, test in accordance with ASTM C1019
2. As delivered to site, verification of slump flow and Visual Stability Index (VSI) per ASTM C 1611.

C. All Field Technicians sampling, making, and curing specimens for acceptance testing shall be certified by the National Concrete Masonry Association, Grade 1 certification, or equivalent.

D. Testing for Mortar: Mortar aggregate ratio per ASTM C780.

3.5 PLACEMENT – GENERAL

A. Place masonry units in running bond pattern unless otherwise noted.

B. Construct 3/8 inch (plus or minus 1/8 inch) mortar bed joints when masonry units are compressed onto mortar.

C. Construct 3/8 inch (minus 1/4, plus 3/8 inch) mortar head joints when masonry units are shoved into mortar.

D. Construct full mortar bed joint on foundation. Joints shall not be less than 1/4 inch and not more than 3/4 inch when masonry units are compressed onto mortar.

E. Tool mortar joints to a concave profile on interior face of wall when mortar is thumbprint hard. Mortar joints on exterior (cavity) face of backup wythe may be tooled or struck flush.

F. Remove mortar joint protrusions extending 1/2 inch or more into CMU cells to be grouted.

G. Place hollow CMU with mortared face shells on head and bed joints.

H. Mortar bed joints on CMU cross webs where individual CMU cells are to be grouted, piers, columns and pilasters.

I. Place solid masonry units with full-mortared head and bed joints.

J. Retempering of non-colored mortar is permitted. Retempering of colored mortar is not permitted.

K. Where indicated, at integral corners, overlap units full width of wythe.

L. Where indicated, at shear wall intersecting walls, provide metal straps at maximum vertical spacing of 4 feet. Grout ends of straps into CMU cells.

M. Where indicated, at non-shear intersecting walls, provide mesh in joints at 16 inches maximum spacing. Grout mesh into CMU cells.

N. Install connectors, and other accessories.
   1. Embed wall ties 1/2 inch in outer faceshell of hollow units and 1-1/2 inches in solid units.
   2. Place connectors in accordance with the sizes, types, and locations indicated.

O. Bracing of masonry walls shall meet the requirements of MIOSHA Construction Safety Standards, Part 2. Masonry Wall Bracing. This may be accomplished by using the Standard Practice for Bracing Masonry Walls Under Construction and the Masonry Wall Bracing Design Handbook. Refer to the MIOSHA Construction Fact Sheet: Bracing Tall Masonry Walls for more information (http://www.michigan.gov/documents/cis/wsh_constfact_masonry_180828_7.htm).

P. Place masonry assembly within the following tolerances:
   1. Bed joints and top of bearing walls can vary from level plus or minus 1/4 inch in 10 feet up to plus or minus 1/2 inch maximum.
   2. Variation from plumb and true to a line may vary from plus or minus 1/4 inch in 10 feet, plus or minus 3/8 inch in 20 feet up to plus or minus 1/2 inch maximum.
   3. Alignment of the bottom of the wall to the top may vary plus or minus 1/2 inch for load-bearing walls and plus or minus 3/4 inch for non-load-bearing walls.
   4. Do not tooth masonry unless specifically approved in writing.

Q. Install flashings, on clean, solid and undamaged surface. Provide flashing at all locations indicated. Extend flashings to outside face of wall and terminate as indicated. Form end dams at horizontal terminations of flashings. All vertical legs at the backup shall be mechanically fastened. Lap joints a minimum of 6 inches and seal with compatible material.
   1. At lintels and shelf angles, install metal drip edges 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 drip edge.
   2. Install weeps and cavity drainage material directly on top of flashing in a clean cavity.

R. Construct expansion and/or control (movement) joints as indicated on the Drawings. Terminate horizontal reinforcing on both sides of the movement joint. Reinforcement for bond beams may be continuous or discontinuous depending upon indicated structural requirements.

S. Keep masonry surfaces clean during construction. Remove all mortar drippings, tags and stains before they cure. Use a light brush sweep across the exposed masonry surfaces upon initial mortar set to minimize smearing.

T. Cover tops of CMU walls at completion of each day's work as practicable as possible. Covering shall remain to minimize water and debris intrusion of ungrouted cells until permanent closure of walls occurs.

3.6 PLACEMENT – VENEER WYTHE

A. Use full-size units without cutting if possible. If cutting is required, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying. Install cut units with cut surfaces concealed.

B. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602, Section 3.3G. or as otherwise approved.

C. 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.

D. Bond Pattern: Unless otherwise indicated, lay masonry in running bond, do not use units with less than nominal 4 inch horizontal face dimensions at corners or jambs.

E. Built-in Work: As construction progresses, build in items specified (door frames, window frames, fire extinguisher cabinets, etc.) as required. Fill in solidly with masonry around built-in items.

F. Mortar Bedding and Jointing:
1. Lay hollow units with face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. 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.
3. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

3.7 REINFORCEMENT

A. Place steel reinforcement in accordance with the sizes, types, and locations indicated.
1. Lap splices as indicated.
2. Install ties for vertical reinforcement in columns as indicated.

B. Joint Reinforcement: Place joint reinforcing in bed joints of all CMU walls, at not more than 16 inches on center vertically, and place in additional locations where indicated. Locate joint

reinforcement so that longitudinal wires are embedded in mortar, including wires within the lap length. Place cross wire over webs of CMU (16 inches on center). Lap length of joint reinforcement a minimum of 6 inches. Do not extend joint reinforcing through movement joint.

C. Place Stainless steel horizontal joint reinforcement in two courses of brick veneer above loose steel lintels.

D. Secure steel reinforcement to prevent displacement from the placement of grout and within the following tolerances:
   1. Place steel reinforcement prior to grouting.
   2. Maintain a clear distance between the reinforcement and the unit cell wall of at least 1/4 inch for fine grout and 1/2 inch for coarse grout.
   3. Place joint reinforcement with at least 5/8 inch mortar cover when exposed to weather or earth and 1/2 inch when not exposed.
   4. Place vertical and horizontal reinforcing bars within walls and flexural elements (beams and lintels) as follows:
      a. "d" less than or equal to 8 inches, within 1/2 inch (plus or minus).
      b. "d" greater than 8 inches but less than or equal to 24 inches, within 1 inch (plus or minus).
      c. "d" greater than 24", within 1-1/4 inch (plus or minus).
   5. Place vertical reinforcing bars within plus or minus 2 inches from the specified location along the length of the wall.

3.8 GROUT PLACEMENT

A. Place grout within 1-1/2 hours from mixing and prior to initial set of grout.
   1. Do not exceed the grout pour heights of ACI 530.1/ASCE 6/TMS 602, Table 7.
   2. Place grout in lifts not exceeding 12.67 feet high when the following conditions are met:
      a. The masonry has cured for at least 4 hours.
      b. The grout slump is maintained between 10 and 11 inches.
      c. No intermediate reinforced bond beams are placed between the top and the bottom of the pour height.
   3. If the conditions of 3.6A2 a and b are met but there are intermediate bond beams within the grout pour, limit the grout lift height to the bottom of the lowest bond beam that is more than 5 feet above the bottom of the lift, but do not exceed a grout lift height of 12.67 ft.
   4. If the conditions of 3.6A2 a or b are not met, place grout in lifts not exceeding 5 feet.
   5. Alternatively, place masonry units and grout using construction procedures employed in the accepted grout demonstration panel.

B. Consolidate grout at the time of placement.

1. Consolidate grout pours 12 in. or less in height by mechanical vibration or by puddling.
2. Consolidate pours exceeding 12 in. in height by mechanical vibration, and reconsolidate by mechanical vibration after initial water loss and settlement has occurred.
3. Consolidation or reconsolidation is not required for self-consolidating grout.

C. Grout Key – When grouting, form grout keys between grout pours. Form grout keys between grout lifts when the first lift is permitted to set prior to placement of the subsequent lift.
1. Form a grout key by terminating the grout a minimum of 1-1/2 in. below a mortar joint.
2. Do not form grout keys within beams or lintels.
3. At beams or lintels laid with closed bottom units, terminate the grout pour at the bottom of the beam or lintel without forming a grout key.

D. Solidly fill cells below lintel or beam bearing minimum as noted on the drawings.

E. Bond Beams and Masonry Lintels:
1. Allow masonry lintels to attain sufficient strength to support loads imposed during construction before removing temporary supports.

3.9 MASONRY CLEANING

A. Keep masonry faces clean during construction whenever possible, i.e. remove all mortar tags and stains before they cure, a light brushing with a soft brush upon initial mortar set, minimize mortar run-down with wet masonry units, minimize water entry into constructed walls, remove mortar build up from scaffold, protect all wall projections from mortar splashes, turn over planks to avoid mortar splashes when not working, protect base of wall from all mortar and mud splashes and remove and clean grout spills immediately.

B. Demonstrate cleaning methods using the selected materials per the approved cleaning plan on the mockup or on an inconspicuous area of the new masonry to determine the suitability of cleaning materials and methods.

C. Before cleaning masonry, protect other masonry and other non-masonry surfaces as necessary to prevent damage

D. Cleaning procedures shall not damage finished masonry.

3.10 CLEAN UP

A. Remove mock-up panels upon completion and approval of all masonry.

B. Remove all masonry related debris and properly dispose of off site.

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Section includes wall sheathing; preservative treatment; blocking in wall and roof openings; wood furring and grounds; electrical panel back boards, concealed wood blocking.

1.2 SUBMITTALS

A. Shop Drawings: Indicate framing system, loads and cambers, bearing details, framed openings, lumber grades and stresses, and framing sizes.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with the following:
1. Lumber Grading Agency: Certified by DOC PS 20.
2. Wood Structural Panel Grading Agency: Certified by EWA - The Engineered Wood Association.
3. Lumber: DOC PS 20.
4. Wood Structural Panels: DOC PS 1 or DOC PS 2.

B. Apply label from agency approved by authority having jurisdiction to identify each preservative treated material.

C. Perform Work in accordance with 2009 Michigan Building Code.

PART 2 PRODUCTS

2.1 LUMBER MATERIALS

A. Lumber Grading Rules: WWPA G-5.

B. Non-structural Light Framing: Stress Group Spruce-Pine-Fir species, grade and size as indicated on structural drawings. 19 percent maximum moisture content.

2.2 SHEATHING MATERIALS

A. Wall Sheathing (as backing at fiber-cement board wall covering and as noted on drawings): APA Rated Sheathing, Structural I, plywood, C-D INT-APA, span rating 32/16, ½ inch thickness, exterior glue; or oriented strand board, as indicated on structural drawings Exposure Durability 1; unsanded.

B. Telephone and Electrical Panel Boards: Provide fire-retardent Plywood. APA/EWA Rated Sheathing; Rated C-D; Exposure Durability 2; unsanded.

2.3 SHEATHING AND UNDERLAYMENT LOCATIONS

A. Above Grade Wall Sheathing: 1/2 inch thick, 48 x 96 inch sized sheets, square edges.

2.4 ACCESSORIES

A. Fasteners and Anchors:
   1. Fasteners: ASTM A153/A153M, hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.

B. Drywall Screws: Bugle head, hardened steel, power driven type, length to achieve full penetration of decking substrate.

C. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.

D. Building Paper (over plywood wall sheathing): ASTM D226; Type II, No. 15 unperforated asphalt felt.

E. Building Paper: Spun bonded polyethylene.

2.5 WOOD TREATMENT

A. Wood Preservative (Pressure Treatment): AWPA U1, Commodity Specification A-Sawn Products or F-Wood Composites using water-borne ACQ preservative.

B. Shop preservative treat wood materials in contact with concrete or masonry or indicated on Drawings.

C. Moisture Content after Treatment: Redried.
   1. Lumber: Maximum 19 percent.
   2. Structural Panels: Maximum 15 percent.

2.6 SOURCE QUALITY CONTROL

A. Section 01 00 00 - General Requirements: Testing, inspection and analysis requirements.

B. Inspect Work performed at fabricator's facility to verify conformance to Contract Documents.

C. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
   1. Specified shop inspections are not required for Work performed by approved fabricator.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify supports are ready to receive units.

B. Verify sufficient end bearing area.

3.2 PREPARATION

A. Coordinate placement of bearing or support items.

3.3 SHEATHING

A. Fasten sheathing in accordance with applicable code.

B. Install sheathing to combination single and two span continuous.

C. Secure wall sheathing with ends staggered, over firm bearing.

D. Install telephone and electrical panel back boards with plywood sheathing material where required. Size back board by 12 inches beyond size of electrical panel.

3.4 SUPPORT BLOCKING

A. Support Blocking: Install wood blocking in stud walls for support of stair handrails, toilet accessories, toilet partitions, wall mounted cabinets, fire extinguisher cabinets, and other wall mounted items requiring support as indicated on drawings.

3.5 ERECTION TOLERANCES

A. Surface Flatness of Sheathing Without Load: 1/4 inch in 10 feet maximum, and 1/2 inch in 30 feet maximum.

3.6 SCHEDULES

A. Refer to structural & architectural drawings for materials used on the project.

END OF SECTION

SECTION 06 41 00

CUSTOM CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Counter in Watch Room No. 104.

1.02 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry: Grounds and support framing.

B. Section 06 61 00 – Solid Surface Fabrications: Countertops in Men’s Locker Room No. 117 and Kitchen/Common Room No. 113.

C. Division 15: Plumbing fixtures.

D. Section 12 35 30 – Manufactured Casework: Base cabinets, Pantry cabinets, and wall cabinets installed in conjunction with items of this section.

1.03 REFERENCES

A. AWI - Quality Standards.

B. FS MM-L-736 - Lumber, Hardwood.

C. FS MMM-A-130 - Adhesive, Contact.

D. National Electric Manufacturers Association (NEMA) LD3 - High Pressure Decorative Laminates.

E. PS 1 - Construction and Industrial Plywood.

F. PS 20 - American Softwood Lumber Standard.

1.04 SUBMITTALS

A. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location, and schedule of finishes.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with AWI Custom quality.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

1.08 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated.

1.09 COORDINATION

A. Coordinate the work with plumbing rough-in.

PART 2 PRODUCTS

2.01 MATERIALS, GRADES, AND SPECIES OF WOOD:

A. Particle Board: High density; 1 inch particle board for use as plastic laminated tops and backsplashes.

B. Plywood: Fir plywood core material for items less than 1 inch thick.

C. Hardwood Lumber: Graded in accordance with AWI I Custom; Red Oak Species; maximum moisture content of 6 percent; with mixed grain.

2.02 MANUFACTURERS - PLASTIC LAMINATE

A. Manufacturer:
1. Formica
2. Nevamar
3. Wilsonart
4. Substitutions: permitted

B. Laminate Materials
1. Plastic Laminate: NEMA LD3, PF 42 Post Forming GP - 50 General Purpose type; color, pattern, and surface texture as selected.
2. Laminate Backing Sheet: LD3 BK20 backing grade, undecorated plastic laminate.

2.03 ACCESSORIES

A. Adhesive: FS MMM-A-130 contact adhesive, Type recommended by AWI to suit application.

B. Fasteners: Size and type to suit application.

C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; stainless steel finish in concealed locations and in exposed locations.

D. Concealed Joint Fasteners: Threaded steel.

2.04 FABRICATION

A. Shop assemble casework as per details and deliver to site in units easily handled and to permit passage through building openings.

B. Cap exposed plastic laminate finish edges with material of same finish and pattern.

C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

D. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.

E. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

F. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint contact surfaces of cut edges.

2.05 FINISH

A. Plastic laminate as specified in this section.

B. Hardwood Lumber: Stain and varnish as specified in Section 09 90 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

3.02 INSTALLATION

A. Set and secure casework in place; rigid, plumb, and level.

B. Use fixture attachments in concealed locations for wall mounted components.

C. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

D. Secure items to floor using appropriate angles and anchorages.

E. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

F. Cut-outs in counter tops for sinks, pipes, fixtures and similar items as conditions require. Cooperate with mechanical and other trades, whose work is involved. Obtain approved shop drawings and all other required information. All work shall fit perfectly.

3.03 ADJUSTING

A. Adjust work under provisions of General Requirements.

3.04 CLEANING

A. Clean work under provisions of General Requirements

B. Clean casework, counters, shelves, hardware, fittings and fixtures.

3.05 SCHEDULES

A. See drawing for location of all custom casework.

END OF SECTION

SECTION 06 61 00

SOLID SURFACE FABRICATIONS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes:
1. Window Stools.
2. Counter Tops

B. Related sections:
1. Section 07 90 00 – Joint Protection.
2. Section 09 21 16 – Gypsum Board Assemblies.
3. Section 12 35 30 – Manufactured Casework
4. Plumbing: Division 22.

1.2 REFERENCES

A. Standards of the following as referenced:
1. American National Standards Institute (ANSI).
2. American Society for Testing and Materials (ASTM).
3. International Cast Polymer Association (ICPA).
4. Environmental Protection Agency (EPA).
5. National Association of Home Builders, Research Foundation, Inc. (NAHB/RF).
6. National Fire Protection Agency (NFPA).

1.3 DEFINITIONS

A. Terms:
1. Solid Surface Fabrication: Cast Polymer; synonymous Terms.
2. Contractor: General Contractor and/or its employees.
3. Manufacturer: Solid Surface Fabrication Manufacturing Company.
4. Installer: Solid Surface Fabrication Installation Company.

B Description:
1. A patterned, non-porous homogeneous mixture of natural minerals and polyester resins thermally bonded to produce solid fabrications with polished sealed surfaces. Colors and grain pattern shall run all the way through the base material.

1.4 SUBMITTALS

A. Shop Drawings: Submit top views, elevations and sections (as needed). Indicate dimensions, material thickness, location and sizes of cutouts, anchorage provisions and attachment methods. Indicate coordination requirements with adjacent and interfacing work.

B. Samples: 6” by 6” samples or as requested; indicate full color range and pattern variation. Approved samples will be standard for solid surface fabrications.

C. Product Data:
1. Submit manufacturer’s product data indicating compliance with specified performance requirements.
2. Operation and maintenance data. Manufacturer’s data indicating cleaning and maintenance requirements.
3. Quality Assurance submittals outlined in Section 01 00 00.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. Solid Surface Fabrication manufacturer qualifications:
a. ICPA member one calendar year, minimum, prior to Contract date.
b. Five years experience, minimum, in manufacturing similar type units.
c. Fabricated five Projects, minimum, of comparable magnitude in last three years.
2. Installer qualifications:
a. Installed five Projects, minimum, of comparable magnitude in last three years. Provide reference list of those completed Projects for review and verification.

B. Quality control submittals:
1. Test reports:
a. Copies of certified test reports for the current year indicating compliance with ANSI Z-124.3 requirements. Four quarterly reports, minimum, are required.
2. Certificates:
a. Current copy of ICPA membership.
b. Completed and current EPA, Office of Toxic Substances, TS-779.
c. Toxic Chemical Release Inventory Reporting Form R and Instructions, Section 313 of the Emergency Planning and Community Right-to-Know Act, Revised 1990 Version
3. Qualification statements indicating compliance with QUALITY ASSURANCE Article; address each item

1.6 DELIVERY, STORAGE AND HANDLING

A. Packing and shipping: to be packed in wooden crates to minimize damage in shipping.

B. Acceptance at site: Contractor to supervise unloading of materials. A forklift is required. Check for damaged crates. Mark bill of lading if there is any obvious damage and notify marble supplier immediately. Otherwise, proceed with offloading crates.

C. Storage and protection: Store materials under cover, off of ground, protect from moisture. Handle materials to prevent physical damage. Protect surfaces from staining, scratching and other damage during handling.

1.7 PROJECT CONDITIONS

A. Field measurements: Shop drawings are to be field verified by Contractor to ensure proper fit of materials.
B. Maintain relative humidity planned for building occupants and an ambient temperature between 65 and 75 F° for 48 hours prior to and during installation. After installation, maintain relative humidity and ambient temperature planned for building occupants.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate construction activities in this Section with construction activities specified in related Sections or other construction activities required for fabrication and installation.

1.9 WARRANTY

A. Furnish manufacturer’s limited 10 year warranty.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Corian Surfaces from the Dupont Company.

B. Wilsonart International, (800) 433-3222, www.wilsonart.com
Wilsonart Solid Surface.

C. Color: As selected by Architect/Owner.

D. Substitutions: Permitted.

2.2 WINDOW STOOLS AND COUNTER TOPS

A. Product standard of quality: NFPA Class A rated material
1. ½ inch thick solid surface fabrication. Width and depth as indicated on drawings and as field verified.
2. Color: As selected by Architect, and as approved by Owner. Owner approval required prior to ordering materials.

B. Performance requirements:
1. 2009 Michigan Building Code: Class A material as measured by the ASTM E84-95 tunnel test. Documentation required.
a. Flame spread of 25 or less
b. Smoke density of 25 or less
c. Liquid Absorption, ISO 4586-2, for ½ inch material thickness: 0.4 percent after 2 hour period.

d. Izod Impact, ASTM D 256, Method A: 0.3 foot pounds per inch.
e. Tensile Modulus, ASTM D 638 Nominal: 1.2 million pounds per square inch.
f. Thermal Expansion, ASTM D 696: 0.000018 inch per inch per degree F, maximum.
g. Hardness, ASTM D 2583, Barcol Impressor: 57.
h. Flexural Toughness, ASTM D 790: 3 (in.-lb,/in^3)
i. Deflection Temperature under load, ASTM D 648: 90 degrees C.
j. Stain Resistance, ANSI Z-124.3 Modified; 3.4: No effect.
k. Boiling Water Resistance, NEMA LD 3-3.05: No effect.
l. High Temperature Resistance, NEMA LD 3-3.06: No effect.
m. Radiant Heat Resistance, NEMA LD 3-3.10: No effect.
n. Light Resistance, NEMA LD 3-3.03: No effect.
o. Ball Impact Resistance, NEMA LD 3-3.08, one half pound ball, unsupported: 125 inches.
p. Specific Gravity (Density ASTM D792): 1.60 grams per cubic centimeter.
q. Approximate weight: 4.20 pounds per square foot.
r. Weatherability, ASTM D 2565: Pass.
s. Fungus Resistance, ASTM G 21: Pass
t. Bacterial Resistance, ASTM G 22: Pass.
u. Pittsburgh Protocol Toxicity: 66.9 grams.
v. Pattern & Color: As selected by Architect.
w. Edge Detail: See drawings (1/8 inch Radius).

C. Adhesives and sealants:
1. Joint adhesive: Manufacturer's standard adhesive to create inconspicuous, nonporous joints, with a chemical bond (WA8215).
2. Sealant: Standard mildew resistant, FDA/UL® recognized silicone sealant in color matched or clear formulations, as specified. Refer to Section 07 90 00 – Joint Sealers
a. Dow Corning Corp., #786 Mildew Resistant Silicone Sealant
3. To caulk solid surface panels to adjoining gypsum board, or paint, use mildew resistant acrylic caulk sealant:
a. Phenoseal Acrylic Caulk (Gibson-Homans)
b. Refer to Section 07 90 00 – Joint Sealers

D. Fabrication:
1. Fabrication to be performed by a certified solid surface fabricator/installer.
2. Fabricate components in shop to greatest extent practical to size and shape indicated, in accordance with approved shop drawing.
3. Form joints between components using manufacturer's standard joint adhesive. Joints shall be inconspicuous in appearance and without voids. Attach 4" (100mm) wide reinforcing strip under joints.
4. Provide holes and cutouts for plumbing and bath accessories as indicated on shop drawings.
5. Rout and finish component edges to a smooth, uniform finish. Rout all cutouts then sand all edges smooth. Repair or reject defective or inaccurate work.

6. Finish: Surfaces shall have a uniform finish.

E. Color: As selected by Architect.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive solid surfacing. Identify conditions detrimental to proper or timely installation. Do not commence installation until conditions have been corrected.

3.2 PREPARATION

A. Precondition Solid Surfacing in accordance with manufacturer's printed installation instructions.

3.3 INSTALLATION

A. Install components plumb and level, in accordance with approved shop drawings, project installation details and manufacturer's printed instructions.

B. Form joints using manufacturer's approved adhesive, with joints inconspicuous in finished work.

C. Remove excessive adhesive and sealants. Components shall be clean on Date of Substantial Completion.

D. Coordinate plumbing installation with Division 22.

3.4 CLEANING

A. Contractor to protect all finished work until final acceptance by Owner.

B. Clean installed units not more than 48 hours prior to Date of Substantial Completion. Repair or replace damaged or stained solid surface fabrication work.

3.5 SCHEDULE:

A. Counter Top & Backsplash at Men's Locker No. 117. Color as selected by Architect.

B. Window Stools in 101, 103, 104, 105, 113, 114 & 115. Color as selected by Architect.

END OF SECTION

SECTION 07 90 00

JOINT PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes sealants and joint backing.

1.2 SUBMITTALS

A. Product Data: Submit data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

1.3 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

PART 2 PRODUCTS

2.1 JOINT SEALERS

A. Manufacturers:
1. Dow Corning Corp.
2. GE Silicones.
3. Pecora Corp..
4. Sika Corp..
5. Tremco.
6. Substitutions: Permitted.

B. Product Description:
1. High Performance General Purpose Exterior (Nontraffic) Sealant Type A: Silicone; ASTM C920, Type S, Grade NS, Class 100/50, Uses NT, M, G, A and O; single component.
   a. Type: Spectrem 1 manufactured by Tremco.
   b. Color: Standard colors matching finished surfaces, as selected.
   c. Applications: Use for:
      1) Control, expansion, and soft joints in masonry or EIFS.
      2) Joints between concrete and other materials.
      3) Joints between metal frames and other materials.
      4) Other exterior nontraffic joints for which no other sealant is indicated.
2. High Performance Exterior (Nontraffic) Sealant Type B: Polyurethane, moisture curing; ASTM C920, Type S, Grade NS, Class 25, Uses NT, M, A, and O; single component.

a. Type: Vulkem 116 manufactured by Tremco.
b. Color: Standard colors matching finished surfaces, as selected.
c. Applications: Use for:
1) Control, expansion, and soft joints in masonry.
2) Joints between concrete and other materials.
3) Joints between metal frames and other materials.
4) Other exterior nontraffic joints for which no other sealant is indicated.

3. General Purpose Traffic Bearing Sealant Type C: Polyurethane; ASTM C920, Type S, Grade P, Class 25, Use T, M, A, O, and I; single component.
a. Type: Vulkem 45 manufactured by Tremco.
b. Color: Standard colors matching finished surfaces, as selected.
c. Applications: Use for exterior and interior pedestrian and vehicular traffic bearing joints.
d. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

4. Exterior Metal Lap Joint Sealant Type D: Butyl or polyisobutylene, non-drying, non-skinning, non-curing.
a. Type: Tremco Butyl Sealant manufactured by Tremco.
b. Applications: Use for concealed sealant bead in sheet metal work, under thresholds, and concealed sealant bead in flashing overlaps.

5. General Purpose Interior Sealant Type E: Acrylic emulsion latex; ASTM C834, single component, paintable.
a. Type: Tremflex 834 manufactured by Tremco.
b. Color: Standard colors matching finished surfaces as selected.
c. Applications: Use for interior wall and ceiling control joints, joints between door and window frames and wall surfaces, and other interior joints for which no other type of sealant is indicated.
d. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

6. Sanitary Sealant Type F: Silicone; ASTM C920, Uses M and A; single component, mildew resistant.
a. Type: Tremsil 200 manufactured by Tremco or Dow Corning Mildew Resistant Silicone Sealant # 786.
b. Applications: Use for joints between plumbing fixtures and floor and wall surfaces, and joints between counter tops and wall surfaces.
c. Color: Standard colors matching finished surfaces as selected.
d. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

2.2 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
1. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; ASTM D1056, closed cell Polyethylene; oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify substrate surfaces and joint openings are ready to receive work.

B. Verify joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

A. Remove loose materials and foreign matter impairing adhesion of sealant.

B. Clean and prime joints.

C. Perform preparation in accordance with ASTM C1193.

3.3 INSTALLATION

A. Perform installation in accordance with ASTM C1193.

B. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer , except where specific dimensions are indicated.

C. Install bond breaker where joint backing is not used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Tool joints concave.

3.4 SCHEDULE

A. Exterior Joints for Which No Other Sealant Type is Indicated: Type A or B.

B. Control and Expansion Joints in Paving: Type C.

C. Control Joints in Masonry, and between Masonry and adjacent work: Type B.

D. Lap Joints in Exterior Sheet Metal Work: Type D.

E. Butt Joints in Exterior Metal Work: Type A or B.

F. Joints Between Exterior Metal Frames and Adjacent Work: Type A or B.

G. Under Exterior Door Thresholds: Type D.

H. Interior Joints for Which No Other Sealant is Indicated: Type E.

I. Control and Expansion Joints in Interior Concrete Slabs and Floors: Type C.

J. Joints Between Plumbing Fixtures and Walls and Floors, and Between Counter tops and Walls: Type F.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes steel doors, and frames; fire rated, and non-rated.

1.2 SUBMITTALS

A. Shop Drawings: Indicate door and frame elevations, internal reinforcement, and finishes.

B. Product Data: Submit door and frame configurations, location of cut-outs for hardware reinforcement.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with the following:
   1. ANSI 250.8 - Recommended Specifications for Standard Steel Doors and Frames.
   2. DHI - Door Hardware Institute - The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.

B. Fire Rated Door Construction: Conform to NFPA 252.

C. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire rated class as indicated on Drawings.

D. Attach label from agency approved by authority having jurisdiction to identify each fire rated door.

E. Perform Work in accordance with the 2009 State of Michigan Building Code.

PART 2 PRODUCTS

2.1 STEEL DOORS AND FRAMES

A. Manufacturers:
   1. Amweld Building Products, Inc..
   2. Ceco Door Products.
   3. Pioneer Industries.
   4. Republic Builders Products.
   5. Steelcraft.
   6. Substitutions: Permitted.

B. Product Description: Standard shop fabricated steel doors, and frames; fire rated; non-rated types; flush face.

2.2 COMPONENTS

A. Interior Doors: ANSI A250.8, and SDI 108, 1-3/4 inch thick.
1. Level 2 - Heavy Duty, Model 1, full flush design.

B. Interior Frames:
1. Level 2 for Door Models 1, nominal 16 gage/0.053 inch thick material, base metal thickness.

C. Door Core: mineral fiberboard.

D. End Closure: Channel, 0.04 inch thick, flush.

2.3 ACCESSORIES

A. Silencers: Resilient rubber fitted into drilled hole.

B. Removable Stops: Rolled steel channel shape.

C. Bituminous Coating: Fibered asphalt emulsion.

D. Primer: ANSI A250.10 rust inhibitive type.

2.4 FABRICATION

A. Fabricate doors and frames with hardware reinforcement welded in place. Protect frame hardware preparations with mortar guard boxes.

B. Fabricate frames as face welded units and for metal wall panels.

C. Fabricate frames with 2 inches head member as indicated on drawings.

D. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.

E. Prepare interior frames for silencers and install.

F. Attach fire rating label to each fire rated door and frame.

2.5 SHOP FINISHING

A. Primer: Air dried.

B. Coat inside of frame profile with bituminous coating.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify opening sizes and tolerances are acceptable.

3.2 INSTALLATION

A. Install doors and frames in accordance with ANSI A250.8.

B. Coordinate installation of doors and frames with installation of hardware specified in Section 08 71 00.

C. Coordinate door frames with masonry & gypsum board construction for frame anchor placement.

D. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

E. Coordinate installation of Glass and Glazing specified in Section 08 80 00 - Glazing and 08 81 17 – Fire-Rated Glass.

F. Adjust door for smooth and balanced door movement.

G. Tolerances:
1. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.3 SCHEDULE

A. See Door Schedule on Drawing A-901.

END OF SECTION

SECTION 08 11 16

ALUMINUM THERMAL FLUSH DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum Thermal Flush Doors.

B. Thermal Aluminum Door Frames

1.02 RELATED SECTIONS

A. Section 04 27 00: Single Wythe Masonry Assemblies (Frame Installation)

B. Section 07 90 00: Joint Protection

C. Section 08 71 00: Door Hardware

D. Section 08 80 00: Glazing

1.03 REFERENCES

A. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.

B. ASTM B 221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

C. ASTM B 308 - Aluminum-Alloy 6061-T6 Standard Structural Profiles.

D. ASTM E 283 - Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

E. ASTM E 330 - Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

F. ASTM E 331 - Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

G. ASTM E 1886 – Standard Test Method for Performance of Exterior Windows, Curtain Walls, Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.

H. ASTM E 1996 – Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.

I. ASTM E 90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

J. NFRC 102-2004 – Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.

K. AAMA 1503-09 – Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections.

1.04 SYSTEM DESCRIPTION

A. System Performance Requirements:

1. Air infiltration: When tested in accordance with ASTM E 283, the air infiltration should not exceed .04 cfm per square foot of fixed area.

2. Water Penetration: No water will pass through the entry system when tested in accordance with ASTM E 331 at a pressure of 6.24.

3. Sound Transmission Loss: STC rating shall be no lower the 32 when tested in accordance with ASTM E 413. OITC rating shall be 30 when tested in accordance with ASTM E 1332.

4. Thermal Performance: U factor of entry system shall be no more than 0.34 when tested with the CTS Method. The condensation resistance factor (CRF) shall be no less than 75 when tested in accordance with AAMA 1503-09.

5. Uniform Load Deflection: Entry system shall be tested in accordance with ASTM E 330: 3840 Pa or 80.0 psf positive and negative.

6. Uniform Load Structural: Entry system shall be tested in accordance with ASTM E 330: 5760 Pa or 120.0 psf positive and negative.

7. Missile Impact: Entry system will pass double impact from large missile; ASTM E 1886.

1.05 SUBMITTALS

A. General: Refer to Submittal Procedures – Section 01 00 00.

B. Product Data: Include manufacturer’s product information, including material, elemental construction, fabrication, and finishes.

C. Shop Drawings: Include shop drawings relating to dimensions, fabrication, finish and installation.
1. Drawings should include the following:
a. Dimensions
b. Elevations with necessary detail keys

c. Entry system reinforcements (if applicable)
d. Fabrication and Finish

D. Samples:
1. Color: Provide manufacturer's samples of standard and non-standard finishes.
2. Door: Supply manufacturer's door sample presenting finish, interior insulation, and standard reinforcement components.

E. Test Results: Offer any required test results for particular jobs. Accredited test reports will be available upon request.

F. Manufacturer's Instructions: Provide all necessary instructions for installation including glazing, anchoring, reinforcement (if applicable), and optimum performance installation.

1.06 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
1. Manufacturing process with contemporary inspection using neoteric checklist for optimum field performance.
2. Manufacturing same product specified for over 30 years.

B. Pre-Installation Meetings: Plan initial pre-installation meetings for job details and regional regulations.

1.07 DELIVERY, STORAGE, HANDLING

A. Packing: Finished products shall be packaged securely with appropriate labeling for protection and product identification visible on packaging.

B. Shipping and Handling: Deliver materials to site in original condition and packaging without any damage to packaging or materials.

C. Unloading: Individually packaged products to be unloaded by hand truck or 2-person team lift (or more if needed) to avoid unnecessary damage.

D. Storage and Protection:
1. Store items indoors away from excessive amounts of moisture.
2. Protect entry doors against damage from outdoor hazards and during the entire installation

E. Waste Management: Refer to contact information apparent on packaging for appropriate recycling opportunities.

1.08 WARRANTY

A. Warrant doors and frames to be free from defects and premature degradation of finish and door structure.

B. Warranty period will be ten years from the date of manufacture.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Cross Aluminum Products Inc.,
Address: 1770 Mayflower Rd., Niles, Michigan 49120.
Phone: (800) 806-3667 or (269) 697-8340
Fax: (269) 697-8348
Web: www.crossaluminum.com
Email: door@crossaluminum.com

B. Substitutions: Permitted.

2.02 THERMAL ALUMINUM FLUSH DOORS

A. Product: FLT-400 Series with required aluminum frames.

B. Door Opening Size: refer to drawings

C. Door Assembly:
1. Door Stile: To be aluminum alloy 6063; temper to be T5 with a minimum 1/8” wall thickness. Stiles to be thermally broken using Technoform I-Strut™ in 2 places.
2. Stile Thickness: To be 1 3/4” thick tubular extrusion.
3. Door Joinery: Joinery shall be 3/8” diameter cadmium tie rods bolted through interlocking stiles. Minimum of 3 tie rods per door (where applicable).
4. Top of Door: To receive added 1/8” reinforcement closer plate adhered to interior wall for door closer hardware.
5. Top/Bottom of Door: To receive 1/8” thick cap for further seal and to trim the top and bottom of door.

D. Pattern:
1. Inside Door Face Fluted
2. Outside Door Face Fluted

E. Insulation: Polyisocyanurate Rigid Foam

2.03 MATERIALS & ACCESSORIES

A. Aluminum:
1. ASTM B 221, alloy and temper to be 6063 T-5 or similar alloy and temper recommended by manufacturer for optimum finish results and consistency.

B. Internal Reinforcement
1. ASTM B 308, for structural aluminum.

C. Fasteners
1. Material: Aluminum, 18-8 Stainless Steel, or other non-corrosive materials compatible with items being screw applied.
2. Exposed:
a. Type: Fasteners exposed will be Philips flathead fasteners unless provided by other supplier.
b. Finish: Fasteners to match appropriate finish on standard doors and frames.
3. Concealed: To be standard according to manufacturer's standards.

D. Weather stripping:
1. Wool pile:
a. Material: Solid Propylene Base with resilient fibers.
b. Color: Manufacturer's standard black color.

E. Glazing:
1. Door Glazing: Interlocking door glazing to be screw fastened and removable from interior with NORSEAL® V710 and/or V740 moisture seal foam tape applied to both interior and exterior sides of door. Exterior glazing to be non-removable.
a. Material: To be 1/8" thick extruded channels-6063-T5.
b. Color: To match finish of door.

F. Thermal Bar:
1. Thermal I-Strut™: Mechanically attached to thermally break tubular extrusions.
a. Material: To be Polyamide 6.6 with 25% glass fibers.
b. Color: Manufacturer's standard black color.

2.04 HARDWARE

A. Hardware Preparation: To be fabricated at factory according to hardware templates provided.

B. Hardware Installation: To factory install all applicable and supplied hardware to doors and frames.

C. Hardware Reinforcement: To provide necessary reinforcement for proper longevity and hardware function; ASTM B 209 and/or ASTM 308.

D. Hardware types: Refer to Section 08 71 00 – Door Hardware

E. Hardware Finish: Refer to Section 08 71 00 – Door Hardware.

2.05 FABRICATION

A. Processes:
1. Job Preparation:
a. Preliminary Analysis: Job drawings to indicate door types, sizes, vision lite configuration(s), and finishes.

b. Fulfill Custom Requirements: Follow through on any specific deviations from standard requirements.

2. Assembly:
   a. Product Operation: Measure, cut, and fabricate required materials for designated job.
   b. Product Refinement: Smooth rough cut edges.
   c. Arrangement: Place prepared structural fasteners inside door to conceal from view.
   d. Reinforcement Preparation: To apply necessary structural and hardware reinforcement in beneficial areas of doors and frames where needed.

3. Fitting:
   a. Placement: Product materials to fit accurately in appropriate locations.
   b. Alignment: Doors to be in proper alignment with intended elevations.

B. Tolerances: Doors and/or frame elevations will not deviate from last revised and approved drawings.

2.06 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard aluminum extruded profiles with required thickness for load support.
   1. Vertical Jamb Sizes: 2"x 4 1/2"
   2. Header Sizes: 2" x 4 1/2"

B. Clips and Reinforcements: Manufacturer's standard high strength aluminum: ASTM B 221 and/or ASTM B 308.

C. Fasteners and Accessories: Manufacturer's standard non-bleeding and non-corrosive material congruent to adjacent material.
   1. Exposed Fasteners: To be stainless steel Philips flathead screws with appropriate finish: ASME B 18.6.4
   2. Concealed Fasteners: To be manufacturer's standard.

D. Assembly:
   1. Framing members are separate aluminum pieces cut to length and mechanically fastened from either spline or clip systems.
   2. Joinery to be hairline.
   3. Sommer and Maca Dymonic or Dow Corning® 795 Sealants applied on applicable areas.
   4. Framing elevations to be identified according to final approved drawings.

E. Anchoring:
   1. Appropriate anchoring fasteners to be secured no more than 18" apart on entire frame opening.
   2. Frame headers to receive no less than 2 anchoring fasteners.

3. Add extra fasteners where hardware and hinge may require more.

F. Doorstop:
1. To be #CDM-32.
a. Wall Thickness: To be 3/16” thick for receiving applicable hardware.
b. Profile Height: To be no less than 5/8” high.
2. Snap-in: Fits standard manufacturer’s door jamb profiles.
3. To receive weather strip around acting door leafs.
a. Wool pile: Solid Propylene Base with resilient fibers in a standard black color.

G. Hardware Preparation:
1. Intramural Work: Hardware preparation according to hardware suppliers’ templates.
2. Field Work: Refer to manufacturers’ installation instructions.

2.07 GLAZING

A. Reference section Glazing accessories (08 80 00)

B. Door Glass Stops:
1. Profile: 1/8” thick interlocking flush fit screw-applied extruded aluminum-stops with color matching door finish and removable from interior. Exterior glass stops to be non-removable.
2. Standard vision lite sizes at FLT-400-NG: 8” x 32”
3. Full Glass Vision lite at FLT-400-FG: 8” Jamb stiles; 8” top rail; 12” bottom rail.

2.09 FINISHES

A. Anodic Finishes:
1. Architectural Class 1, AA-M12C22A44, 0.7 mils. Non-standard color as selected by Architect.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine conditions for compliance with requirements for installation tolerances and other conditions affecting proper installation.

3.02 INSTALLATION

A. Comply with manufacturer’s instructions.

B. Do not install damaged components.

C. Install doors plumb, level, and square, with no warp or rack in frame.

D. Hang doors with the following required clearances:
   1. Lock Stiles: 0.125”
   2. Between Meeting Stiles: 0.187”- 0.250”
   3. At Top Rails: 0.125”
   4. Between Bottom Rail and Threshold: 0.125” - 0.187”

E. Fit joints to produce hairline joints free of burrs and distortion.

F. Rigidly secure non movement joints.

G. Install recommended anchors with separators to prevent metal corrosion and electrolytic deterioration.

H. Seal joints watertight, unless otherwise indicated.

I. Glazers to provide necessary glazing shims for proper glass installation on vision lites and side lites. Reference section Glazing Accessories (08 80 00).

J. Place thresholds in proper weather sealant.

3.03 ADJUSTING

A. Fine-tune doors and hinges to operate properly without bind or sag.

B. Adjust pressure settings on closers.
   1. For doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch measured to the leading door edge.

3.04 CLEANING

A. Immediately clean doors after installation.

B. Avoid any harsh cleaners not specified on manufacturer’s cleaning and care guide.

3.05 PROTECTION

A. Follow Manufacturer’s guide to cleaning and care for proper treatment on entrances for optimum longevity, function, and performance.

3.06 SCHEDULE

A. Doors 100A, 105C, 113A, 118D and 118G: Aluminum Thermal Flush Door with Glass Lite. Style FLT-400-HG.

END OF SECTION

SECTION 08 36 13

SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sectional Overhead Doors.

1.2 RELATED SECTIONS

A. Section 05 12 00 – Structural Steel Framing: Structural Metal Framing.

B. Section 08 80 00 – Glazing: Insulated Safety Glass for Sectional Overhead Doors.

C. Division 26: Electrical.

1.3 REFERENCES

A. ASTM A480/A480M-04; 2004 - Standard Specification for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.

B. ASTM A653/A653M-03; 2003 - Standard Specification for Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM A666-00; 2000 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

D. ASTM B209-04; 2004 - Standard Specification for Aluminum - Alloy Sheet and Plate.

E. ASTM B221-02; 2002 - Standard Specification for Aluminum - Alloy Extruded Bars, Rods, Wires, Shapes and Tubes.

F. National Fire Protection Association NFPA 80, 1999 Edition - Standard for Fire Doors and Fire Windows.

G. Underwriters Laboratories (UL) 10B, 1997 Edition - Standard for Fire Tests of Door Assemblies.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 00 00 – General Requirements.

B. Shop Drawings: Indicate opening dimensions and required tolerances, jamb connection details, anchorage spacing, hardware locations, installation details, and special conditions.

C. Product Data: Provide information on components, application, hardware and

accessories.

D. Closeout Submittals:
1. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall provide a coiling door system capable of withstanding positive and negative design loads as required by local building code for 50,000 cycles.

B. Installer Qualifications: Installer shall be authorized and qualified to install overhead door systems on the type and scope of project specified.

1.6 PERFORMANCE REQUIREMENTS

A. Design doors to withstand positive and negative wind loads as calculated in accordance with applicable building code.
1. Design Wind Load: 20 lb/sf.
2. Test Wind Load: 1.5 times design wind load.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of all materials in accordance with federal, state and local laws.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. Provide an original of the manufacturer's limited warranty against manufacturing defects and product workmanship.
1. Sectional Door Warranty: 10 Years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: C.H.I. Overhead Doors, which is located at: 1485 Sunrise Dr. ; Arthur, IL 61911; Toll Free Tel: 800-590-0559; Fax: (217) 543-4454; Email: rscafidi@chiohd.com ; Web: www.chiohd.com. Model 3216.

B. Acceptable Manufacturer: Haas Door Company: Model CHT-2012.

C. Substitutions: Permitted.

2.2 MATERIALS

A. Galvanized Steel Sheet:
1. Galvanized commercial steel, (CS type) per ASTM A653/A653M, G90 and

G60 coating class.

B. Glazing: 1 inch Insulated Safety Glass in accordance with Section 08 80 00 – Glazing.

2.3 INSULATED SANDWICH STYLE SECTIONAL DOORS

A. Door Sections:
1. Type: Micro-grooved sandwich style, wood grain embossed.
2. Material: Galvanized steel.
3. Gauge: 26 gauge exterior and 27 gauge interior.
4. Thickness: Nominal 2 inches.
5. Hinge attachment strips: Run full height of section in all hinge lines.
6. Rails: Tongue-and-groove.
7. End caps: Wrap-around box style, 20 gauge galvanized steel, full height of section.
8. Insulation: Polyurethane, foamed-in-place, 95% closed cell with section thermal break, top and bottom of section.

B. Operation and Construction:
1. Electric operation.
2. Track and Operating Hardware: 3” heavy duty track for high lift operations.
3. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel, with floating hardened ball bearing rollers, located at top and bottom of each panel, each side.
4. Spring Counterbalance:
   a. Oil tempered torsion springs mounted on cross-header shaft supported by galvanized steel ball bearing end plates and center carrier brackets as required.
   b. Counterbalance transferred to doors via aircraft quality braided steel lift cables.
   c. Counterbalance torsion springs designed for minimum 50,000 cycles.
5. Weatherstripping:
   a. Bottom: Vinyl weatherseal, full width of door.
   b. Head and Jamb: Flexible one-piece vinyl extrusions.
6. Lock Mechanism: Outside cylinder, adjustable keeper, spring activated.
7. Add electrical interlock switch for each lock location.

C. Vision Lite Configuration
1. Glazing Type: 1 inch insulated safety glass in accordance with Section 08 80 00 – Glazing..
2. Glazing Pattern – As indicated on drawings.

D. Electric Operator:
1. Type: Jackshaft or trolley.
2. Power Supply: 115 Volts AC, 1 phase.
3. Emergency Operation: Manually operable in case of power failure.
4. Control Station: 24 Volt three button (Open / Stop / Close) stations, located at each door and a custom control panel in Watch Room 104; as detailed on Electrical Drawing Sheet E-211.

E. Safety Reversing Edge:
1. Electric Edge, four wire, fail-safe, self monitoring: Detect obstruction and reverse door upon contact with electric strips in vinyl housing.
2. Doors shall also be equipped with photo-electric eyes to stop downward travel when beam is interrupted and return door to open position. Photo-electric eyes shall be as manufactured by Valu-Beam 912 Series, and be complete with SM912LV retroreflective, SMB900 mounting bracket and any and all accessories required for proper and complete installations. Coordinate with Electrical and Architectural trades involved for proper and complete installation.
a. Provide all necessary contacts and devices to enable remote controls, and remotely located pushbuttons.
b. Provide a total of eight (8) radio two-channel transmitters. Provide directly to Fire Department's representative with copy of transmittal to Architect. Each transmitter shall be set to operate both doors in a drive thru bay as selected by Fire Department. Coordinate exact numbers of each with Fire Department.
c. Radio operators shall be capable of operating doors from cab of apparatus 150 feet away from doors. Provide special antenna length, location or operator power as required to operate doors from this distance.
d. Provide and install remotely located pushbuttons each with "Open/Close/Stop" functions for all six (6) overhead doors (118A, 118B, 118C, 118H, 118J and 118K), and a custom gang control panel in Watch Room 104.

F. Finish:
1. Galvanized Steel for Exterior Panel Surfaces: Baked-on enamel primer and polyester finish coat.
a. Color: To be selected from manufacturer's non-standard colors.
2. Galvanized Steel for Interior Panel Surfaces: Baked-on enamel primer.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install assembly in accordance with manufacturer's instructions.

B. Anchor to adjacent construction without distortion or stress.

C. Fit and align assembly including hardware, plumb, level and square to ensure smooth operation.

D. Make wiring connections between power supply and operator and between operator and controls.

3.2 ADJUSTING

A. Adjust closures to operate smoothly throughout full operating range.

3.3 DEMONSTRATION

A. Demonstrate proper operation to Owner.

3.4 SCHEDULE

A. See Door Schedule on Drawing No. A-901.

END OF SECTION

SECTION 08 51 13

ALUMINUM 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.

1.2 SUMMARY

A. Section includes Kawneer Architectural Aluminum Windows including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of window units.
   1. Types of aluminum windows include:
      a. Kawneer Series 8225TL ISOLOCK™ (Thermally Broken)
      b. Outswing Casement Windows
      c. 2-1/4" (57.2 mm) frame depth
      d. C-AW90

B. Related Sections:
   1. Division 07 90 00 “Joint Protection” for joint sealants installed as part of the window system.
   2. Division 08 32 13 "Sliding Aluminum-Framed Glass Doors"

1.3 DEFINITIONS

A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufactures Association (AAMA) – AAMA Glossary (AAMA AG).

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed window system shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction.

   1. Design Wind Loads: Determine design wind loads applicable to the Project from basic wind speed indicated in miles per hour, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
      a. Basic Wind Speed (MPH): 90
      b. Importance Factor: 1.15 for Occupancy Category IV.
      c. Exposure Category: B

B. Window Performance Requirements:

   1. Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS)
      a. Performance Class and Grade: C-AW90

   2. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283 at a minimum window size of 36" x 60" (91.44 x 152.4 mm). The air infiltration rate shall not exceed 0.10 cfm/ft at a static air pressure differential of 6.24 psf (300 Pa).

3. Water Resistance: The test specimen shall be tested in accordance with ASTM E 547 and ASTM E 331 at a minimum window size of 36" x 60" (91.44 x 152.4 mm). There shall be no leakage as defined in the test method at a static air pressure differential of 12 psf (574 Pa).
4. Uniform Load Deflection: A minimum static air pressure difference of 90 psf (4310 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member.
5. Uniform Load Structural Test: A minimum static air pressure difference of 135 psf (6465 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. The unit shall be evaluated after each load.
6. Component Testing: Window components shall be tested in accordance with procedures described in AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).
7. Condensation Resistance Test (CRF): When tested in accordance with AAMA 1503, the condensation resistance factor (CRF) shall not be less than:
   a. Outswing Casement: (CRF_f) frame not less than 56 with clear glass.
      Outswing Casement: (CRF_g) glass not less than 55 with clear glass.
8. Thermal Transmittance Test (U-Factor): When tested in accordance with AAMA 1503, the conductive thermal transmittance (U-Factor) shall not be more than:
   a. Outswing Casement: U-Factor not more than .60 BTU/hr/sf/°F per AAMA 507 or NFRC100 when using project specified glass.
9. Forced Entry Resistance: All windows shall conform to ASTM F588, Grade 10.
10. Thermal Barrier Tests: Testing shall be in general accordance with AAMA 505 Dry Shrinkage and Composite Thermal Cycling test procedure, AAMA TIR-A8, Structural Performance of Composite Thermal Barrier systems.

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances and installation details.

C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.

D. Samples for Verification: For aluminum windows and components required.

E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type, class, grade, and size of aluminum window. Test results based on use of downsized test units will not be accepted.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An installer which has had successful experiences with installation of the same or similar units required for this project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Refer to Division 01 Section "General Requirements." Do not modify size and dimensional requirements.
   1. 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.

E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "General Requirements."

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

A. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty.
   1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

B. Insulating Glass: Warranted to be free from defects (excluding breakage) for a period of five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product:
   1. Kawneer Company Inc.
   2. Series 8225TL ISOLOCK™ (Thermally Broken) Outswing Casement Windows
   3. 2-1/4" (57.2 mm) frame depth
   4. C-AW90

B. Subject to compliance with requirements, provide a comparable product by the following:
   1. Manufacturers: Tubelite; EFCO; Wausau Metals.

C. Substitutions: Refer to Substitutions Section for procedures and submission requirements.
   1. Pre-Contract (Bidding Period) Substitutions: In accordance with Section 01 00 00 – General Requirements..
   2. Post-Contract (Construction Period) Substitutions: Submit written request in order to avoid window installation and construction delays.
   3. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
   4. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for window system performance criteria, and (2) has been engaged in

the design, manufacturer and fabrication of aluminum windows for a period of not less than ten (10) years. (Company Name)

5. Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
6. Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.

D. Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.090” (2.3 mm) wall thickness at any location for the main frame and sash members.

B. Thermal Barrier: The thermal barrier shall be Kawneer ISOLOCK™ with a nominal 3/8" (9.5 mm) separation consisting of a two-part, chemically curing high density polyurethane which is mechanically and adhesively bonded to the aluminum.

C. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.

D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

E. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

F. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

2.3 WINDOW SYSTEM

A. Series 8225TL ISOLOCK™ (Thermally Broken) Outswing Casement Windows

2.4 GLAZING

A. Glass and Glazing Materials: Refer to Division 08 Section 08 80 00 "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.

B. Glazing System: Glazing method shall be a wet/dry type in accordance with manufacturer’s standards. Exterior glazing shall be silicone back bedding sealant. Interior glazing shall be snap-in type .062" (1.57 mm) glazing beads with an interior gasket in accordance with AAMA 702 or ASTM C864.

2.5 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows, and sized to accommodate sash weight and dimensions.

B. Casement Window Typical Hardware:

1. Locking:
   a. Roto-Operator
   b. Multipoint Lock
2. Hinging:
   a. Butt Hinges
   b. Friction Adjusters
   c. Limit Stop

C. Exterior Panning and Trims: Extruded aluminum, 6063-T6 alloy and temper, extruded to profiles and details indicated. Seal exterior joints with manufacturer's standard sealant to assure water-tight joints.
   1. Exterior Panning and Trims: All panning profiles shall be a minimum thickness of 0.062" (1.57 mm) to match the profiles as shown the drawings. Any profile variations shall be submitted to the architect and/or owner for approval 10 days prior to bid date. All panning shall be factory fabricated for field assembly. All corner joinery shall be factory cut. Joinery at the sill shall be coped and butt-type construction. All preparations for assembly shall be completed by the window manufacturer. Upon assembly, panning frame joints shall be back-sealed to prevent moisture penetration. Include Head Receptor; Jamb Receptor; and Sill, as indicated on drawings.

2.6 ACCESSORIES

A. Insect Screens: Extruded aluminum frames, 6063-T6 alloy and temper, joined at corners: 18 x 16 mesh aluminum screen cloth; frames finished to match aluminum windows; splines shall be extruded vinyl, removable to permit rescreening.

2.7 FABRICATION

A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fit joints; make joints flush, hairline and weatherproof.
   3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
   4. Physical and thermal isolation of glazing from framing members.
   5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   6. Provisions for field replacement of glazing.
   7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

B. Window Frame Joinery: Screw-Spline, Factory sealed frame and vent corner Joints

C. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

D. Fabricate aluminum windows that are re-glazable without dismantling sash or framing.

E. Mullions: Provide mullions and cover plates as shown, 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, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

F. Sub frames: Provide sub frames with anchors for window units as shown, of profile and dimensions indicated but not less than 0.093” (2.4 mm) thick extruded aluminum. Miter or cope corners, and join with concealed mechanical joint fasteners. Finish to match window units. Provide sub frames capable of withstanding design loads of window units.

G. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).

H. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match frame.

2.8 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Factory Finishing:
   1. Kawneer PermanodicTM AA-M10C22A44, AAMA 611, Architectural Class I Color Anodic Coating Color as selected by Architect.

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 work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight window installation.
   1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
   2. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
   3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

B. Install aluminum framed window system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.

D. Install aluminum framed window system and components to drain condensation, water penetrating joints, and moisture migrating within system to the exterior.

E. Separate aluminum from dissimilar materials to prevent corrosion or electrolytic action at points of contact.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
   1. Testing Methodology: Testing Standard shall be per AAMA 502 including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 for Water Penetration Test.
      a. Air Infiltration Test: Conduct test in accordance with ASTM E 783 at a minimum uniform static test pressure of 1.57 psf (75 Pa) for CW or 6.24 psf (300 Pa) for AW. The maximum allowable rates of air leakage for field testing shall not exceed 1.5 times the project specifications.
      b. Water Infiltration Test: Water penetration resistance tests shall be conducted in accordance with ASTM E 1105 at a static test pressure equal to 2/3 the specified water test pressure.
   2. Testing Extent: Architect shall select window units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present.
   3. Test Reports: Shall be prepared according to AAMA 502.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.

B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

E. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART I - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. The extent of finish hardware is indicated on the drawings and in schedules.

B. Related Work Specified in Other Sections:

1. Aluminum Doors

2. Adjustable Shelving Supports

3. Drawer Slides

4. Access Panels

C. The Finish Hardware Supplier shall make a survey of all drawings and specifications, and any item of finish hardware not specifically mentioned in the "Finish Hardware Groups" but required for completion of the work shall be provided under this Section without additional cost to the Owner. Such items shall be of type suitable for service required and of equal quality to hardware for similar service.

D. Where the type of hardware specified is not adaptable to the finished size of members requiring hardware, submit an item having a similar operation and quality to the Architect for review.

E. The contractor shall obtain all information required as to details, sizes, thickness, shapes, and bevel of doors and other items requiring hardware from subcontractor furnishing same or from the Architect. Should any openings require hardware not listed in this specification, the contractor shall consult Architect for specifications.

1.3 QUALITY ASSURANCE

A. Supplier

1. A recognized architectural finish hardware supplier, with warehousing facilities, who has been furnishing hardware in the project's vicinity for a period of not less than 2 years, and who is, or who employs an experienced architectural hardware consultant who is available, at reasonable times during the course of the work, for consultation about project's hardware requirements, to Owner, Architect and Contractor.

2. The hardware supplier must be able to show evidence of past experience furnishing and servicing detention hardware.

B. Service

1. The hardware supplier shall have at least one builder's hardware contract man on the staff to service the work to be done. He shall be available on short notice if his services are required. When project is turned over to the Owner, all parts shall be in perfect order.

2. Contractor shall have the factory representative inspect and properly adjust each door closer, lock and exit device at completion of building.

3. At the time of final inspection of building, furnish the Owner with two complete sets of installation instructions, service manuals, maintenance helps, special wrenches or keys required to keep hardware in perfect adjustment. This material shall be in two separate packets - one for the Owner's files and one for the Owner's maintenance staff.

C. Fire-Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80 and local building code requirements. Provide only hardware which has been tested and listed by UL or FM for types and sizes of doors required and complies with requirements of door and door frame labels.

1. Where emergency exit devices are required on fire-rated doors (with supplementary marking on doors' UL or FM labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL or FM label on exit devices indicating "Fire Exit Hardware".

D. Furnish all finish hardware to comply with the requirements of all laws, codes, ordinances and regulations of the governmental authorities having jurisdiction where such requirements exceed the requirements of the Specifications. Comply with the requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and the State of Michigan Construction Code Act Barrier Free Design Law.

E. Hardware to hazardous areas shall comply with the requirements of the regulations for public building accommodations for physically handicapped persons of the governmental authority having jurisdiction.

F. Contract Document Review Log

1. The Contractor's Field Superintendent shall review the requirements of the Contract Documents with each subcontractor's foreman or workman that comes to the job site for the first time. This review shall include a paragraph-by-paragraph joint reading of the appropriate specification section. The Superintendent shall keep a log of this review with the date and initials of both the Superintendent and foreman or workman. This log shall be subject to the Architect's review upon request and failure to comply may be cause for adjustment to the Application for Payment.

1.4 SUBMITTALS

A. Manufacturer's Literature: Furnish to Architect, when required, copies of manufacturer's specifications, maintenance and keying manuals and installation instructions (templates to suit each particular installation), for each item of finish hardware. Include photographs, catalog cuts, marked templates and other data as may be required to show compliance with these specifications.

B. Finish and Color: Submit to the Architect, when requested, prior to the submission of finish hardware, item finish samples. Architect's review and selection shall be for color and texture only of surface finish. Compliance with all other requirements is the exclusive responsibility of the Contractor.

C. Samples: If requested by the Architect, a sample of each hardware item, properly marked and tagged for identification shall be submitted for review.
1. After final review, deliver samples to job site for comparison with hardware delivered for installation. Unblemished samples may be used in the work.

D. Finish Hardware Schedule: Submit to the Architect for review, copies of finish hardware schedule covering complete identification of all items required for the project. Include manufacturer's names and identification of finishes. Include a separate schedule of key and master-key system with final submittal of schedule. Architect's review and approval of schedules shall neither be construed as a complete check nor shall it relieve the supplier of responsibility for errors, deviations or omissions from requirement to provide complete hardware for project.

E. Schedules of hardware shall include a preface sheet showing category only on manufacturers' names of all items to be furnished in the following format:

Category	Specified	Scheduled
Hinges	Manufacturer A	Manufacturer B
Locksets	Manufacturer X	Manufacturer X
Kick Plates	Manufacturer Z	Manufacturer Z

1. Door description shall include single or pair, number, location, hand, active leaf, degree of swing, size, material, frame material and UL listing mark.

2. Hardware description shall include quantity, category, catalog number, fasteners and finish.

3. Supplier's scheduling sequence shall be in duplication of that shown in Hardware Groups. Furnish "Vertical" scheduling format only.

4. Each heading number in supplier's schedule shall include a reference to Architect's Hardware Group Number.

5. The scheduling format and sequence of schedule shall comply with recommendations of the American Society of Architectural Hardware Consultants.

6. Submittal Sequence: Submit schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule.

F. Catalog Cuts

1. Provide in booklet form using Supplier's schedule covers as binders four copies of catalog pages of all pieces of hardware listed in Supplier's Schedule that are other than those shown in the Specification.

2. Submit Catalog Booklets concurrently with copies of Hardware Schedule.

3. Review of Hardware Schedule will not begin until Catalog Booklets have been received. At least one copy of Catalog Booklet will be stamped and returned.

G. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware. Upon request, check shop drawings of such other work, to confirm that adequate provisions are made for proper location and installation of hardware.

1.5 PRODUCT HANDLING

A. Package each item of Finish Hardware complete with all screws, bolts, expansion shields, anchors and other fasteners, installation instructions, templates and special adjusting keys or wrenches required for installation. Mark door location and Finish Hardware Schedule Item number on each Package.

B. Delivery of Materials

1. Deliver Hardware to the job site unless otherwise directed. Hardware shall be delivered in their original containers and each item clearly marked so as to agree with Hardware Schedule showing the designated locations. A packing list shall accompany each shipment using item numbers that conform with the approved schedule.

2. The Contractors receiving hardware from this supplier shall sign receipt for same and any subsequent loss and/or missing articles of hardware shall then become the responsibility of the receiving Contractor.

3. Inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

4. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation.

5. Provide secure lock-up for hardware delivered to the project, but not yet installed. Control handling and installation of hardware items which are not immediately

replaceable, so that completion of the work will not be delayed by hardware losses, both before and after installation.

6. Provide typewritten schedule with each shipment in conformity with the approved and filed schedule. The parties receiving hardware from this contractor will receipt for hardware in duplicate.

1.6 GUARANTEE

A. All material furnished under this Contract shall be guaranteed free from defects in manufacture and capable of performing the duties required for which it is designed for a period of one (1) year after final acceptance. Any material failing to comply with the above guarantee shall be replaced with satisfactory material.

B. All door closers shall be guaranteed for five (5) years.

PART II - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Acceptable manufacturers are shown with each product category. Furnish each category with the products of only one manufacturer, except where noted otherwise in Hardware Groups. This requirement is mandatory, whether various producers are listed or not.

2.2 MATERIALS SPECIFIED IN SCHEDULE

A. For simplicity and convenience, the Hardware Groups designate hardware items by catalog numbers as manufactured by the following, except as noted for individual items:

1. Locks – Schlage

2. Exit Devices – Von Duprin

3. Continuous Hinges - Select

4. Butts – Ives

5. Closers – LCN

6. Stops – Ives and Brookline

7. Kickplates – Ives and Brookline

8. Threshold, Weather Seal, Light Seal – National Guard Products and Reese

2.3 FINISHES

A. Hinges - 626

B. Locksets/Exit Devices - 626

C. Closers - Sprayed Aluminum

D. Door Stops - 626

E. Kick Plates - 630

2.4 HARDWARE MOUNTING LOCATIONS

A. Location of Hardware

1. Locate finish hardware in accordance with the following schedule except where door manufacturer's standard required other placement. Consult Architects for any deviation from this schedule. All dimensions are to centerline.

2. Pull Plate - 42"

3. Push Plate - 42"

4. Door Knob - 38"

5. Deadlock - 60" - 56"

6. Bottom Hinge - 10" from floor to bottom of hinge.

7. Top Hinge - 5" from head to top of hinge.

8. Center Hinge - equal distance between top and bottom hinge.

9. Kickplates - 1/4" from door bottom to plate bottom.

2.5 HINGES

A. Hinges shall be Ives of class and size shown in the hardware sets. All hinges, both regular weight and extra heavy, are to be of the oil impregnated ball bearing type. Hinge pins shall be of stainless steel. Hinges are to be of five knuckle construction. All hinges are to have nonremovable pins at exterior doors and security sets.

B. The following hinge manufacturers will be approved as equals, providing they meet the specifications.

1. Stanley
2. H. Soss

2.6 LOCKSETS

A. Locksets shall be Schlage L9000 series, Lever Style 06.

B. The following locksets will be approved as equals, providing they meet the specifications.:

1. Corbin-Russwin ML2000 Newport

2.7 DOOR CLOSERS

A. All door closers shall be of rack and pinion construction with cast iron cases, have key regulated valves, adjustable spring power, adjustable back check and adjustable closing and latching speeds. Concealed closers shall be LCN's 2030 2010 series. Surface closers shall be LCN's 4110- CUSH series, 4110 series, 4010 series, 4020 series, 4110-H-CUSH series as directed in the hardware sets. All door closers shall be of one manufacturer.

2.8 KICK PLATES

A. Shall be wrought ".050". Use 10" height by door width less 1-1/2" at single and less 1" at pairs of doors. Products from any nationally recognized trim or lock manufacturer are acceptable.

2.9 THRESHOLDS

A. Consult hardware sets for location and type. All thresholds shall be equal in length to full masonry opening and coped when frame is recessed. Cope all thresholds around door frame.

2.10 KEY CABINET

A. Furnish one complete key control wall cabinet Model SMTC-AWC-250-S manufactured by P.O. Moore, Inc., Glen Riddle, Pennsylvania. Finish applied manufacturer in standard neutra-tone gray color. Owner will designate location. Key cabinet shall have hook capacity to hold not less than 10% more keys than is required for the building.

2.11 KEYING

A. Establish a new master key system with construction keying. Individual key sets shall be as directed by the Architect and Owner.

2.12 FINISH HARDWARE SCHEDULE

HW SET: 01

2	EA	CONTINUOUS HINGES	SL11 HD	204R1	SEL
1	EA	EXIT DEVICE (ACTIVE)	9875L-06	626	VON
1	EA	EXIT DEVICE (INACTIVE)	9849L-DT-06	626	VON
1	EA	OPEN BACK STRIKE	576A	626	VON
2	EA	SURFACE CLOSERS	4110-3077	695	LCN
1	SET	WEATHER SEAL	BY FRAME SUPPLIER	AL	B/O
2	EA	DOOR SWEEPS	C627BLK	AL	NGP
1	EA	ASTRAGAL	355CS	AL	PEMCO
1	EA	COORDINATOR	CORG7G	AL	IVE
1	EA	CYLINDER	3215	AL	VON
1	EA	THRESHOLD	425	AL	NGP

HW SET: 02

6	EA	HINGES	5BB1 4.5 X 4.5	652	IVE
1	EA	EXIT DEVICE (ACTIVE)	9875L-NL-06	626	VON
1	EA	EXIT DEVICE (INACTIVE)	9849L-DT-06	626	VON
1	EA	ELECTRIC STRIKE	6224AL-FS-EB	-	VON
1	EA	FRAME POWER TRANSFER	EPT-2	-	VON
2	EA	SURFACE CLOSERS	4110-3077	695	LCN
1	EA	CYLINDER	3215	AL	VON

HW SET: 03

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	L9050P L06 L583-363	626	SCH
1	EA	WALL STOP	WS33	626	IVE

HW SET: 04

3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	L9010 L06	626	SCH
1	EA	SURFACE CLOSER	4010-3077	689	LCN
1	EA	KICK PLATE	8400 10" X 34"	630	IVE
1	EA	WALL STOP	WS33	626	IVE

HW SET: 05

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080P L06	626	SCH
1	EA	SURFACE CLOSER	4010-3077	689	LCN
1	EA	KICKPLATE	8400 10” X 34”	630	IVE
1	EA	WALL STOP	WS33	626	IVE

HW SET: 06

3	EA	HINGES	5BB1 4.5 X 4.5	652	IVE
1	EA	EXIT DEVICE	9875L-NL-06	626	VON
1	EA	SURFACE CLOSER	4110-3077	695	LCN
1	EA	CYLINDER	3215	AL	VON
1	EA	KICKPLATE	8400 10” X 34”	630	IVE
1	SET	WEATHER SEAL	137NA	AL	NGP
1	EA	DOOR SWEEP	C627BLK	AL	NGP

HW SET: 07

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY SET	L9040 L06 L583-363	626	SCH
1	EA	SURFACE CLOSER	4010-3077	689	LCN
1	EA	KICK PLATE	8400 10" X 34"	630	IVE
1	EA	WALL STOP	WS33	626	IVE

HW SET: 08

3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	INNER ENTRY LOCKSET	L9050 L06	626	SCH
1	EA	SURFACE CLOSER	4010-3077	689	LCN
1	EA	KICKPLATE	8400 10” X 34”	630	IVE
1	EA	WALL STOP	WS33	626	IVE

HW SET: 09

3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200	630	IVE
1	EA	PULL PLATE	8302	630	IVE
1	EA	SURFACE CLOSER	1040-3077	689	LCN
1	EA	KICKPLATE	8400 10” X 34”	630	IVE
1	EA	WALL STOP	WS33	626	IVE

PART III - EXECUTION

3.1 INSTALLATION

A. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Custom Steel Doors and Frames" by the Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.

B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, install each item completely and then remove and store in a secure place during the finished application. After completion

of the finishes, re-install each item. Do not install surface-mounted items until finishes have been completed on the substrate.

C. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant.

3.2 ADJUST AND CLEAN

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Lubricate moving parts with type lubrication recommended by manufacturer (graphite-type if not other recommended). Replace units which cannot be adjusted and lubricated to operate freely and smoothly as intended for the application made.

B. Clean adjacent surfaces soiled by hardware installation.

C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Glass and glazing for wood doors, as scheduled in this Section, and as shown on the drawings.
2. Glass and glazing for exterior aluminum thermal flush doors, exterior sliding aluminum-framed glass door and exterior overhead doors.
3. Glass for toilet room mirrors is specified in Section 10 28 00 Toilet Accessories.
4. Fire rated glass is specified in Section 08 81 17 Fire-Rated Glass, scheduled in this Section, and referenced in this section.
5. Glass and glazing materials and installation requirements are included in this section for other sections referencing this section.

1.2 SYSTEM DESCRIPTION

A. Glass Thickness: Provide thicknesses specified as a minimum or select minimum thickness in accordance with ASTM E1300 to resist specified design loads, if required.

B. Structural Design: Design in accordance with 2009 Michigan Building Code for most critical combination of wind, snow, seismic, and dead loads.

C. Exterior Glass Deflection: Maximum of 1/175 of glass edge length or 3/4 inch, which ever is less with full recovery of glazing materials.

D. Interior Glass Deflection: Maximum differential deflection for two adjacent unsupported edges when 50 plf force is applied to one panel at any point up to 42 inches above finished floor less than thickness of glass.

1.3 SUBMITTALS

A. Shop Drawings: Signed and sealed by professional engineer.
1. Indicate sizes, layout, thicknesses, and loading conditions for glass.

B. Product Data:
1. Glass: Provide structural, physical, and thermal and solar optical performance characteristics, size limitations, special handling or installation requirements.
2. Glazing Sealants, Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors where exposed.

C. Design Data: Signed and sealed by professional engineer.
1. Submit design calculations for glass thicknesses.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual, GANA FGMA Sealant Manual, GANA Laminated Glass Design Guide for glazing installation methods.

B. Perform Work in accordance with State of 2009 Michigan Building Code.

PART 2 PRODUCTS

2.1 FLOAT GLASS MATERIALS

A. Annealed Glass: ASTM C1036, Type 1 transparent flat, Quality Q3, float glass.
1. Furnish annealed glass except where heat strengthened or tempered glass is required to meet specified performance requirements.

B. Heat Strengthened Glass: ASTM C1048, Type 1 transparent flat, Quality Q3, Kind HS heat strengthened, Condition A uncoated, float glass.
1. Furnish heat strengthened glass where annealed glass cannot meet specified performance requirements.

C. Tempered Glass: ASTM C1048, Type 1 transparent flat, Quality Q3, Kind FT fully tempered, Condition A uncoated, float glass with horizontal tempering.
1. Furnish tempered glass where heat strengthened glass cannot meet specified performance requirements.
2. Furnish tempered glass conforming to CPSC 16 CFR 1201 Category II at locations where safety glass is required by applicable code and as indicated on Drawings.

2.2 FLOAT GLASS PRODUCTS

A. Float Glass Manufacturers:
1. PPG Industries (Basis of Design): Solarban 67 Clear Low E (interior) + Vistacool Solargray tinted (exterior) at Insulating Glass Units.
2. ACH Glass Operations (similar to PPG)
3. AFG Industries, Inc. (similar to PPG)
4. Guardian Industries Corp. (similar to PPG)
5. Pilkington North America, Inc. (similar to PPG)
6. Substitutions: Permitted.

B. Clear Glass: Annealed, and Tempered float glass as specified; Class 1 clear.
1. Clear annealed glass (FG-CA).
2. Clear tempered glass (FG-CT).
3. Minimum Thickness: ¼ unless otherwise indicated.

C. Clear Low-E Glass: Annealed, and Tempered float glass as specified; Class 2.
1. Low E annealed glass (FG-LEA).
2. Low E tempered glass (FG-LET).
3. Minimum Thickness: 1/4 inch unless otherwise indicated.

4. Product: 1/4 inch Solarban 67 manufactured by PPG Industries.
5. Tint: Solarban 67 - Clear.

2.3 FIRE RESISTIVE GLASS PRODUCTS

A. Fire rated Safety Glass (FR-SG): Specified in Section 08 81 17 and scheduled in the drawings and this Section.

B. FR60-SG: 60 minute fire rated safety glass.

2.4 INSULATING GLASS PRODUCTS

A. Insulating Glass Manufacturers:
1. PPG: Solarban 67 Clear (inboard) + Vistacool Solargray (outboard).
2. Substitutions: Permitted.

B. Insulating Glass: ASTM E2190 certified by Insulating Glass Certification Council and Insulating Glass Manufacturers Alliance; with glass elastomer edge seal; purge interpane space with dry hermetic air.
1. Total Unit Thickness: 1 inch unless otherwise indicated.
2. Insulating Glass Unit Edge Seal Construction: Aluminum, thermally broken, bent and soldered corners.
3. Insulating Glass Unit Edge Seal Material: Black color.

C. Double Pane Insulating Glass (IG-DP):
1. Total Unit Thickness: 1 inch.
2. Product: Solarban 67 (low E on #3 surface) + Vistacool Solargray manufactured by PPG.
3. Inner Pane: Glass Type FG-LEA.
4. Outer Pane: Glass Type FG-CA.
5. U-Factor Winter: 0.29 maximum.
6. U-Factor Summer: 0.27 maximum.
7. Solar Heat Gain Coefficient: 0.23 maximum.
8. Visible Light Transmittance: 21% minimum.
9. Visible Light Reflectance Outside: 12% maximum.

D. Double Pane Insulating Safety Glass (ISG-DP):
1. Total Unit Thickness: 1 inch.
2. Product: Solarban 67 + Vistacool Solargray manufactured by PPG.
3. Outer Pane: Glass Type FG-LET.
4. Inner Pane: Glass Type FG-CT.
5. U-Factor Winter: 0.29 maximum.
6. U-Factor Summer: 0.27 maximum.
7. Solar Heat Gain Coefficient: 0.23 maximum.
8. Visible Light Transmittance: 21% minimum.
9. Visible Light Reflectance Outside: 12% maximum.

2.5 GLAZING SEALANTS

A. Glazing Sealant, Gasket, Tapes, Compounds Manufacturers:
   1. Tremco.
   2. Pecora.
   3. Norton
   4. Substitutions: Permitted.

B. Elastomeric Glazing Sealants: Materials compatible with adjacent materials including glass, laminated glass core, insulating glass seals, and glazing channels.
   1. Silicone Glazing Sealant: ASTM C920, Type S, Grade NS, Class and Use suitable for glazing application indicated; single component; chemical curing; capable of water immersion without loss of properties; non-bleeding, non-staining, cured Shore A hardness of 15 to 25.
      a. Color: Black.
      b. Structural Silicone: Furnish high-modulus structural silicone glazing materials where sealant bonds glass to substrate.
      c. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.
   2. Polyurethane Glazing Sealant: ASTM C920, Type S, Grade NS, Class and Use suitable for glazing application indicated; single component, chemical curing, non-staining, non-bleeding, Shore A Hardness Range 20 to 35.
      a. Color: Black.
      b. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

C. Dense Gaskets: Resilient extruded shape to suit glazing channel retaining slot; black color.
   1. Neoprene: ASTM C864.
   2. EPDM: ASTM C864.
   3. Silicone: ASTM C1115.

D. Soft Gaskets: ASTM C509 Type II; resilient extruded shape to suit glazing channel retaining slot; black color.
   1. Neoprene.
   2. EPDM.
   3. Silicone.

E. Pre-Formed Glazing Tape: Size to suit application.
   1. Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer hardness; coiled on release paper; black color.
      a. Butyl Corner Sealant: ASTM C920 single component non-skinning butyl compatible with glazing tape; color to match tape.
      b. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

2.6 GLAZING ACCESSORIES

A. Setting Blocks: Elastomeric material recommended by glass manufacturer, 80 to 90 Shore A durometer hardness.

B. Spacer Shims: Elastomeric material recommended by glass manufacturer, 50 to 60 Shore A durometer hardness.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify openings for glazing are correctly sized, within tolerance, and glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.2 PREPARATION

A. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

B. Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION

A. Perform installation in accordance with GANA Glazing Manual.
   1. Glazing Sealants: Comply with ASTM C1193.

B. Exterior Wet/Dry Method (Preformed Tape and Sealant) Installation:
   1. Cut glazing tape to length and set against permanent stops. Seal corners by butting tape and dabbing with compatible butyl sealant.
   2. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapor seal.
   3. Place setting blocks at 1/4 points.
   4. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.
   5. Install removable stops, with spacer strips inserted between glazing and applied stops, 1/4 inch below sight line. Place glazing tape on glazing pane or unit with tape1/4 inch below sight line.
   6. Fill gap between glazing and stop with elastomeric glazing sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.
   7. Apply cap bead of elastomeric glazing sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

C. Exterior Wet Method (Sealant and Sealant) Installation:
   1. Place setting blocks at 1/4 points and install glazing pane or unit.
   2. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line.

3. Fill gaps between glazing and stops with elastomeric glazing sealant to depth of bite on glazing, but not more than 3/8 inch below sight line to ensure full contact with glazing and continue air and vapor seal.
4. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

D. Interior Dry Method (Tape and Tape) Installation:
1. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
2. Place setting blocks at 1/4 points.
3. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
4. Place glazing tape on free perimeter of glazing in same manner described above.
5. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
6. Knife trim protruding tape.

E. Interior Wet/Dry Method (Tape and Sealant) Installation:
1. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.
2. Place setting blocks at 1/4 points.
3. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.
4. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.
5. Fill gaps between pane and applied stop with elastomeric glazing sealant to depth equal to bite on glazing, to uniform and level line.
6. Trim protruding tape edge.

3.4 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove manufacturer’s labels after Work is complete.

C. Clean fire labels of any paint, dirt, and dust.

D. Clean glass and adjacent surfaces.

3.5 SCHEDULE

A. Refer to Door Schedule on Drawing Sheet A-901 and the following:

B. Door 118E, 118F and Borrowed Lite Frame BL-1: 60 minute fire rated safety glass: Glass Type FR60-SG (Fire Rated-60 min.-Safety Glass).

C. Glass in all Interior Solid Wood Doors: Glass Type FG-CT (Float Glass Clear Tempered).

D. Exterior Aluminum Thermal Flush Doors: ISG-DP (Tinted Double Pane Insulating Safety Glass).

E. Exterior Aluminum Widows: IG-DP (Tinted Double Pane Insulating Glass).

F. Exterior Sectional Overhead Doors: ISG-DP (Tinted Double Pane Insulating Safety Glass).

END OF SECTION

SECTION 08 81 17

FIRE-RATED GLASS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Fire-rated safety glazing materials installed as vision lights in fire-rated doors and borrowed lite frames. (Door 118E and 118F)
2. Fire-rated safety glazing materials installed as borrowed lites and windows in fire-rated frames. (Frame BL-1)

B. Related Sections include the following:
1. Section 08 11 13 “Hollow Metal Doors & Frames” for vision panels in interior door sidelights (borrowed lites) frames.
2. Section 08 14 10 “Interior Wood Doors” for vision panels in interior doors.
3. Section 08 80 00 “Glazing” for schedule and references.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM E2074-00: Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.
2. ASTM E2010-01: Standard Test Method for Positive Pressure Fire Tests of Window Assemblies.

B. American National Standards Institute (ANSI):
1. ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings

C. Consumer Product Safety Commission (CPSC):
1. CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials

D. Glass Association of North America (GANA):
1. GANA – Glazing Manual.
2. FGMA – Sealant Manual.

E. National Fire Protection Association (NFPA):
1. NFPA 80: Fire Doors and Windows.
2. NFPA 252 – Fire Tests of Door Assemblies.
3. NFPA 257 – Fire Tests of Window Assemblies.

F. Underwriters Laboratories, Inc. (UL):
1. UL 9 – Fire Tests of Window Assemblies.
2. UL 10B – Fire Tests of Door Assemblies.
3. UL 10C – Positive Pressure Fire Tests of Door Assemblies.

G. 2009 Michigan Building Code

1.3 PERFORMANCE REQUIREMENTS

A. Fire-rated glass ceramic clear and wireless glazing material with surface-applied film listed for use in impact safety-rated locations such as doors, transoms and borrowed lites with fire rating requirements ranging from 20 minutes to 3 hours with required hose stream test.

1.4 SUBMITTALS

A. Comply with requirements of Section 01 00 00.

B. Product data: Submit manufacturer's technical data for each glazing material required, including installation and maintenance instructions.

C. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.

D. Product Test Listings: From UL indicating fire-rated glass complies with requirements, based on comprehensive testing of current product.

1.5 QUALITY ASSURANCE

A. Glazing Standards: FGMA Glazing Manual and Sealant Manual.

B. Fire Protective Rated Glass: Each lite shall bear permanent, nonremovable label of UL certifying it for use in tested and rated fire protective assemblies.

C. Fire Protective Glazing Products for Door Assemblies: Products identical to those tested per ASTM E 152, labeled and listed by UL or other certification agency acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials under provisions of Section 01 00 00.

B. Deliver materials to specified destination in manufacturer's or distributor's packaging, undamaged, complete with installation instructions.

C. Store off ground, under cover, protected from weather and construction activities.

1.7 WARRANTY

A. Provide manufacturer's limited warranty under provision of Section 01 00 00.

B. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIRE-RATED GLAZING MATERIALS

A. Manufacturer:
1. FireLite® NT as supplied by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065, voice 1-800-426-0279, fax 1-800-451-9857, e-mail sales@fireglass.com, web site www.fireglass.com . This product is the basis of design for performance.
2. Keralite FRF
3. Other manufacturers as tested and approved by door and frame manufacturer's, meeting the performance requirements of the drawings and specifications.
4. Substitutions: Permitted.

B. Properties:
1. Thickness: 3/16 inch FireLite®.
2. Film: Fire-rated surface film as approved by manufacturer.
3. Weight: 2.4 lbs./sq. ft.
4. Approximate Visible Transmission: 88 percent.
5. Approximate Visible Reflection: 9 percent.
6. Hardness (Vicker's Scale): 700.
7. Fire-rating: 20 minutes to 3 hours for doors; 20 minutes to 90 minutes for other applications.
8. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).
9. Positive Pressure Test: UL 10C, UBC 7-2 and 7-4; passes.
10. Surface Finish:
    a. Standard Grade-Comparable to alternative fire-rated products marketed as "Premium"

C. Maximum sheet sizes based on surface finish:
1. Standard: 48 inches by 96 inches.

D. Labeling: Permanently label each piece of FireLite® NT with the FireLite® logo, UL logo and fire rating in sizes up to 3,325 sq. in., and with the FireLite® label only for sizes that exceed the listing (as approved by the local authority having jurisdiction).

E. Fire Rating: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with ASTM E2074-00 and ASTM E2010-01; NPFA 252 and NFPA 257; or UL 9, UL 10B and UL 10C.

2.2 GLAZING COMPOUND FOR FIRE-RATED GLAZING MATERIALS

A. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.

B. Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable. Available Products:
1. Dow Corning 795 - Dow Corning Corp.
2. Silglaze-II 2800 - General Electric Co.
3. Spectrem 2 - Tremco Inc.]

C. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.

D. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.3 FABRICATION

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine glass framing, with glazier present, for compliance with the following:
1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
2. Minimum required face or edge clearances.
3. Observable edge damage or face imperfections.

B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

C. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

3.2 INSTALLATION (GLAZING)

A. Comply with referenced FGMA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.

B. Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.

C. Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.

D. Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.

E. Place setting blocks located at quarter points of glass with edge block no more than 6 inches from corners.

F. Glaze vertically into labeled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.

G. Place glazing tape on free perimeter of glazing in same manner described above.

H. Install removable stop and secure without displacement of tape.

I. Install in vision panels in fire-rated doors to requirements of NFPA 80.

J. Install so that appropriate UL and FireLite® NT markings remain permanently visible.

3.3 PROTECTION AND CLEANING

A. Protect glass from contact with contaminating substances resulting from construction operations. Remove any such substances by method approved by glass manufacturer.

B. Wash glass on both faces not more than four days prior to date scheduled for inspections intended to establish date of substantial completion. Wash glass by method recommended by glass manufacturer.

3.4 GLAZING SCHEDULE: (See Section 08 80 00 and Door Schedule on drawings for schedule of locations and sizes)

Rating	Assembly	Max. Exposed Area (Sq. In.)	Max. Width Of Exposed Glazing (In.)	**O R**	Max. Height Of Exposed Glazing (In.)	Stop Height
60 min.	Doors (non-temp rise)	3,204	36		89	5/8”
	HMS or wood Fireframes D.S.	3,204	36		89	3/4"
	Doors (temp rise)	100	12		33	5/8”
	Other than doors	3,325	95		95	5/8”
	HMS or wood Fireframes D.S.	3,325	95		95	3/4"

* HMS indicates hollow metal steel framing. Fireframes® D.S. indicates Designer Series narrow profile framing.. For wood frames, check with manufacturer for maximum tested glass sizes.

END OF SECTION

SECTION 09 21 16

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes gypsum board with joint treatment; metal stud wall framing; metal channel ceiling framing.

1.2 SUBMITTALS

A. Product Data: Submit data on metal framing, gypsum board, joint tape; acoustic accessories and accessories.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C840. GA-201 - Gypsum Board for Walls and Ceilings. GA-214 - Recommended Specification: Levels of Gypsum Board Finish. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.

B. Furnish framing materials in accordance with SSMA - Product Technical Information.

C. Perform Work in accordance with the 2009 Michigan Building Code.

PART 2 PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A. Manufacturers:
1. National Gypsum Co.
2. United States Gypsum Co.
3. G-P Gypsum Corp.
4. CertainTeed
5. Substitutions: Permitted.

2.2 COMPONENTS

A. Studs and Tracks: ASTM C645; GA-216 and GA-600; galvanized sheet steel, 0.036 inch thick (20 gauge), C shape, 3 5/8 inch width.

B. Furring, Framing, and Accessories: ASTM C645, GA-216, and GA-600.

C. Non-fire Rated Ceiling Suspension System: Chicago Metallic 640/660 Non-Fire Rated Drywall Grid System: Furring Runners; Cross Channels; Furring Tees; Cross Tees; Wall Track; Utility Angle; and 12 gauge hanger wire, as required.

D. Gypsum Board Materials: ASTM C1396/C1396M.
1. Standard Gypsum Board: 5/8 inch thick, maximum available length in place; ends square cut, tapered edges. Gold Bond Gypsum Wallboard, or approved equals.
2. Interior Mold and Moisture Resistant Gypsum Board: 5/8 inch thick, maximum available length in place; ends square cut, tapered edges. Gold Bond eXP Interior Extreme Gypsum Panel, mold and moisture resistant. or approved equal.

2.3 ACCESSORIES

A. Gypsum Board Accessories: ASTM C1047; metal; corner beads, edge trim, and expansion joints.
1. Metal Accessories: Galvanized steel.
2. Edge Trim: Type LC, L, or U bead.

B. Joint Materials: ASTM C475, GA-201 and GA-216, reinforcing tape, joint compound, and water.

C. Fasteners: ASTM C1002; Type S hardened screws and GA-216; length to suit application.

D. Adhesive: ASTM C557 and GA-216.
1. Interior Adhesives: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

E. Gypsum Board Screws: ASTM C954 and ASTM C1002; length to suit application.
1. Screws for Steel Framing: Type S.
2. Screws for Wood Framing: Type W.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site conditions are ready to receive work.

3.2 INSTALLATION

A. Metal Studs:
1. Install studs in accordance with ASTM C754, GA-216 and GA-600.
2. Metal Stud Spacing: 16 inches or less oc.
3. Partition Heights: 6 feet high and 3.5 feet high as indicated on drawings with un-braced tops. 20 gauge studs.

B. Ceiling Framing:
1. Install in accordance with ASTM C754 and GA-216.
2. Coordinate location of hangers with other work. Install ceiling framing independent of walls, columns, and above ceiling work.

3. Reinforce openings in ceiling suspension system interrupting main carrying channels or furring channels, with lateral channel bracing.
4. Laterally brace entire suspension system.
5. Furring Runners to be installed at 48 inches on center maximum, with 12 gauge hanger wire spaced at 48 inches on center maximum, hung from structure above.
6. Space Furring Tees at 16 inches on center maximum between Furring Runners. Use Wall tracks and Cross Tees as needed per manufacturer's instructions.
7. Ceilings at the underside of the metal trusses to be fastened directly to the truss member.

C. Gypsum Board:
1. Install gypsum board in accordance with GA-216 and GA-600.
2. Fasten gypsum board to furring or framing with screws. Staples may not be used.
3. Place control joints consistent with lines of building spaces as required and as directed by Architect/Engineer. 30 feet on center maximum spacing.
4. Place corner beads at external corners and as indicated on Drawings. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.
5. Seal cut edges and holes in eXP gypsum board with sealant.

D. Joint Treatment:
1. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
2. Feather coats onto adjoining surfaces so camber is maximum 1/32 inch.
3. Taping, filling, and sanding is not required at surfaces above suspended ceilings at the underside of the trusses.

E. Tolerances: Maximum Variation from Flat Surface: 1/8 inch in 10 feet in any direction.

F. Schedule:
1. 5/8 inch eXP Gypsum Board on metal suspension system: shower in Men No. 117 and shower in Women No. 116.

2. 5/8 inch Gypsum Wall Board: All areas indicated on interior elevations, schedules, and details on the drawings. Soffits at cabinets in Kitchen/Common Room No. 113.

3. Metal Studs: Type as indicated on drawing details and schedules. 20 gauge steel studs for soffits above cabinets in Kitchen/Common Room No. 113.

4. Non-Fire Rated Ceiling Suspension System: Shower in Men No. 117 and shower in Women No. 116.

END OF SECTION

SECTION 09 30 00

TILING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes porcelain tile and base for interior floor and wall applications using the thin-set application method.

1.2 REFERENCES

A. ANSI A108.1 – General Requirements.

B. ANSI A108.5 – Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.

C. ANSI A108.10 – Installation of Grout in Tile work.

D. ANSI A118.1 – Dry-Set Portland Cement Mortar.

E. ANSI A118.4 – Latex-Portland Cement Mortar.

F. ANSI A118.6 – Standard Cement Grouts for Tile Installation.

G. ANSI A137.1 – Standard Specifications for Ceramic Tile.

H. TCA (Tile Council of America) – Handbook for Ceramic Tile Installation.

I. SCAQMD Rule 1168 – Adhesive and Sealant Applications.

1.3 SUBMITTALS

A. Shop Drawings: Indicate patterned applications and thresholds.

B. Product Data: Submit instructions for using grouts and adhesives.

C. Manufacturer’s Certificate: Certify that products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit recommended cleaning methods, stain removal methods, and polishes and waxes.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with ANSI A137.1.

B. Conform to TCA Handbook, ANSI A108.1.

C. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

D. Installer: Company specializing in performing Work of this section approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of General Requirements.

B. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not install adhesives in unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F (10 degrees C) during installation of mortar materials.

1.8 EXTRA MATERIALS

A. Provide four square feet of each size, color, and surface finish of tile specified.

PART 2 PRODUCTS

2.1 TILE MANUFACTURERS

A. Floor Tile
1. Lobby No. 100 floor tile, and base: Ceramiche Marca Corona – Natural Stone Effect Ceramics.

2. Women No. 116 and Men No. 117 (Locker Room, Toilet Room, Floor Tile, and Base: Virginia Tile – Crossville Ceramics.
   a. Locker Room, Toilet Room Floor Tile; 12 inch x 12 inch
   b. Shower Floor and Wall Tile; 3 inch x 3 inch

3. Shower Wall Accent Tile: Virginia Tile – Crossville; Series Glass Blox.

B. Substitutions: Permitted but final Owner/Architect approval is required before ordering materials.

2.2 COMPONENTS

A. Mortar Materials:
1. Mortar Bond Coat Materials:
a. Latex-Portland Cement type: ANSI A118.4. ISO 13007 Classification C2EP1.
1) MAPEI, Ultraflex 2

B. Grout Materials:
1. Grout: ANSI A118.6 and A118.7. ISO 13007 Classification CG2WAF; Color as selected by Architect. Owner approval required.
a. MAPEI, Ultracolor Plus.
b. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify substrate under provisions of General Requirements.

B. Verify surfaces are ready to receive work.

3.2 PREPARATION

A. Protect surrounding work from damage or disfiguration.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler.

3.3 INSTALLATION – THIN-SET METHOD

A. Floors: Install adhesive, tile, and grout in accordance with applicable requirements of ANSI A108.1 through A108.10, and TCA Handbook, No. F113-07 as scheduled

B. Base and Wall Tile on Gypsum Board: Install adhesive, tile, and grout in accordance with applicable requirements of ANSI A108.1 through A108.10, and TCA Handbook, No. W243-07 as scheduled.

C. Base and Wall Tile on Concrete Masonry Units: Install adhesive, tile, and grout in accordance with applicable requirements of ANSI A108.1 through A108.10, and TCA Handbook, No. W202-07 as scheduled.

D. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor, and base joints.

E. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Provide 3/16 inch grout joints. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

F. Sound tile after setting. Replace hollow sounding units.

G. Allow tile to set for a minimum of 48 hours prior to grouting.

H. Grout tile joints.

I. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.4 CLEANING

A. Clean work under provisions of General Requirements.

B. Clean tile and grout surfaces.

3.5 PROTECTION OF FINISHED WORK

A. Protect finished work under provisions of General Requirements.

B. Do not permit traffic over finished floor surface for 4 days after installation.

3.6 SCHEDULE

A. As noted on Drawing No. A-901.

END OF SECTION

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes suspended metal grid ceiling system and perimeter trim.

B. Acoustical tile.

1.2 REFERENCES

A. ASTM C635 – Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

B. ASTM C636 – Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

C. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

D. ASTM E1264 – Classification of Acoustical Ceiling Products.

E. CISCA – Acoustical Ceilings: Use and Practice.

F. UL – Fire Resistance Directory and Building Material Directory.

G. GS 11 – Green Seal Standards & Certification: Paints.

1.3 SYSTEM DESCRIPTION

A. Provide system capable of supporting imposed loads with deflection limited to 1: 360.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product data on metal grid system components and acoustical units.

B. Manufacturer’s Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

C. Samples: Submit ceiling tile and suspension system.

1.5 QUALITY ASSURANCE

A. Conform to CISCA requirements.

B. Surface Burning Characteristics: Class B - Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C) and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.7 SEQUENCING

A. Sequence work to insure acoustical ceiling are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Install acoustical units after interior wet work is dry.

PART 2 PRODUCTS

2.1 ACOUSTICAL UNITS

A. Manufacturers:
1. USG: Astro ClimaPlus #8223 and Radar Ceramic ClimaPlus #56644.
2. Armstrong: Equal product as required to match existing.
3. Celotex: Equal product as required to match existing.
4. Substitutions: Permitted.

2.2 SUSPENSION SYSTEM

A. Manufactures:
1. USG: Donn DX/DXL, 15/16” Exposed Tee and AX 15/16” Exposed Tee.
2. Armstrong: Equal product as required to match existing.
3. Celotex: Equal product as required to match existing.
4. Substitutions: Permitted.

2.3 COMPONENTS

A. Grid:
1. Non-Fire Rated Grid: ASTM C635, intermediate duty, non-fire rated exposed T configuration; components die cut and interlocking.
2. Grid Materials: Commercial quality cold rolled steel with galvanized coating (typical).
3. Exposed grid surface width: 15/16 inch (14 mm).
4. Grid Finish: White.
5. Support Channels and Hangers: Galvanized steel, size and type to suit application and ceiling system flatness requirements specified.
6. Accessories: Stabilizer bars, clips, splices, edge moldings, and hold down clips required for suspended grid system.
7. Grid Type Donn DX/DXL at ACT-1.

8. Grid Donn AX at ACT-2.

B. Acoustic Panels (ACT-1): ASTM E1264 conforming to the following:
1. Nominal Size: 24 x 48 inches as indicated on sheet A-610.
2. Thickness: 5/8 inches.
3. Composition: Wet-formed mineral fiber.
4. Light Reflectance: 0.86
5. NRC: 0.55.
6. CAC Minimum: 35.
7. Recyclable Content: 65%
8. Surface Color: White.
9. Surface Finish: Fine texture, non-perforated and non-fissured appearance, factory applied acrylic latex paint.
10. Edge: Beveled tegular lay-in.
11. Fire Hazard Classification: Class A (UL).
12. Anti Mold and Mildew Treatment.

C. Acoustic Panels (ACT-2): ASTM E1264 conforming to the following:
1. Nominal Size: 24 x 48 inches as indicated on sheet A-610.
2. Thickness: 5/8 inches.
3. Composition: Ceramic Bonded mineral fiber.
4. Light Reflectance: 0.82
5. NRC: 0.50.
6. CAC Minimum: 40.
7. Recyclable Content: 44%
8. Surface Color: White.
9. Surface Finish: Perforated appearance, factory applied finish.
10. Edge: Square lay-in.
11. Fire Hazard Classification: Class A (UL).
12. Totally Inorganic Product. Resistant to Mold and Mildew.

2.4 ACCESSORIES

A. Touch-up Paint: Type and color to match acoustic and grid units.
1. Interior Flat and Non-Flat Paints: Maximum volatile organic compound content in accordance with GS-11.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site conditions.

B. Verify layout of hangers does not interfere with other work.

3.2 INSTALLATION

A. Suspension System:

1. Install system in accordance with ASTM C636 and as supplemented in this section.
2. Install system capable of supporting imposed loads to a deflection of 1:360 maximum.
3. Locate system on room axis according to reflected plan on sheet A-610.
4. Coordinate location of hangers with other work. Where components prevent regular spacing of hangers, reinforce system to span extra distance.
5. Install hanger clips. Provide additional hangers and inserts as required.
6. Hang system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
7. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
8. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.
9. Do no eccentrically load system, or produce rotation or runners.
10. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.

B. Acoustic Units:
1. Install acoustical units in accordance with manufacturer’s instructions.
2. Install acoustic units level, free from damage, twist, warp or dents.
3. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
4. Fit border trim neatly against abutting surfaces.
5. Cut panels to fit irregular grid and perimeter edge trim.

C. Tolerances:
1. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).
2. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.3 SCHEDULE

A. Ceilings indicated on sheet A-610 and materials scheduled on sheet A-901.

END OF SECTION

SECTION 09 65 00

RESILIENT FLOORING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes resilient tile flooring and base.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer’s product data.

B. Samples:
1. Submit manufacturer's complete set of color samples for initial selection.
2. Submit two samples, 4 x 4 inch in size illustrating color and pattern for each resilient flooring product specified.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit maintenance instruction and data.

1.4 QUALITY ASSURANCE

A. Surface Burning Characteristics:
1. Floor Finishes: Class II, minimum 0.22 watts/sq cm when tested in accordance with NFPA 253.
2. Base Material: Class II, minimum 0.22 watts/sq cm when tested in accordance with NFPA 253.

B. Perform Work in accordance with 2009 Michigan Building Code.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (32 degrees C).

B. Store materials for not less than 48 hours prior to installation in area of installation at temperature of 70 degrees F (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).

PART 2 PRODUCTS

2.1 TILE FLOORING

A. Manufacturers:

1. Johnsonite: Azrock VCT.
2. Armstrong: Equal Product.
3. Mannington: Equal Product.
4. Substitutions: Permitted.

B. Furnish materials in accordance with 2009 Michigan Building Code.

C. Vinyl Composition Tile (VCT-1): ASTM F1066:
1. Size: 12 x 12 inch.
2. Thickness: 0.125 inch.
3. Pattern: Class 2 - Through pattern.
4. Static Load Limit: 150 psi per ASTM F970
5. Flammability: ASTM E648 Class 1 < 0.45 CRF
6. Smoke Density: ASTM E662 <450
7. Color as selected by Architect from Manufacturers 73 Standard Price Colors.

2.2 RESILIENT BASE

A. Manufacturers:
1. Johnsonite.
2. Armstrong.
3. Mannington.
4. Substitutions: Permitted.

B. Furnish materials in accordance with the 2009 Michigan Building Code.

C. Base: ASTM F1861 Vinyl; top set coved:
1. Height: 4 inch.
2. Thickness: 0.125 inch thick.
3. Finish: Satin.
4. Length: Roll.
5. Accessories: Premolded external corners, internal corners, and end stops.

2.3 ACCESSORIES

A. Subfloor Filler: Cementitious or Premix latex; type recommended by floor material manufacturer.

B. Primers and Adhesives: Waterproof, types recommended by floor material manufacturer.
1. Interior Adhesives: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

C. Moldings and Edge Strips: Same material as flooring.

D. Sealer and Wax: Types recommended by floor material manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify concrete floors are dry to maximum moisture content of 7 percent, as recommended by manufacturer, and exhibit negative alkalinity, carbonization, and dusting.

3.2 PREPARATION

A. Clean substrate.

B. Fill minor low spots and other defects with sub-floor filler.

C. Apply primer as required to prevent "bleed-thru" or interference with adhesion by substances that cannot be removed.

3.3 INSTALLATION

A. Spread adhesive and set flooring in place. Press tile flooring to attain full adhesion.

B. Install tile flooring with joints and seams parallel to building lines. Allow minimum 1/2 full size tile width at room or area perimeter.

C. Scribe flooring to produce tight joints at items penetrating flooring.

D. Where floor finishes are different on opposite sides of door, terminate flooring under centerline of door.

E. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated. Secure resilient strips by adhesive.

F. Adhere base tight to wall and floor surfaces.

G. Fit joints tightly and make vertical. Miter internal corners. At external corners, use premolded units.

3.4 CLEANING

A. Remove excess adhesive from surfaces without damage.

B. Apply Sealer and Wax in accordance with Manufacturer’s Installation Instructions

3.5 SCHEDULE

A. See Room Finish Schedule on Drawing No. A-901.

END OF SECTION

SECTION 09 68 00

CARPETING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Carpet Tiles direct-glued to substrate.

B. Final approval of Colors & Styles is required by Owner prior to ordering materials.

1.2 SUBMITTALS

A. Samples: Submit two carpet tile samples full size, illustrating color and pattern for each carpet tile material specified.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit maintenance and cleaning instructions.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials:
1. Furnish one (1) full carton of tiles of each type, color, and pattern specified.

1.5 QUALITY ASSURANCE

A. Surface Burning Characteristics:
1. Floor Finishes: Comply with one of the following:
a. Class II, minimum 0.22 watts/sq cm when tested in accordance with NFPA 253.
b. CPSC 16 CFR 1630.

B. Texture Appearance Retention Rating: Rating classifications as determined by CRI Model Specifications for Commercial Carpets.
1. Greater than or equal to 3.0 TARR for Heavy Traffic Level Classification.

C. Perform Work in accordance with the 2009 Michigan Building Code.

1.6 AMBIENT CONDITIONS

A. Store materials in area of installation of 48 hours prior to installation.

B. Maintain minimum 70 degrees F (21 degrees C) ambient temperature 3 days prior to, during and 24 hours after installation.

C. Ventilate installation area during installation and for 3 days after installation.

1.7 WARRANTY

A. Furnish manufacturer's standard Lifetime Limited Modular warranty for carpet tiles integrity, wear, and colorfastness.

PART 2 PRODUCTS

2.1 CARPET TILES

A. Manufacturer and Product List:
   1. Carpet tiles CPT-1: Shaw Contract Group, No Rules Collection, Intrigue Tile Style, in color as selected, as basis of design.
   2. Substitutions permitted but Owner approval required prior to ordering material.

2.2 COMPONENTS

A. Carpet Tile CPT-1:
   1. Tile Size: 24 x 24 inches.
   2. Construction: Multi-level pattern loop
   3. Style: Intrigue Tile 59558.
   4. Gauge: 1/12" (47 rows per 10 cm.)
   5. Dye Method: 100% Solution Dyed.
   6. Fiber Type: Eco Solution q Nylon.
   7. Protective Treatment: SSP Shaw Soil Protection.
   8. Primary Backing Material: Synthetic.
   9. Secondary Backing Material: Ecoworx Tile.
   10. Installation Method: ¼ turn.
   11. Flammability: ASTM E 648 Class 1 (Glue Down).
   12. Smoke Density: ASTM E 662 Less than 450.
   13. Static Propensity: AATCC-134 Under 3.5 KV.
   14. Color: As Selected by Architect
   15. Face Weight: 19 oz.
   16. Tufts per Inch: 9.0
   17. Finished Pile Thickness: 0.092 inch
   18. Total Thickness: 0.23 inch
   19. Color: As selected by Architect.

2.3 ACCESSORIES

A. Sub-Floor Filler: Cementitious Type recommended by flooring material manufacturer.

B. Base Cap: ¾ inch nylon strip, color to match base carpet. Wrap around exposed edge and sew to top edge of carpet.

C. Moldings and Edge Strips: Rubber color as selected.

D. Contact Adhesive: Compatible with carpet tile material and recommended by carpet tile manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify floor surfaces are smooth and flat within tolerances specified in Section 03 30 00 and are ready to receive work.

B. Verify concrete floors for glue-down installation are ready for carpet tile installation by testing for moisture emission rate and alkalinity. Obtain instructions when test results are not within specified limits.

3.2 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.

B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

C. Vacuum clean substrate.

3.3 INSTALLATION

A. Install carpet tiles in accordance with CRI Carpet Installation Standard.

B. Verify carpet tiles match before cutting to ensure minimal variation between dye lots.

C. Lay out carpet tiles and locate joints in accordance with shop drawings:
   1. Locate change of color or pattern between rooms under door centerline.

D. Install carpet tiles by direct glue-down method.

E. Complete installation of edge strips, concealing exposed edges. Bind cut edges where not concealed by edge strips.

F. Cleaning:
   1. Remove excess adhesive from floor, base, and wall surfaces without damage.
   2. Clean and vacuum sheet carpet surfaces.

3.4 SCHEDULE: (Refer to Drawing Sheets A-511 and A-901.)

A. CPT-1 and coordinated vinyl base where indicated on drawings..

END OF SECTION

SECTION 09 81 00

EPOXY FLOORING

PART I - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 SUMMARY

A. This Section includes furnishing and installation of epoxy flooring to surfaces scheduled and specified, indicated as CONC-EC in Room Finish Schedule, including surface preparation, bases, prime coats, flooring systems and top coats.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain primary epoxy flooring materials including primers, resins, hardening agents, finish or sealing coats from a single manufacturer with not less than ten (10) years of successful experience in manufacturing and installing principal materials described in this section. Contractor shall have completed at least five (5) projects of similar size and complexity. Provide secondary materials only of type and from source recommended by manufacturer of primary materials.

B. Coordination of Work: Review sections in which other flooring systems are provided to ensure compatibility of the total systems for various substrates. Upon request, furnish information on characteristics of specified finish materials, to ensure that compatible prime coats are used.
   1. Notify the Architect of problems anticipated using the flooring systems specified.

C. Field Samples: On actual floor surface, duplicate flooring systems of prepared samples. Provide full-coat finish samples on at least 10 sq. ft. of surface.
   1. Final acceptance of colors will be from job applied samples.

D. Material Quality: Provide the best quality grade of the various floor coatings as regularly manufactured by acceptable coating manufacturers. Materials not displaying manufacturer's identification as a best-grade product will not be acceptable.
   1. Proprietary names used to designate colors or materials are not intended to imply that products of named manufacturers are required to the exclusion of equivalent products of other manufacturers.

E. Pre-Installation Conference
   1. Contractor shall arrange a meeting not less than thirty (30) days prior to starting work
   2. Attendance
      a. Architect/Owner's Representative
      b. Manufacturer/Installer's Representative

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data, installation instructions, and general recommendations for each epoxy flooring material required. Include certification indicating compliance of materials with requirements.

B. Samples: Submit, for verification purposes, 4-inch square samples of each type of epoxy flooring required, applied to a rigid backing, in color and finish indicated.
   1. For initial selection of colors and finishes, submit manufacturer's color charts showing full range of colors and finishes available.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, new, unopened packages and containers bearing manufacturer's name and label and the following information.
   1. Name or title of material.
   2. Manufacturer's name, stock number and date of manufacture.
   3. Application instructions.
   4. Color name and number.
   5. Handling instructions and precautions.

B. Material shall be stored in a dry, enclosed area protected from exposure to moisture. Temperature of storage area shall be maintained between 60 and 85 deg. F.

1.6 JOB CONDITIONS

A. Prior to start of specified work, insure that the areas to receive the specified work shall be maintain at a minimum temperature of 60 deg. F. at floor level for at least 14 days previous to and during installation of the work, and for at least 72 hours after installation.

B. Do not begin specified work in a space until the work of other finishing trades, including painting, has been completed in each space.

PART II - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, provide products by the following manufacturers or approved equal.
   1. Stonhard, Inc.: Stonkote GS4
   2. Sherwin-Williams: Armorseal Floor-Plex 7100
   3. Tnemec Company, Inc. (Tnemec): Equivalent Product.
   4. Substitutions: Permitted.

2.2 EPOXY FLOORING

A. Provide the following epoxy floor coatings at location indicated on Drawings and as noted in Room Finish Schedule on Drawing No. A-901:
      1. Stonkote GS4 as manufactured by Stonhard, Inc., Maple Shade, NJ, (800) 854-0310, a nominal 15 mil thick system comprised of a penetrating two-component

epoxy primer, and a high performance, two-component, pigmented epoxy sealer with Type I surface. Color as selected by Architect from Manufacturer's standard colors.

2.3 JOINT SEALANT MATERIALS

A. Type produced by manufacturer of epoxy flooring system for type of service and joint condition indicated.

PART III - EXECUTION

3.1 INSTALLATION OF EPOXY FLOORING

A. General
1. This type of floor shall be installed by a Contractor approved and authorized by the floor covering manufacturer, and acceptable to the Architect and Construction Manager. Install in strict accordance with manufacturer's recommendations.
2. Work shall not be started until work of other trades which penetrate the floor covering has been completed.
3. Room temperature must be over 70 deg. F. for 14 days before, during and 72 hours after the installation.
4. Concrete must be structurally sound and free of grease, oil and other contaminates. Concrete must be thoroughly cured to prevent shrinkage cracks at least 30 days at 70 deg. F.

B. Examination
1. Examine substrates and conditions under which flooring will be performed for compliance with requirements for application of coatings. Do not proceed with application until unsatisfactory conditions have been corrected.
2. Start of coating work will be construed as the installers acceptance of surfaces within particular area.

C. Preparation
1. Substrate: Concrete preparation shall be by mechanical means and include use of a scabbler, scarifier or shot blast machine for removal of bond inhibiting materials such as curing compounds or laitance.

D. Application - Epoxy Flooring
1. General: Apply each component of epoxy flooring system in compliance with manufacturer's directions to produce a uniform monolithic wearing surface of thickness indicated, uninterrupted except at divider strips, sawn joints or other types of joints (if any), indicated or required.
2. Primer: Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates.
3. Coating: Mix and apply coating with strict adherence to manufacturer's installation procedures.

E. Field Quality Control
1. The right is reserved to invoke the following material testing procedure at any time, and any number of times during period of flooring application.

2. The Owner may engage service of an independent testing laboratory to sample materials being used on the job site. Samples of material will be taken, identified and sealed, and certified in presence of Contractor.
3. Testing laboratory will perform tests for any of characteristics specified, using applicable testing procedures referenced herein, or if none referenced, in manufacturer's product data.
4. If test results show materials being used do not comply with specified requirements, Contractor may be directed by Owner to stop work; remove non-complying materials; pay for testing; reapply flooring materials to properly prepared surfaces which had previously been coated with unacceptable materials.

F. Curing, Protection and Cleaning
1. Cure epoxy flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 24 hours.
2. Protect epoxy flooring materials from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application.
3. Cleaning: Remove temporary covering and clean epoxy flooring just prior to final inspection. Use cleaning materials and procedures recommended by epoxy flooring manufacturer.

G. Clean all adhesive from adjacent finished surfaces as the work progresses; be responsible for, and pay all costs incurred for, repairing or replacing adjacent finish materials that cannot be cleaned to the original condition, at no cost to the Owner.

H. Contractor to include as a part of Base Contract Work, 800 lineal feet of striping of contrasting color in Apparatus Bay as coordinated with Fire Department.

END OF SECTION

SECTION 09 90 00

PAINTING AND COATING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes surface preparation and field application of paints, and other coatings.

1.2 REFERENCES

A. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 RELATED SECTIONS

A. 09 81 00 – Epoxy Flooring: Epoxy Floor Coating for areas scheduled to receive Epoxy Floor System.

1.4 SUBMITTALS

A. Product Data: Submit data on all finishing products

B. Samples: Submit two paper chip samples illustrating range of colors available for each surface finishing product scheduled.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit maintenance and cleaning instructions.

1.6 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience, and with service facilities within 100 miles of project.

B. Installer: Company specializing in performing work of the section with minimum three years documented experience.

C. Surface Burning Characteristics:
1. Fire Retardant Finishes: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Store and apply materials in environmental conditions required by manufacturer's instructions.

PART 2 PRODUCTS

2.1 PAINTS AND COATINGS

A. Manufacturers:
1. Sonneborn Building Products.
2. Sherwin-Williams.
3. Devoe and Reynolds.
4. Glidden Coatings.
5. Benjamin Moore and Co.
6. Pittsburgh Paints.
7. Pratt and Lambert
8. Substitutions: Not Permitted.

2.2 COMPONENTS

A. Coatings: Ready mixed except field catalyzed coatings of good flow and brushing properties, capable of drying or curing free of streaks or sags.
1. Interior Flat and Non-Flat Paints: Maximum volatile organic compound content in accordance with GS-11.
2. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with GC-03.

B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials required to achieve finishes specified.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify substrate conditions are ready to receive Work.

B. Measure moisture content of porous surfaces using electronic moisture meter. Do not apply finishes unless moisture content is less than 12 percent.

3.2 PREPARATION

A. Correct minor defects and clean surfaces affecting work of this section.

B. Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or applying finishes.

C. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

D. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

E. Gypsum Board and Plaster Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.

F. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

G. Concrete Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove foreign matter. Remove oil and grease with solution of tri-sodium phosphate, rinse well and allow to dry.

H. Uncoated Steel and Iron Surfaces: Remove scale by wire brushing, sandblasting, clean by washing with solvent. Apply treatment of phosphoric acid solution. Prime paint after repairs.

I. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Clean surfaces with solvent. Prime bare steel surfaces.

J. Interior Wood Items Scheduled to Receive Paint Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

K. Do not paint over door and frame fire labels! Painting contractor is responsible for masking of fire labels, removing paint from labels or paying for replacement of labels.

3.3 APPLICATION

A. Apply products in accordance with manufacturer’s instructions.

B. Do not apply finishes to surfaces that are not dry.

C. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.

D. Allow applied coat to dry before next coat is applied.

E. Apply each coat to uniform finish.

F. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

G. Sand wood and metal surfaces lightly between coats to achieve required finish.

H. Where clear finishes are required, tint fillers to match wood.

I. Prime concealed surfaces of interior woodwork with primer paint.

J. Finishing Mechanical And Electrical Equipment:
1. Paint shop primed equipment exposed to view in finished spaces.
2. Remove unfinished louvers, grilles, covers, and access panels and paint separately.
3. Prime and paint insulated and exposed pipes hangers, brackets, collars and supports (in finished spaces), except where items are prefinished.
4. Paint exposed conduit and electrical equipment occurring in finished areas.
5. Paint both sides and edges of plywood backboards.
6. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
7. Paint ductwork exposed in areas without ceilings.

K. Cleaning: As work proceeds, promptly remove finishes where spilled, splashed, or spattered.

3.4 SCHEDULE - SHOP PRIMED ITEMS FOR SITE FINISHING

A. Division 08 - Openings: Hollow metal door frames.

3.5 SCHEDULE - EXTERIOR SURFACES

A. Steel - Shop Primed or Galvanized (Steel Channel Overhead Door Frames; and Exposed surfaces of Steel Lintels):
1. Touch-up with acrylic primer: Sherwin-Williams Pro-Cryl Universal Acrylic Primer, B66-310 Series. (Shop Primed Items)
2. Touch-up with latex primer: Sherwin-Williams All Surface Enamel Latex Primer, A41W210. (Galvanized items)
3. Two coats of enamel: Sherwin-Williams SherCryl HPA High Performance Acrylic, B66-350 Series.

B. Exterior Concrete Masonry Units: (Interior walls of dumpster enclosure.)
1. One Coat Latex Block Filler: Sherwin-Williams PrepRite Block Filler.
2. Two Coats of Acrylic Enamel: Sherwin-Williams A-100 Exterior Latex, Satin finish.

3.6 SCHEDULE - INTERIOR SURFACES

A. Concrete Floors (indicated as sealed concrete or CONC-S in Room Finish Schedule):
1. Concrete Hardening, Sealing, and Dustproofing: Kure-N-Harden by Sonneborn Building Products/BASF. Clear sealer, hardener, and dustproofing compound. 150 to 200 square foot per gallon coverage.

B. Concrete Block Walls (indicated as CMU-P in Room Finish Schedule):
1. One coat block filler: Sherwin-Williams Loxon Block Surfacer, A24W200.
2. Two coats latex enamel: Sherwin-Williams Harmony Low Odor Interior Latex Eg-Shel, B9 Series.

C. Concrete Block Walls Epoxy (indicated as CMU-EP in Room Finish Schedule):
1. One coat block filler: Sherwin-Williams Heavy Duty Block Filler.
2. Two coats Semi-Gloss Epoxy: Sherwin-Williams Waterbased Tile-Clad Epoxy, 2 component system, B73-100/B73V100.

D. Steel – Primed (Hollow Metal Doors & Frames):
1. One Coat Primer: Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer.
2. Two coats of Semi-gloss Epoxy: Sherwin-Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy, single component, K46-150.

E. Galvanized (miscellaneous exposed metals):
1. Touch-up with latex primer: Sherwin-Williams All Surface Enamel Latex Primer, A41W210.
2. Two coats of latex enamel: Sherwin-Williams Harmony Low Odor Interior Latex Eg-Shel, B9 Series.

F. Copper (Miscellaneous exposed piping):
1. One coat of latex primer: Sherwin-Williams DTM Wash Primer, B71Y1.
2. Two coats of latex enamel: Sherwin-Williams Harmony Low Odor Interior Latex Eg-Shel, B9 Series.

G. PVC (Miscellaneous exposed piping):
1. One coat of latex primer: Sherwin-Williams All Surface Enamel Latex Primer, A41W210.
2. Two coats of latex enamel: Sherwin-Williams Harmony Low Odor Interior Latex Eg-Shel, B9 Series.

H. Gypsum Board (Gypsum board partitions, soffits and ceilings typical unless otherwise noted. Indicated as GB-P in Room Finish Schedule):
1. One coat of latex primer sealer: Sherwin-Williams Harmony Low Odor Interior Latex Primer, B11W900.
2. Two coats latex enamel: Sherwin-Williams Harmony Low Odor Interior Latex Eg-Shel, B9 Series.

I. Gypsum Board Epoxy System (Gypsum board ceilings in shower rooms):
1. One coat of latex primer: Sherwin-Williams ProMar 200 Latex Primer.
2. Two coats Semi-Gloss Epoxy: Sherwin-Williams Waterbased Tile-Clad Epoxy, 2 component system, B73-100/B73V100.

3.7 SCHEDULE – COLORS

A. Colors to be chosen by Owner and Architect from manufacturer’s standard colors.

END OF SECTION

SECTION 10 21 13

TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal toilet compartments, floor mounted, head rail braced, Baked Enamel or Powder Coat finish.

1.02 RELATED SECTIONS

A. Section 10 28 00 - Toilet Accessories.

1.03 REFERENCES

A. ANSI A117.1 - Safety Standards for the Handicapped.

B. ASTM A167 - Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

C. ASTM A526 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.

D. FS RR-P-1352 - Partitions, Toilet, Complete.

1.04 SUBMITTALS

A. Submit under provisions of Section 01 00 00.

B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall & floor, supports, door swings.

C. Product Data: Provide data on panel construction, hardware, and accessories.

D. Samples: Submit two samples of partition panels, illustrating panel finish, color, and sheen.

E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.05 REGULATORY REQUIREMENTS

A. Conform to ANSI A117.1 code for access for the handicapped.

1.06 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.07 COORDINATION

A. Coordinate the work with placement of support framing and anchors in wall.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Accurate: Concord, powder coated baked enamel.

B. Bradley-Mills: Series 400 Sentinel overhead braced, baked enamel.

C. Metpar Corporation: Overhead braced, baked enamel.

E. Substitutions: Permitted.

2.02 MATERIALS

A. Steel Sheet: ASTM A526, with G90 zinc coating.

2.03 ACCESSORIES

A. Pilaster Shoe: Formed chromed steel with polished finish, 3 inch high, with adjustable screw jack.

B. Head Rails: Hollow steel anodized aluminum tube, 1 x 1-5/8 inch size, with anti-grip strips and cast socket wall brackets.

C. Attachments, Screws, and Bolts: Stainless steel; tamper proof type, heavy duty extruded aluminum brackets.

D. Hardware: Chrome plated non-ferrous cast metal
1. Pivot hinges, gravity type, adjustable for door close positioning.
2. Nylon bearings.
3. Thumb turn door latch with exterior emergency access feature.
4. Door strike and keeper with rubber bumper.
5. Door pull for outswinging doors.

2.04 FABRICATION

A. Fabricate partitions in accordance with FS RR-P-1352.

B. Fabricate components of steel sheet as follows:
1. Panel and Door Faces: 20 gage panel & 22 gage door.
2. Pilaster Faces: 20 gage.
3. Reinforcement: 12 gage.

C. Doors and Panels:
1. Thickness: 1 inch
2. Door Width: 24 inch
4. Height: 58 inch.

D. Pilasters: 1-1/4 inch (32 mm) thick, of sizes required to suit cubicle width and spacing.

E. Door, Panel, and Pilaster Construction: Sheet steel face, pressure bonded to sound deadening core, form and close edges, miter and weld corners, grind smooth.

F. Internal Reinforcement: Provide in areas of attached hardware and fittings. Mark locations of reinforcement for partition mounted washroom accessories.

2.05 FINISHING

A. Clean, degrease, and neutralize panels.

B. Follow immediately with a phosphatizing treatment, prime coat and two finish coats baked enamel.

C. Single Color: color as selected.

D. Exposed Steel Surfaces: Polished chrome plated.

D. Aluminum: Anodized to clear color.

E. Non-ferrous Surfaces: Polished chrome plated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify site conditions.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attached panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets with tamper proof through bolts and nuts. Locate head rail joints at pilaster center lines.

E. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster. Conceal floor fastenings with pilaster shoes.

F. Equip each door with two hinges, one door latch.

G. Install door strike and keeper with door bumper on each pilaster in alignment with door latch.

H. Field touch-up of scratches or damaged enamel finish will not be permitted.

I. Replace damaged or scratched materials with new materials.

3.03 ERECTION TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

A. Adjust work.

B. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

C. Adjust hinges to position doors in partial opening position when unlatched. Return out swinging doors to closed position.

D. Adjust adjacent components for consistency of line or plane.

3.05 SCHEDULES

A. As indicated on Contract Drawings and as follows:
1. Women No. 116: Partitions around standard water closet.
2. Men No. 117: Partitions around standard water closet and one urinal screen.

END OF SECTION

SECTION 10 28 00

TOILET ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Toilet, and locker room accessories.

B. Grab bars.

C. Attachment hardware.

1.2 RELATED SECTIONS

A. Section 06 10 00 – Rough Carpentry: Blocking in walls for accessories.

1.3 REFERENCES

A. ANSI A117.1 - Safety Standards for the Handicapped.

B. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

C. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

D. ASTM A269 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

E. ASTM A366 - Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.

F. ASTM B456 - Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

1.4 SUBMITTALS

A. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.

B. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.5 REGULATORY REQUIREMENTS

A. Conform to ANSI A117.1 and ADA code for access for the handicapped.

1.6 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on product data.

1.7 COORDINATION

A. Coordinate work with other trades for required blocking in walls.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. American Specialties, Inc. - Product: As scheduled.

B. Other acceptable manufacturers offering equivalent products.
1. Bobrick - equal.
2. Bradley - equal.
3. McKiney/Parker - equal.

C. Substitutions: Permitted.

2.2 MATERIALS

A. Sheet Steel: ASTM A366.

B. Stainless Steel Sheet: ASTM A167, Type 304.

C. Tubing: ASTM A269, stainless steel.

D. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof, and security type.

E. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.3 FABRICATION

A. Weld and grind joints of fabricated components, smooth.

B. Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion. Maintain surfaces without scratches or dents.

C. Fabricate grab bars of tubing, free of visible joints, return to wall with end attachment flanges. Form bar with 1-1/2 inches clear of wall surface.

D. Shop assemble components and package complete with anchors and fittings.

E. Provide steel anchor plates, adapters, and anchor components for installation.

2.4 KEYING

A. Supply 2 keys for each accessory to Owner.

B. Master key all accessories.

2.5 FINISHES

A. Galvanizing: ASTM A123 to 1.25 oz/sq yd. Galvanize ferrous metal and fastening devices.

B. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.

C. Chrome/Nickel Plating: ASTM B456, Type SC 2 polished finish.

D. Stainless Steel: No. 4 satin luster finish.

E. Back paint components where contact is made with building finishes to prevent electrolysis.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site conditions.

B. Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings.

C. Verify exact location of accessories for installation.

3.2 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions and ANSI A117.1.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Items indicated as OFCI are Owner Furnished Contractor Installed.

3.4 SCHEDULE

A. See Drawings (plans and interior elevations) for toilet accessory locations indicated in keynotes, including: Grab bars, mirrors, robe hooks, shower curtain, shower curtain hooks, towel bar, soap dispenser, combination paper towel dispenser and waste receptacle, toilet tissue holder, and sanitary disposal units.

B. Grab Bars: 1 ½ inch diameter Grab Bars with Snap-on Flange Covers. American Specialties Inc. Model No. 3801, Type-01. Stainless steel. Mounting Height to top of horizontal Grab Bar = 33 to 36 inches; and bottom of vertical Grab Bars = 39 to 41 inches. Locations: Unisex Toilet No. 108. Lengths 18 inches; 36 inches; and 42 inches.

C. Double Roll Toilet Paper Dispenser: Surface Mounted Dual Roll Toilet Paper Holder with Hood. American Specialties Inc. Model No. 74022-HSM. Satin Finish Stainless steel. Mounting height = 15 inches minimum AFF to bottom of unit below Grab Bars; or 12 inches minimum to bottom of unit abve Grab Bars; and 7 to 9 inches to centerline from front of Water Closet. Locations: Women 116; Men 117; and Unisex Toilet 108. Size 5 ½ inches W x 10 ¾ inches H x 4 inches D.

D. Combination Paper Towel Dispenser and Waste Receptacle: Semi-recessed Paper Towel Dispenser and Waste Rec eptacle. American Specialties Inc. Model No. 0469-2. Satin Stainless steel; 800 standard multi-fold or 600 standard C-fold paper towel capacity; 12 Gallon Waste Capacity tumbler lock, 2 inch wall recess. Mounting height = 48 inches maximum to towel dispensing opening. Locations: Women 116; Men 117 and Unisex Toilet Room 108. Size 17 ¼ inches W x 56 inches H x 4 inches D.

E. Double Robe Hook: Surface Mounted Double Robe Hook. American Specialties Inc. Model No. 7345. Satin Stainless Steel; Mounting height = 48 inches maximum in barrier free locations: Located on walls as indicated on drawings.

F. Mirror: Channel Frame Mirror: American Specialties Inc. Model No. 0620-A. Satin Stainless steel frame; ¼ inch thick Plate glass with No. 1 quality polished, silver coated and hermetically sealed with a uniform coating of electrolytic copper plating. Mounting height = 40 inches maximum to bottom edge of mirror over a lavatory. Locations: Women 116; Men 117; and Unisex Toilet 108. Size 24 and 48 inches W x 36 inches H x 5/8 inches D.

G. Sanitary Disposal: Surface Mounted Sanitary Napkin Disposal. American Specialties Inc. Model No. 0852. Satin Stainless steel. Mounting Height to top of disposal door = 24 to 34 inches. Locations: In water closet stall in Women 116. Size 7 1/2 inches W x 9 1/2 inches H x 4 inches D.

H. Towel Bar: Heavy Duty Stainless Steel Towel Bar. American Specialties Inc. Model No. 0755-SS18. Satin Stainless Steel; Mounting height = 48 inches: Located in Women 116 and Men 117, one for each shower at location shown on drawings. 18 inches long.

I. Shower Curtain: Vinyl Shower Curtain. American Specialties Inc. Model No. 1200-V. 0.008 thick vinyl treated with Macrobiotic KV-33 anti-bacterial, anti-fungal, anti-mildew agent, and flame retardant agents; Located in Women 116 and Men 117, one for each shower at location shown on drawings. 36 inch opening – 42 inch curtain x 72 inch height.

J. Shower Cutain Hooks: Stainless Steel Shower Curtain Hooks. American Specialties Inc. Model No. 1200-SGU. Satin Stainless Steel; Located in Women 116 and Men 117, 7 hooks for each shower curtain.

END OF SECTION

SECTION 10 44 00

FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Cabinets.

C. Accessories.

1.02 RELATED SECTIONS

A. Section 04 27 00 – Single Wythe Masonry Assemblies: Roughed-in wall openings.

1.03 REFERENCES

A. ANSI/NFPA 10 - Portable Fire Extinguishers.

B. ANSI/UL 711 - Rating and Fire Testing of Fire Extinguishers.

C. UL 299 - Dry Chemical Fire Extinguishers.

1.04 SUBMITTALS

A. Shop Drawings: Indicate cabinet physical dimensions.

B. Product Data: Provide extinguisher operational features, color and finish, & anchorage details.

C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

D. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.05 OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.06 QUALITY ASSURANCE

A. Provide units conforming with ANSI/UL 711.

1.07 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 10 for requirements for extinguishers.

B. Conform to ADA accessability Guidelines.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Larsens: Architectural Series SS-2409-SM Cabinet and MP5 Fire Extinguisher.

B. Potter-Roemer: Equal product.

C. JL Industries: Equal product

D. Substitutions: Permitted.

2.02 EXTINGUISHERS

A. Dry Chemical Type: UL 299, Cast steel tank, with pressure gage; Class 2A-10B: C

2.03 CABINETS

A. Metal: Formed sheet steel, galvanized; 18 gage thick base metal.

B. Configuration: Surface mounted type, size as scheduled.

C. Trim Type: Stainless steel, rolled edge, returned to wall surface, with 2 1/2 inch projection.

D. Door: 18 gage thick, reinforced for flatness and rigidity; Stainless steel. Full flush door. ADA approved pull handle.

E. Cabinet Mounting Hardware: Appropriate to cabinet.

2.04 ACCESSORIES

A. Cabinet Graphics: Red Die Cut Vertical Letters.

2.05 FABRICATION

A. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trim and door stiles.

B. Pre-drill for anchors.

C. Hinge doors for 180 degree opening with two butt continuous piano hinge. Provide roller type catch.

D. Weld, fill, and grind components smooth.

2.06 FINISHES

A. Extinguisher: Steel, enamel to red color.

B. Cabinet Exterior Trim and Door: Stainless steel door and trim.

C. Cabinet Interior: White baked enamel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings, 48 inches from finished floor to handle of cabinet, maximum.

C. Secure rigidly in place.

D. Place extinguishers in cabinets.

3.03 SCHEDULES

A. Locations as indicated on drawings.
1. Larsens SS-2409-SM Architectural Series Cabinet, Semi-recessed, 2 1/2” projection, stainless steel door with red vertical letters.
2. Larsens MP5 Fire Extinguisher, 5 lb. capacity, UL rating: 2A-10B:C.

END OF SECTION

SECTION 10 51 13

METAL LOCKERS

1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.02 DESCRIPTION

A. Work Included
1) Furnish all labor, material and equipment required to furnish and install all new metal lockers and benches complete with all accessories, incidentals, fasteners, etc. in accordance with the Drawings, and these Specifications.

B. Related Work Described Elsewhere
1) Rough carpentry for bases - Section 06 10 00
2) Turn-out lockers - Section 10 99 90

1.03 QUALITY ASSURANCE

A. Field Measurements
1) Take field measurements to verify or supplement dimensions indicated and be responsible for accurate fit of specified work.

B. Uniformity
1) Provide each type of metal locker as produced by a single manufacturer, including necessary mounting accessories, fittings, and fastenings.

1.01 SUBMITTALS

A. Product Data
1) Submit manufacturer's technical data and installation and maintenance instruction for metal locker units.

B. Samples
1) Submit color samples on squares of same metal to be used for fabrication of lockers.

C. Shop Drawings
1) Submit shop drawings for metal lockers, verifying dimensions affecting locker installations for each location shown and indicated on drawings. Show lockers in detail, method of installation, fillers, trim, and accessories. Show all interface requirements of adjacent materials. Include locker numbering sequence information.

2 PRODUCTS

2.01 METAL LOCKERS

A. Manufacturers
1) Design of new lockers is based on Republic Storage Systems Company, Inc. “Quiet Lockers” for lockers. All lockers shall be specified or an equal approved in advance by the Architect. Lockers proposal shall be accompanied by manufacturers descriptive literature to fully describe the locker proposed with proposed locker clearly noted.

B. Single Tier Lockers in Firefighter Locker Rooms
1) Single tier lockers shall be in numbers and dimensions as noted on the Drawing, without legs, and with flat bottoms for sitting on new built-up base. Lockers shall have two (2) interior hat shelves, recessed handle and latch to receive padlock furnished by Owner. Built-in lockers, lockers which abut walls or with ends not exposed to view shall be supplied with manufacturer’s standard gauge and panels as required. Free standing exposed to view locker ends shall be supplied with 16 gauge end finishing panels with no exposed bolt heads. Lockers shall have two single prong hooks along side walls and one double prong hook along the back wall.
2) Lockers shall be 24" x 20" x 72", free standing, single door.

C. Ventilation
1) Ventilation for all doors shall be achieved by manufacturer's standard ventilation without perforations or louvers.

D. Locker Groups
1) Lockers shall be arranged in runs or groups as indicated on the Drawings, complete with top and front fillers at corners.

2.02 MATERIALS AND FABRICATION

A. Materials
1) Fabricate lockers from cold rolled, steel enameling stock free from buckles, scale and other imperfections and defects capable of taking a high grade enamel finish. Use stretcher leveled steel sheets for doors and panels.
2) Use minimum 16 gauge structural steel shapes for reinforcement, securely welded or riveted in place.
3) All bolts, nuts, fasteners shall be cadmium plated, chrome plated, galvanized or otherwise metallically rustproofed steel.
4) Provide locker units in colors(s) as selected by Architect from manufacturer's standards. Unless otherwise indicated, concealed parts may be manufacturer's standard neutral color.
5) Provide one (1) quart of each color paint used for touch-up.

B. Fabrication
1) Locker construction
a). Fabricate tops, backs, bottoms, of not less than 24 gauge sheet steel with flanges as required. Fabricate each run of lockers as a group, except that each group

shall not exceed five lockers wide. Reinforce locker side panels at exposed ends of locker groups. Seam edges of vertical sheets to provide double thickness of metal at connections. Flange top and bottom edges of lockers on four sides, flange backs on two sides.

b). Frame and reinforce door frames with formed steel channels at each side having flanged edge to form door stops, formed from minimum 16 gauge steel sheet for hallway lockers, rigidly welded at corners, and with formed channel cross members. Side of frames shall form a continuous door strike.

c). Fabricate doors from a single sheet of steel, 16 gauge minimum thickness with both vertical edges formed into channel shaped reinforcements, and right angle flange on top and bottom edges.

d). Fabricate shelves of minimum 24 gauge sheet steel, at lockers, of full width and depth of lockers. Flange back and side edges and form front edge in a channel shape.

2) Fillers and Trim

Fabricate fillers and trim of not less than 18 gauge sheet steel. Provide filler strips at top, bottom and sides. Secure strips to locker body and building construction with continuous strips. Provide fillers or closures at exposed ends of sloping tops. Provide corner fillers as required.

3) Hardware

a). Hinges shall be not less than 2" high, 5 knuckle, of full-loop, tight-pin style, securely welded to frame and riveted to door.

b). Hinge leaves shall project into locker interior. Hinges and hinge pins shall be non-removable from exterior. Doors for lockers shall have three (3) hinges for doors over 42" high, at least two (2) hinges for each door 42" high or less.

c. Recessed Handle and Latch: Manufacturer's standard design consisting of housing to form recess for latch lifter and locking devices; non-protruding latch lifter containing strike; and automatic, prelocking, pry-resistant latch mechanism with latching action as follows:

i) Single-tier lockers: Not less than 3-point latching.

d). Padlocks will be furnished by the Owner.

4) Accessories

a). Coat hooks shall be of cadmium plated steel with ball points, free of sharp edges and corners, attached with not less than two (2) bolts each.

b). Each locker shall have a number plate attached near the top of the door. Plates shall be of polished chrome, nickel or aluminum, with bright background and etches, embossed, or stamped black numerals not less than 1/2" high. Number lockers as directed.

c). Provide continuous sloping tops, where noted, not less than 20 gauge sheet steel, approximately 25° pitch, in lengths as long as practicable but not less than four (4) lockers. Provide closures at ends. Finish to match lockers.

d). Provide filler panels as required, of not less than 18 gauge steel sheet, factory-fabricated and finished to match locker units.

5) Finish

a). All metal parts and surfaces, except bright metal hooks and number plates, shall be bonderized and given a factory applied baked-on enamel finish. Finish must withstand a rigid hammer test without flaking or chipping. Colors of finish shall be as selected by the Architect from manufacturer's standard color range.

2.03 LOCKER BENCHES (IN MEN'S AND WOMEN'S LOCKER ROOMS)

A. Locker benches shall be as manufactured by Republic Storage Systems Co., Inc. or an equal approved in advance by the Architect.

B. Locker benches shall be 9-1/2" wide by full 1-1/4" thick laminated maple hardwood with all corners rounded and sanded, of lengths as noted, with two coats of manufacturers clear finish on tops and edges, and one coat on bottom. Mount tops on pedestals consisting of 1-1/4" o.d. steel tubing with 10 gauge steel flanges welded to each end. Overall height of bench shall be 17-1/2" Space bases not more than 6'-0" apart. Finish bases same color as lockers.

3 EXECUTION

3.01 INSPECTION

A. Examine all work in place on which specified work is in anyway dependent to assure that conditions are satisfactory for the installation of specified work. Report defects which may influence satisfactory completion of specified work. Absence of such notification will be construed as acceptance of work in place.

3.02 PREPARATION

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication of special components, when possible, to ensure proper fittings of work. However, allow for adjustment and fitting of trim and filler panels wherever taking of field measurements before fabrication might delay work.

3.03 INSTALLATION

A. General
1). Install metal lockers at locations shown in accordance with manufacturer's instructions for plumb, level, rigid, and flush installation.

B. Metal Lockers
1). Secure rigidly to the base and wall. Bolt lockers securely to the wood base or wood sleeper in concrete base. Bolt adjacent locker sections together. Space fastenings about 12" o.c. to secure each locker to base and apply through back-up reinforcing plates where necessary to avoid metal distortion. Conceal fasteners insofar as possible.

2). Install formed metal trim to close off ends of lockers, to close joints between groups of lockers at internal corners, to close joints between ends of locker runs and abutting walls, and to close top space between adjacent lockers at internal corners. Install trim, metal base, sloping top units, and metal filler panels where indicated, using concealed fasteners to provide flush, hairline joints against adjacent surfaces.

3). At completion, adjust all doors to operate freely without sticking or binding, and to close tightly. All mechanisms shall be in good operating condition.

4). Touch-up marred finishes, but replace units which cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

C. Locker Benches

1). Anchor and bolt locker benches securely to concrete floors, plumb and level.

3.04 CLEANING UP

A. Wash and clean all exposed surfaces as required to remove all surface contamination. Touch up all areas of damaged paint finish to match adjacent surfaces.

END OF SECTION

SECTION 10 99 90

MISCELLANEOUS SPECIALTIES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes Ceiling Access Panels; Turn Out Gear Lockers; Wall Mounted Projection Screen; Wall Mounted Clocks; Room Signage; Range Hood; Hood Fire Suppression System; and Monopole .

1.2 SUBMITTALS

A. Shop Drawings: Indicate component locations, dimensions, details of blocking and attachment, and anchors.

B. Product Data: Submit data on Product, and accessories.

1.3 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Data.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the 2009 Michigan Building Code.

PART 2 PRODUCTS

2.1 MISCELLANEOUS SPECIALTIES

A. Manufacturers:
1. Provide product specified in individual components specification.
2. Substitutions: Permitted.

2.2 CEILING ACCESS PANELS

A. Furnish and install access panels in ceiling where noted, Milcor “Style M Flush Panel Door”, fabricated of factory prime painted steel, equipped with screw driver operated locks, 20 inch x 30 inch size.

2.3 TURN OUT GEAR LOCKERS

A. Provide and install wall mounted turnout gear lockers as shown on drawings and as manufactured by Geargrid Storage Systems, Division of Mid-Minnesota Wire and Manufacturing. Inc. Phone: 1-888-643-6694 or 1-612-464-4468. Contact: Robert Foht.

B. Wall mounted lockers shall be 20 inch wide x 20 inch deep x 72 inch tall, with adjustable wire shelves (3 inch increments), with electrostatic TGIC powder coating, in manufacturer's standard color, as selected by Architect/Owner.

C. Frames shall be heavy duty 1 ¼ inch steel tubing, with ¼ inch cold rolled wire side and back grids at 3 inch on center. Shelves shall be ¼ inch cold rolled wide, with 20 gauge cold rolled metal name plate.

D. Provide 3 apparel hooks for each locker, personalized name plate. Horizontal hanging rod, and coat drying hanger; for each locker.

E. Securely mount units to concrete block walls at 12 inches minimum clear above floor.

F. Substitutions: Permitted.

2.4 WALL MOUNTED PROJECTION SCREEN

A. Furnish and install one (1) wall mounted manual pull down projection screen in the Training/Polling Room No. 105, location as designated by Owner, "Model C with CSR" as manufactured by Da-Lite Screen Company, Inc., or equal as approved by the Architect. Screen shall be 69"H x 92"W, matte white and come complete with all required mounting hardware, brackets as required for a complete installation. Install in strict accordance with manufacturer's recommendations.

2.5 WALL MOUNTED CLOCK

A. Furnish and install three (3) wall mounted clocks, one (1) each in Apparatus Bay No. 118, Kitchen/Common Room No. 113 and Training/Polling Room No. 105. Clock to be Universal 24-Hour Round Wall Clock, Model UNV10441, 12'1/2" diameter, Black with 1 AA battery.

2.6 ROOM SIGNAGE

A. Furnish and install acrylic plaque signs by ASI Sign System, SP Series for Uni-Sex Toilet (#108), Women (#116) and Men (#117).

2.7 RANGE HOOD

A. Furnish and install range hood in kitchen, Model No. PRH18 as manufactured by "Vent A Hood", P.O. Box 830426, 1000 N. Greenville Ave., Richardson, TX 75083-0426, 1 (214) 253-5201. Distributed by Home Appliance Mart, 1 (313) 669-9500. Hood shall be commercial, stainless steel 48" wide.

1. Equip hood with "Vent A Hood" Magic Lung model 200 , dual exhauster, 300-600 CFM with transition to 8" dia. Exhaust duct. Include flourescent light and 3 switches.

2.8 HOOD FIRE SUPPRESSION SYSTEM

A. The fire suppression system shall be a pre-engineered, fixed pipe, automatic wet agent fire suppression system provided and installed for the kitchen exhaust hood(s) and plenum(s), ductwork, and cooking appliances requiring protection. The system shall be Kidde Wet Chemical, Model WHDR manufactured by Kidde Fire Systems, 400 Main Street, Ashland, MA or approved equal. The manufacturer shall be ISO 9001 certified. System must be U.L. 300 approved.

1. The system shall conform to and be in accordance with UL300, NFPA 17A, NFPA 96, Kidde Model WHDR instruction Manual and all applicable addendums, as identified by Underwriters Laboratories File No. U.L. EX-3559, all applicable local and state codes and standards, and all applicable insurance company requirements.

2. The system shall use Kidde “APC” (Aquaeous Potassium Carbonate) wet agent. The “APC” wet agent shall be contained in one or more stored pressure DOT rated steel cylinder and valve assemblies.

3. The Kidde Model WDHR cylinder(s) shall be sized according to the Kidde Model WHDR Instruction Manual and filled with the required amount of “APC” wet agent. The cylinder(s) shall have a tin-nickel alloy plated brass valve, with pressure gauge. The cylinder valve assemblies shall be capable of being stored and operated at temperatures between 0EF. and 120EF.

   Sufficient cylinder and valve assemblies shall be provided to protect the entire hazard area. Bracketing shall be provided to mount the cylinder securely to the intended mounting surface. The system control equipment shall be capable of all functions associated with automatically and manually discharging the set agent from all cylinder and valve assemblies, including automatically shutting off the heat source or fuel to all protected cooking appliances upon system discharge.

4. System detection shall be fusible link.

5. Nozzles shall be located to protect the exhaust duct(s), plenum(s) and all cooking appliances requiring protection. Nozzle choice, coverage and location shall be per the applicable Kidde U.L. listed instruction manual.

   All nozzles shall be equipped with strainers to prevent foreign matter inside the distribution tubing from clogging the nozzle orifice. All nozzles shall be equipped with foil seals which prevent entry of grease and foreign matter into the nozzles and piping.

   All nozzles shall incorporate a ring identification system to easily identify nozzle types. Rings are to be matched into the nozzle body by the manufacturer.

6. The entire hood, ductwork, appliance and fire suppression system installation must conform to the requirements of NFPA 96.

7. The distribution system shall be stainless steel piping or Type 304 stainless steel tubing.

8. All internal surfaces of piping or tubing are to be clean. All cut ends of pipe or tubing are to be reamed to remove burrs.

2.9 MONOPOLE

A. Furnish and install 50 ft. high radio monopole located as shown on the drawings. Complete system design and installation by Contractor to include empty conduit into Watch No. 104. Pole as manufactured by ROHN, Sabre Industries, Nello Corporation, Valmont Industries or approved equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify surfaces and internal wall blocking are ready to receive work and opening dimensions are as indicated on shop drawings or instructed by manufacturer.

3.2 INSTALLATION

A. Secure units level and plumb.

END OF SECTION

SECTION 11 31 00

APPLIANCES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes a Dishwasher, Refrigerator, Gas Range, Washer and a Dryer.

B. Section includes set-up and installation of appliances supplied by Owner, designated as OFCI (Owner Furnished Contractor Installed), in the specification.

C. Final Owner approval of specified appliances is required, prior to ordering.

1.2 SYSTEM DESCRIPTION

A. Equipment: Conform to applicable code for UL approval.

1.3 SUBMITTALS

A. Product Data: Submit data on equipment, and accessories.

B. Manufacturer's Installation Instructions: Submit manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit relevant instructions.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with the 2009 Michigan Building Code.

PART 2 PRODUCTS

2.1 RESIDENTIAL EQUIPMENT

A. Manufacturers:
1. As indicated in each component specification.
2. Substitutions: Permitted.

2.2 COMPONENTS

A. Dishwasher in Kitchen 113: Model KitchenAid KUDE70FXSS, 24 inch, 6-Cycle/7-Option, Stainless Steel Dishwasher, Architect Series II. 40 Decibel Level; Stainless Steel Tub; 23 7/8 inch width; 34 ½ inch maximum height to 33 ¾ inch minimum height; 27 ½ inch depth; 120 volt; 60 Hz; 15 or 20 amp fused electrical supply.

B. Refrigerator in Kitchen No. 113: Maytag MFT2574DEM, Stainless Steel.

C. Gas Range in Kitchen No. 113: Southbend S36D, 36” w/standard oven.

D. Washer and Dryer in Work/Electric/Laundry No. 111: Maytag MVWC425BW (Washer) and Maytag MGDC300BW (Dryer).

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify openings and utility services are ready to receive work and opening dimensions are as indicated on shop drawings and instructed by manufacturer.

3.2 INSTALLATION

A. Set and adjust units level and plumb.

B. Connect to utilities and make units operational.

C. Activate units to confirm correct operation.

END OF SECTION

SECTION 12 20 00

WINDOW TREATMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes horizontal metal slat louver blinds; and operating hardware.

1.2 SUBMITTALS

A. Shop Drawings: Indicate method of attachment and anchorage. Indicate locations for operating controls.

B. Product Data: Submit data indicating physical and dimensional characteristics, operating features, and color.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with three years documented experience.

PART 2 PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS

A. Manufacturers:
1. Hunter Douglas: Model CD82, 1 inch, Decorative Beveled Headrail (Basis of Design).
2. Levelor Contract: www.levelorcontract.com.
3. Bali: Equivalent product.
4. Substitutions: Permitted.

2.2 COMPONENTS

A. Blinds: Horizontal slat louvers hung from full-width headrail with full-width bottom rail; manual control of raising and lowering by cord; blade angle adjustable by control wand.

B. Metal Slats: Spring tempered pre-finished aluminum; radiused slat corners, with manufacturing burrs removed; non-perforated.
1. Width: 1inch.
2. Thickness: 0.008 inch.
3. Color: Sand as required to match existing (field verify).

C. Slat Support: Woven polypropylene cord, ladder configuration.

D. Headrail: Pre-finished, formed aluminum box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats; height 1 3/8 inches.
   1. Color: Same as slats.

E. Bottom Rail: Pre-finished, formed aluminum with top side shaped to match slat curvature; with end caps.
   1. Color: Same as headrail.

F. Lift Cord: Braided nylon; continuous loop.
   1. Free end weighted
   2. Color: As selected.

G. Control Wand: Extruded hollow plastic; hexagonal shape.
   1. Non-removable type.
   2. Length of window opening height less 3 inches.
   3. Color: Clear.

H. Headrail Attachment: Wall brackets or Ceiling brackets as recommended by manufacturer.

I. Accessory Hardware: Type recommended by blind manufacturer.

2.3 FABRICATION

A. Fabricate blinds to fit within openings with uniform edge clearance of 1/4 inch.

B. At openings requiring multiple blind units, furnish separate blind assemblies with space of 1/4 inch between assemblies, occurring at window mullion centers.

C. Determine sizes by field verification.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive the Work.

B. Ensure that structural blocking and supports are correctly placed.

3.2 INSTALLATION

A. Secure in place with concealed fasteners.

B. Adjust blinds for smooth operation.

3.3 SCHEDULE:

A. Window in Sheriff 101.

B. Window in Watch Room 104 (North wall only).

C. Windows in Training/Polling 105.

D. Windows in Kitchen/Common Room 113.

E. Windows in Bunk Room 1-114 and Bunk Room 2-115.

END OF SECTION

SECTION 12 35 30

MANUFACTURED CASEWORK

PART 1 GENERAL

1.1 SUMMARY

A. Section includes shop fabricated manufactured cabinet units with counter tops as specified in Section 06 61 00 Solid Surface Fabricationscountertops.

1.2 SUBMITTALS

A. Shop Drawings: Indicate casework locations, scale plans, elevations, and clearances required.

B. Product Data: Submit data on component profiles, sizes, assembly methods, and schedule of finishes.

C. Samples: Submit two panels, 4 x 4 inch in size illustrating cabinet and counter top finish.

D. Samples: Submit hardware samples.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with KCMA (Directory of Certified Cabinet Manufacturers) - Certification Program.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Install after interior temperature and humidity are controlled and stabilized.

PART 2 PRODUCTS

2.1 MANUFACTURED CASEWORK

A. Manufacturers:
   1. Merillat Masterpiece: Calais, Hickory Praline.
   2. Substitutions: Permitted.

2.2 COMPONENTS

A. Hardware: Manufacturer's standard.

B. Shelf Standards and Rests: Manufacturers Standard.

C. Drawer and Door Pulls: #7085-SS.

D. Catches: Manufacturers Standard.

E. Hinges: Manufacturers Standard Offset pin.

2.3 FACTORY FINISHING

A. Exposed To View Surfaces: Seal and varnish.

B. Interior Surfaces: Plastic Laminate of color and pattern as selected.

C. Counter Tops: Solid Surface Fabrications as indicated on drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify adequacy of backing and location of mechanical and electrical outlets.

3.2 PREPARATION

A. Install supplementary support framing.

3.3 INSTALLATION

A. Set and secure casework in place rigid, plumb, and level.

B. Provide openings for plumbing fixtures, appliances, and other fixtures and fittings.

C. Use fixture attachments at concealed locations for wall mounted components.

D. Use concealed joint fasteners to align and secure adjoining cabinet units and counter tops.

E. Carefully scribe casework against other building materials, leaving gaps of 1/32 inch maximum. Use filler strips not additional overlay trim for this purpose.

F. Secure cabinet and counter bases to floor using appropriate anchorage.

G. Adjust moving or operating parts to function smoothly and correctly.

3.4 SCHEDULE:

A. Kitchen/Common Room 113: Base Cabinets, Wall Cabinets, Full Height Pantry Cabinets as indicated on drawings, sheet A-210 and A-401.

B. Women 116: Vanity Base Cabinet, as indicated on drawings, sheet A-210 and A-401.

C. Men 117: Vanity Base Cabinet, as indicated on drawings, sheet A-210 and A-401.

END OF SECTION

SECTION 133419

METAL BUILDING SYSTEMS

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. Structural-steel framing.
2. Metal roof panels.
3. Metal wall panels.
4. Metal soffit panels.
5. Thermal insulation.
6. Accessories.

B. Related Sections:

1. Section 081113 Hollow Metal Doors and Frames.
2. Section 083613 Sectional Overhead Doors.

1.3 DEFINITIONS

A. Terminology Standard: See MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in referenced standards.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of metal building system component. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

1. Structural-steel-framing system.
2. Metal roof panels.
3. Metal wall panels.
4. Metal liner panels.
5. Insulation and vapor retarder facings.
6. Flashing and trim.
7. Accessories.

B. Shop Drawings: For the following metal building system components. Include plans, elevations, sections, details, and attachments to other work.

1. Anchor-Bolt Plans: Submit anchor-bolt plans and templates before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location.
2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.

3. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.

4. Accessory Drawings: Include details of the following items:

a. Flashing and trim.
b. Gutters.
c. Downspouts.
d. Louvers.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below:

1. Metal Panels: Nominal 12 inches long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
2. Flashing and Trim: Nominal 12 inches long. Include fasteners and other exposed accessories.
3. Vapor-Retarder Facings: Nominal 6-inch square Samples.
4. Accessories: Nominal 12-inch long Samples for each type of accessory.

D. Delegated-Design Submittal: For metal building systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panel finishes to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer.

1. AISC Certification for Category MB: An AISC-Certified Manufacturer that designs and produces metal building systems and components in an AISC-Certified Facility.
2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

C. Source Limitations: Obtain metal building system components, including primary and secondary framing and metal panel assemblies, from single source from single manufacturer.

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

E. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.

F. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, 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 weather tight 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. 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 foam-plastic materials as rapidly as possible in each area of construction.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements:

1. Established Dimensions for Foundations: Comply with established dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.
2. Established Dimensions for Metal Panels: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal panels without field measurements, or allow for field trimming metal panels. Coordinate construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.9 COORDINATION

A. Coordinate sizes and locations of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."

B. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leak-proof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty on Metal 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 Substantial Completion.

B. Special Weather tightness 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 leak or otherwise fail to remain weather tight within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Butler Manufacturing Company building or comparable product by one of the following:
1. Behlen Mfg. Co.
2. Ceco Building Systems; Division of NCI Building Systems, L.P.
3. VP Buildings; a United Dominion company.
4. Approved equal.

2.2 METAL BUILDING SYSTEMS

A. Description: Provide a complete, integrated set of metal building system manufacturer's standard mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.

1. Provide metal building system of size and with bay spacings, roof slopes, and spans indicated.

B. Primary-Frame Type:

1. Rigid Clear Span: Solid-member, structural-framing system without interior columns.

C. End-Wall Framing: Engineer west end walls to be expandable. Provide primary frame, capable of supporting full-bay design loads, and end-wall columns.

D. Roof System: Manufacturer's standard vertical-rib, standing-seam.

E. Exterior Wall System: Manufacturer's standard metal wall panels with field-installed insulation and standard liner panel on the interior face in Apparatus Bay above masonry.

2.3 METAL BUILDING SYSTEM PERFORMANCE

A. Delegated Design: Design metal building system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

2.4 STRUCTURAL-STEEL FRAMING

A. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements.

B. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.

2.5 METAL ROOF PANELS

A. Vertical-Rib, 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.

B. Finishes:

1. Exposed Coil-Coated Finish:
   a. Three-Coat Fluoropolymer: AAMA 621. 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. Color as selected by Architect from manufacturer’s full range of colors.

2.6 METAL WALL PANELS

A. Concealed-Fastener Metal Wall Panels as shown on building elevations: Formed with vertical panel edges and a single wide recess, centered between panel edges; with flush joint between panels; with 1-inch wide flange for attaching interior finish; designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps.

1. Material: Aluminum-zinc alloy-coated steel sheet.

   a. Exterior Finish: Fluoropolymer.
   b. Color: As selected by Architect from manufacturer's full range of colors.

B. Flush-Profile, Metal Liner Panels as shown on drawings in Apparatus Bay. Solid panels formed with vertical panel edges and flat pan between panel edges; with flush joint between panels; designed for interior side of metal wall panel assemblies and installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps.

1. Material: Aluminum-zinc alloy-coated steel sheet.

   a. Exterior Finish: Acrylic enamel.
   b. Color: As selected by Architect from manufacturer's full range of colors.

2.7 METAL SOFFIT PANELS

A. General: Provide factory-formed 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 and factory-applied sealant in side laps. Include accessories required for weather tight installation.

B. Metal Soffit Panels: Match profile and material of metal roof panels.

1. Finish: Match finish and color of metal roof panels.

2.8 THERMAL INSULATION

A. Faced Metal Building Insulation: ASTM C 991, Type II, glass-fiber-blanket insulation; 0.5-lb/cu. ft. density; 2-inch wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.

1. Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than 0.02 perm when tested according to ASTM E 96/E 96M, Desiccant Method.
   a. Composition: White vinyl film facing, fiberglass scrim reinforcement, and metallized-polyester film backing.

2.9 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

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.

B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.

D. Flashing and Trim: Formed from metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match adjacent metal panels.

E. Gutters: Formed from metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."

1. Gutter Supports: Fabricated from same material and finish as gutters.
2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.

F. Downspouts: Formed from 0.022-inch nominal-thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match metal

wall panels. Fabricate in minimum 10-foot long sections, complete with formed elbows and offsets.

1. Mounting Straps: Fabricated from same material and finish as gutters.

G. Louvers: Size and design indicated; self-framing and self-flashing. Fabricate welded frames from minimum 0.052-inch nominal-thickness, metallic-coated steel sheet; finished to match metal wall panels. Form blades from 0.040-inch nominal-thickness, metallic-coated steel sheet; folded or beaded at edges, set at an angle that excludes driving rains, and secured to frames by riveting or welding. Fabricate louvers with equal blade spacing to produce uniform appearance.

1. Blades: Fixed.
2. Blades: Adjustable type, with weather-stripped edges, and manually operated by hand crank or pull chain.
3. Bird Screening: Galvanized steel, 1/2-inch square mesh, with rewirable frames, removable and secured with clips; fabricated of same kind and form of metal and with same finish as louvers.

    a. Mounting: Interior face of louvers.

H. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

I. Materials:

1. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.
    a. Fasteners for Metal Roof Panels: Self-drilling, Type 410 stainless-steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal panels.
    b. Fasteners for Metal Wall Panels: Self-drilling, Type 410 stainless-steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head.
    c. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
    d. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
2. Corrosion-Resistant 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.
3. 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.
4. Metal Panel Sealants:

    a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
    b. Joint Sealant: ASTM C 920; one-part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and

remain weather tight; and as recommended by metal building system manufacturer.

2.10 FABRICATION

A. General: Design components and field connections required for erection to permit easy assembly.

B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.

C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.

D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.

E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.

1. Engage land surveyor to perform surveying.

C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal

in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION OF STRUCTURAL FRAMING

A. Erect metal building system according to manufacturer's written erection instructions and erection drawings.

B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

D. Base Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. 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 plate before packing with grout.
3. Promptly pack grout solidly between bearing surfaces and 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.

E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. 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 will be completed and in service.

F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.

1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for bolt type and joint type specified.

    a. Joint Type: Snug tightened or pretensioned.

G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.

1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
2. Locate and space wall girts to suit openings such as doors and windows.
3. Locate canopy framing as indicated.

4. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

H. Steel Joists: Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Standard Specifications and Load Tables for Steel Joists and Joist Girders," joist manufacturer's written instructions, 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.
4. Bolt joists to supporting steel framework using carbon-steel bolts unless otherwise indicated.
5. Bolt joists to supporting steel framework using high-strength structural bolts unless otherwise indicated. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
6. 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.

I. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.

1. Tighten rod and cable bracing to avoid sag.
2. Locate interior end-bay bracing only where indicated.

J. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

K. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

3.4 METAL PANEL INSTALLATION, GENERAL

A. Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.

1. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.

B. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.

a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.

2. Install metal panels perpendicular to structural supports unless otherwise indicated.
3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment.
6. Lap metal flashing over metal panels to allow moisture to run over and off the material.

C. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weather tight enclosure. Avoid "panel creep" or application not true to line.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

E. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.

1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.5 METAL ROOF PANEL INSTALLATION

A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.

1. Install ridge and hip caps as metal roof panel work proceeds.
2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.

B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.

1. Install clips to supports with self-drilling or self-tapping fasteners.

2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels for fasteners.
6. Provide metal closures at peaks and each side of ridge and hip caps.

C. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

D. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels 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.

3.6 METAL WALL PANEL INSTALLATION

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
2. Shim or otherwise plumb substrates receiving metal wall panels.
3. When two rows of metal panels are required, lap panels 4 inches minimum.
4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
5. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.
6. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
7. Install screw fasteners in predrilled holes.
8. Install flashing and trim as metal wall panel work proceeds.
9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated; or, if not indicated, as necessary for waterproofing.
10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.

C. Installation Tolerances: Shim and align metal wall panels within installed tolerance of 1/4 inch in 20 feet, noncumulative, on level, plumb, and on location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.7 METAL SOFFIT PANEL INSTALLATION

A. Provide metal soffit panels the full width of soffits. Install panels perpendicular to support framing.

B. Flash and seal metal soffit panels with weather closures where panels meet walls and at perimeter of all openings.

3.8 THERMAL INSULATION INSTALLATION

A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.

1. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated. Do not obstruct ventilation spaces except for fire stopping.
2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.
3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths, with both sets of facing tabs sealed, to provide a complete vapor retarder.
4. Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation, with both sets of facing tabs sealed, to provide a complete vapor retarder.

3.9 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weather tight 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.
2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

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 or bayonet-type 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).

C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

1. Provide elbows at base of downspouts to direct water away from building.

E. Louvers: Locate and place louver units level, plumb, and at indicated alignment with adjacent work.

1. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather tight connection.
2. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.
3. Protect galvanized- and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of corrosion-resistant paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
4. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weather tight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

F. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

3.10 FIELD QUALITY CONTROL

A. Special Inspections: The Contractor will engage a qualified special inspector to perform the following special inspections:

1. Inspection of fabricators.
2. Steel construction.

B. Testing Agency: The Contractor will engage a qualified testing agency to perform tests and inspections.

C. Tests and Inspections:

1. High-Strength, Field-Bolted Connections: Connections shall be tested and inspected during installation according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

2. Welded Connections: In addition to visual inspection, field-welded connections shall be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at inspector's option:

    a. Liquid Penetrant Inspection: ASTM E 165.
    b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
    c. Ultrasonic Inspection: ASTM E 164.

D. Product will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.11 ADJUSTING

A. Adjustable Louvers: After completing installation, including work by other trades, lubricate, test, and adjust units to operate easily and be free of warp, twist, or distortion as needed to provide fully functioning units.

1. Adjust louver blades to be weather tight when in closed position.

3.12 CLEANING 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 erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing and accessories.

1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Tool Cleaning."
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

C. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

D. Louvers: Clean exposed surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

1. Restore louvers damaged during installation and construction period so no evidence remains of corrective work.

a. 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

SECTION 31 10 00

SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Removing surface debris, asphalt paving, curbs, underground utilities, miscellaneous items and sidewalks as designated on drawings.
2. Removing designated plant life.
3. Removing topsoil.
4. Rough grading and site contouring.

1.2 SUBMITTALS

A. Product Data: Submit data for herbicide.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with the 2009 Michigan Building Code.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PREPARATION

A. Call Local Utility Line Information service at Miss Dig, 800-482-7171 not less than three working days before performing Work.
1. Request underground utilities to be located and marked within and surrounding construction areas.

3.2 PROTECTION

A. Locate, identify, and protect utilities indicated to remain, from damage.

B. Protect trees, plant growth, and features designated to remain, as final landscaping.

C. Protect bench marks, survey control points, and existing structures from damage or displacement.

3.3 CLEARING

A. Clear areas required for access to site and execution of Work to minimum depth of 12 inches.

B. Remove miscellaneous items, sidewalks, curbs, asphalt paving, and topsoil, as indicated on drawings.

C. Remove existing underground utilities, as indicated on drawings.

3.4 ROUGH GRADING

A. Identify required lines, levels, contours, and datum.

B. Identify known underground, above ground, and aerial utilities. Stake and flag locations.

C. Excavate topsoil and subsoil from areas to be further excavated, re-landscaped or re-graded.

D. Stockpile topsoil and subsoil in area designated on site.

E. Remove excess topsoil and subsoil not being reused, from site.

3.5 CLEAN UP

A. Remove debris, and extracted plant life from site.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes site grading, building excavating and trenching, backfilling, and compacting.

B. Dewatering shall be provided in accordance with the Geotechnical Evaluation Report and specification Section 31 23 19 Dewatering.

1.2 SUBMITTALS

A. Samples: Submit 10 lb sample of each type of structural fill to testing laboratory, in air tight containers.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with the 2009 Michigan Building Code.

B. Comply with recommendations of the “Geotechnical Evaluation Report” by Soils & Materials Engineering, Inc., dated December 24, 2013, in Section 00 31 00.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Topsoil: Reusable excavated friable loam; free of subsoil, roots, grass, weeds, large stone, and foreign matter.

B. Subsoil: Excavated material, graded free of lumps larger than 6 inches, rocks larger than 3 inches, organic material, and debris.

C. Type A - Subsoil: Reused, free of rock larger than 3 inch size, and debris. Existing sand is OSHA Type C soil. Existing sand may be used as a base material in accordance with Type B specification if verified to be in accordance with the Type B – Sand specification, by a qualified testing laboratory.

D. Type B - Sand: Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter. MDOT Class II or ASTM SP or SW (clean sand).

E. Type C - Pea Gravel: Natural stone; washed, free of clay, shale, organic matter.
1. Minimum Size: 1/4 inch.
2. Maximum Size: 5/8 inch.

F. Type D - Select Granular Material: Dense Graded Aggregate: Pit run, Crushed, natural stone, gravel and crushed concrete; free of shale, clay, friable material, sand, debris.
1. Grading: MDOT 21AA where indicated.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Call Local Utility Line Information service at Miss Dig 800-482-7171 not less than three working days before performing Work.
1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum.

C. Notify Architect/Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

D. Maintain and protect existing utilities to remain.

E. Verify foundations are braced to support surcharge forces imposed by backfilling operations.

3.2 PROTECTION OF ADJACENT WORK

A. Underpin adjacent structures which may be damaged by excavation work, including service utilities and pipe chases.

B. Grade excavation top perimeter to prevent surface water run-off into excavation or to adjacent properties.

3.3 TOPSOIL EXCAVATING

A. Do not excavate wet topsoil.

B. Excavate topsoil and stockpile in area designated on site. Remove excess topsoil not being reused from site.

3.4 SUBSOIL EXCAVATING

A. Do not remove wet subsoil.

B. Excavate subsoil from marked areas required for building foundations, construction operations, and other Work. Remove all existing fill or sand with organics or buried topsoil, below footings, paving, and slabs, in accordance with the Geotechnical Evaluation Report; unless otherwise reviewed and approved by the Soil Engineering Consultant.

C. Slope banks to angle of repose or less, until shored.

D. Do not interfere with 45 degree bearing splay of foundations.

E. Fill soft spots with type A or B fill and compact uniformly to 95 percent of maximum density. Compact surfaces with a large smooth drum roller in two mutually perpendicular directions.

F. Proof roll bearing surfaces. Use a fully-loaded tandem-axle truck or other similar pneumatic-tire equipment. Inspect surfaces, remove unsuitable soils, and replace with engineered fill.

G. Provide dewatering in accordance with the Geotechnical Evaluation Report and Section 31 23 19 – Dewatering.

H. Correct unauthorized excavation at no cost to Owner.

I. Fill over-excavated areas under structure bearing surfaces in accordance with direction by Architect/Engineer.

J. Stockpile subsoil in area designated on site. Remove excess subsoil not being reused from site.

K. Comply with recommendations of the “Geotechnical Evaluation Report”, by Soils & Materials Engineers, Inc., dated December 24, 2013, in Section 00 31 00.

3.5 TRENCHING

A. Excavate for underground utilities as indicated on drawings.

B. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.

C. Provide dewatering in accordance with the Geotechnical Evaluation Report and Section 31 23 19 – Dewatering.

D. Compact trenches and engineered fill with smooth drum vibratory roller or vibratory plate compactors.

E. Hand trim excavation and leave free of loose matter.

F. Support pipe during placement and compaction of bedding fill.

G. Backfill trenches to required contours and elevations.

H. Place and compact fill materials as for Backfilling.

I. Comply with recommendations of the “Geotechnical Evaluation Report”, by Soils & Materials Engineers, Inc., dated December 24, 2013, in Section 00 31 00.

3.6 BACKFILLING

A. Backfill areas to contours and elevations. Use unfrozen and unsaturated materials.

B. Backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy sub-grade surfaces.

C. Place fill material in continuous layers and compact in accordance with schedule at end of this section.

D. Compact engineered fill with smooth drum vibratory roller or vibratory plate compactors.

E. Place material in continuous layers as follows:
1. Soil Materials: Maximum 8 inches compacted depth.
2. Fill Materials: Maximum 8 inches compacted depth.

F. Employ placement method so not to disturb or damage foundations, or utilities in trenches.

G. Maintain optimum moisture content of backfill materials to attain required compaction density.

H. Backfill against supported foundation walls. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.

I. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.

J. Comply with recommendations of the “Geotechnical Evaluation Report”, by Soils & Materials Engineers, Inc., dated December 24, 2013, in Section 00 31 00.

3.7 PLACING TOPSOIL

A. Place topsoil in areas where seeding is scheduled.

B. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of sub-grade.

C. Remove large stone, roots, grass, weeds, debris, and foreign material while spreading.

D. Lightly compact placed topsoil.

E. Leave stockpile area and site clean and raked, ready to receive landscaping.

3.8 TESTS

A. Perform laboratory material tests in accordance with ASTM D1557.

B. Perform in place compaction tests in accordance with the following:

1. Density Tests: ASTM D1556 or ASTM D2922.

C. Frequency of Tests: 100 cubic yards.

D. Perform special inspections and testing of soils as required by the 2009 Michigan Building Code Chapter 17. Special inspector shall be an independent inspection and testing laboratory as indicated in Specification Section 01 00 00 – General Requirements.

3.9 TOLERANCES

A. Top Surface of Exposed Sub-grade: Plus or minus one inch.

B. Top of Topsoil: Plus or minus 1/2 inch.

3.10 SCHEDULE

A. Interior Slab-On-Grade: Type D fill, 6 inches minimum thick, compact uniformly to 95 percent of maximum density.

B. Sub-grade soil under footings: Existing undisturbed B soil or engineered fill Type A, compact uniformly to 95 percent of maximum density using vibratory equipment (vibratory hoe-pac).

C. Exterior Side of Foundation Walls: Type A or B fill, to sub-grade elevation, compact uniformly to 95 percent.

D. Fill Under Landscaped Areas: Type A or B fill, to 12 minimum inches below finish grade, compact uniformly to 95 percent of maximum density.

E. Fill in Utility Trenches: Type C fill to top of trench, compact uniformly to 95 percent of maximum density.

F. Fill Under Concrete Sidewalks: Type D fill, to 6 inches minimum below finish paving elevation, compact uniformly to 95 percent of maximum density.

G. Comply with recommendations of the “Geotechnical Evaluation Report”, by Soils & Materials Engineers, Inc., dated December 24, 2013, in Section 00 31 00.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Dewatering system.
2. Surface water control system.
3. Monitoring wells.
4. System operation and maintenance.
5. Water disposal.

B. Dewatering is anticipated at areas 5 feet or less below existing grade. This may include footings, trenches, and areas where unsuitable soils are removed and replaced with engineered fill. Comply with “Geotechnical Evaluation Report” included in Section 00 31 00, under Sub-surface Investigation Report. If excavations extend below the water table, comply with the report and this specification.

1.2 DEFINITIONS

A. Dewatering includes the following:
1. Lowering of ground water table and intercepting horizontal water seepage to prevent ground water from entering excavations for footings.
2. Reducing piezometric pressure within strata to prevent failure or heaving of excavations.
3. Disposing of removed water.

B. Surface Water Control: Removal of surface water within open excavations.

1.3 SYSTEM DESCRIPTION

A. Provide dewatering and surface water control systems to permit Work to be completed on dry and stable subgrade.

B. Provide monitoring wells and monitoring equipment to obtain meaningful observations of conditions affecting excavation.

C. Furnish standby equipment stored at Project site and ready for immediate use upon failure of dewatering equipment.

D. Design dewatering systems to:
1. Lower water table within areas of excavation, to a bottom of excavation to permit Work to be completed on dry and stable sub-grade.
2. Relieve hydrostatic pressures in confined water bearing strata below excavation to eliminate risk of uplift or other instability of excavation.

3. Prevent damage to adjacent properties, buildings, structures, utilities, and facilities from construction operations.
4. Prevent loss of fines, quick condition, or softening of foundation sub-grade.
5. Maintain stability of sides and bottoms of excavations.

E. Design surface water control systems to:
1. Collect and remove surface water and seepage entering excavation.

1.4 SUBMITTALS

A. Design Data:
1. Refer to “Preliminary Geotechnical Investigation” by Testing Engineers & Consultants, Inc., referenced in Section 00 31 00.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations and depths of capped wells and piping abandoned in place.

1.6 QUALITY ASSURANCE

A. Comply with authorities having jurisdiction for the following:
1. Drilling and abandoning of wells used for dewatering systems.
2. Water discharge and disposal from pumping operations.

B. Obtain permit as required for storm water discharge from construction sites.

C. Assume sole responsibility for dewatering and surface water control systems and for loss or damage resulting from partial or complete failure of protective measures and settlement or resultant damage caused by ground water control operations.

PART 2 PRODUCTS

2.1 DEWATERING EQUIPMENT

A. Select dewatering equipment to meet specified performance requirements.

2.2 MONITORING EQUIPMENT

A. Piezometers: Standpipe type for sand filter installation to monitor water elevation.

B. Flow Measurement: Furnish devices as follows:
1. Pitometer installed on discharge of pipe of from each well.
2. Pitometer installed to measure flow from entire dewatering system.

2.3 ACCESSORIES

A. Valves and Fittings: Furnish valves and fittings to isolate each well from header pipe and to prevent loss of pump prime.

B. Filter Sand: ASTM C33; natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter; graded to suit well screen.

C. Grout: Mixture of portland cement and bentonite clay or sand suitable for sealing abandoned wells and piping.

PART 3 EXECUTION

3.1 EXAMINATION

A. Contractor may, at his option, conduct additional borings and investigations to supplement subsurface investigations identified in Section 00 31 00 as required to complete dewatering system design.

B. Call Local Utility Line Information service Miss Dig) at 1-800-482-7171 not less than three working days before performing Work.
1. Request underground utilities to be located and marked within and surrounding construction areas.

3.2 PREPARATION

A. Protect existing adjacent buildings, structures, and improvements from damage caused by dewatering operations.

3.3 DEWATERING SYSTEM

A. Install dewatering system in accordance with shop drawings.

B. Drill wells in sizes and to depth indicated. Provide temporary surface casing when required to stabilize soil while advancing well.

C. While drilling and installing well keep bore hole filled with natural or organic drilling fluid. Bentonite clay drilling fluid is not permitted.

D. Attach well screen to riser pipe. Attach centralizers to riser pipe at maximum 20 feet spacing to keep screen and riser centered in bore hole. Insert well screen and riser pipe into well to elevation indicated.

E. Develop wells by over pumping water to remove clay, silt, and sand from well screen and immediate vicinity of bore hole.

F. Test well for proper water flow through well screen and pumping rate for dewatering system operation. Repeat development until well meets performance requirements.

G. Cover and seal top of well until pump is installed.

H. Install pumps in accordance with manufacturer’s instructions.

I. Connect pumps to discharge header. Install valves to permit pump isolation.

3.4 SURFACE WATER CONTROL SYSTEM

A. Provide ditches, berms, and other devices to divert and drain surface water from excavation area.

B. Divert surface water and seepage water within excavation areas into sumps and pump water into drainage channels in accordance with requirements of agencies having jurisdiction.

C. Control and remove unanticipated water seepage into excavation.

3.5 SYSTEM OPERATION AND MAINTENANCE

A. Operate dewatering system continuously until backfill is minimum 2 feet above normal ground water table elevation.

B. Provide 24-hour supervision of dewatering system by personnel skilled in operation, maintenance, and replacement of system components.

C. When dewatering system cannot control water within excavation, notify Architect/Engineer and stop excavation work.

D. Modify dewatering and surface water control systems when operation causes or threatens to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells.

3.6 WATER DISPOSAL

A. Discharge water into existing drainage channels.

3.7 SYSTEM REMOVAL

A. Remove dewatering and surface water control systems after dewatering operations are discontinued.

B. Remove piezometers and monitoring wells.

C. Fill abandoned wells with sand.

D. Fill abandoned piping with grout.

3.8 FIELD QUALITY CONTROL

A. After dewatering system is installed, perform pumping test to determine when selected pumping rate lowers water level in well below pump intake. Adjust pump speed, discharge volume, or both to ensure proper operation of each pump.

B. Monitor and record the following, daily, until steady state conditions occur. Then monitor and record conditions each week.
   1. Average discharge flow rate for each deep well, eductor header, and well point.

C. Monitor and record the following, daily, until dewatering system is discontinued.
   1. Ground water elevation.

D. Monitor ground water discharge for sand content. Sample and test water from each well weekly for sand content. Maximum permitted sand content 5 parts per million.

E. Monitor ground water discharge for contamination while performing pumping in vicinity of potentially contaminated sites. Sample and test water weekly for contaminates.

F. Survey existing adjacent buildings, structures, and improvements weekly to detect movement in comparison to original elevations during dewatering operations.
   1. Notify Architect/Engineer immediately of measured movement.

G. Submit initial installation reports including the following:
   1. Installation and development reports for well points and pumps.
   2. Installation and baseline reports for monitoring wells and piezometers.
   3. Test reports of monitoring well water analysis.
   4. Initial dewatering flow rates.

H. Submit weekly monitoring reports including the following:
   1. Dewatering flow rates.
   2. Piezometer readings.
   3. Test reports of discharge water analysis.
   4. Maintenance records for dewatering and surface water control systems.

END OF SECTION

SECTION 32 13 13

CONCRETE PAVING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Concrete sidewalks; curbs; ramps; paving; driveway approach aprons.

1.2 SUBMITTALS

A. Product Data: Submit product information.

B. Design Data: Submit mix design.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301. Section 03 30 00.

B. Prepare base in accordance with section 31 20 00 Earth Moving.

PART 2 PRODUCTS

2.1 REINFORCED CEMENT CONCRETE PAVEMENT

A. Concrete Materials: As specified in Section 03 30 00.

B. Forms: Wood, Steel material, profiled to suit conditions.

C. Joint Filler: Asphalt impregnated wood fiberboard type.

D. Dowels: ASTM A615/A615M Plain steel, unfinished.

E. Cement: ASTM C150 Normal Type Portland type, gray color.

F. Fine and Coarse Aggregates: ASTM C33.

G. Water: Clean and not detrimental to concrete.

H. Admixtures: ASTM C260.

I. Curing Compound: ASTM 309 Liquid Membrane Forming, type 2: Day-Chem White Pigmented Cure-W (J-9) manufactured by Dayton Superior.

2.2 CONCRETE MIX

A. Mix and deliver concrete in accordance with ASTM C94 Option A.

B. Furnish concrete for sidewalks of the following characteristics:
1. Compressive Strength at 28 days: 3,000 psi.
2. Minimum Water/Cement Ratio: 0.45.
3. Slump: 4 inches maximum.
4. Air Entrainment: 6 percent +/-1.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Verify gradients and elevations of base.

B. Verify compacted granular base is ready to support paving and imposed loads, in accordance with Section 31 20 00.

C. Moisten substrate to minimize absorption of water from fresh concrete.

3.2 FORMING

A. Place and secure forms to correct location, dimension, and profile.

B. Place joint filler in joints, vertical in position, in straight lines. Secure to formwork.

C. Place expansion and construction joints at 20 foot maximum intervals. Align joints.

D. Place joint filler between paving components and other appurtenances.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 301 and Section 03 30 00.

B. Do not disturb reinforcement or formwork components during concrete placement.

C. Place concrete continuously between predetermined joints.

3.4 FINISHING

A. Sidewalk Surfaces: Light broom, radius and trowel joint edges. Wood float.

B. Apply curing compound on exposed concrete surfaces immediately after finishing.

C. Control joints shall be placed at 6 foot intervals maximum in sidewalks and 10 foot maximum in paving.

END OF SECTION

SECTION 33 11 16

SITE WATER LINES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe and fittings for site fire and domestic water line.

B. Valves, pipe, and accessories.

1.02 RELATED SECTIONS

A. Section 31 20 00 – Earth Moving: Granular fill, excavating, backfilling, and trenching.

B. Section 33 13 00 – Disinfection of Water Distribution System.

1.03 REFERENCES

A. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop.

B. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

C. ANSI/AWWA C111- Rubber-Gasket Joints for Ductile Iron and Grey-Iron Pressure Pipe and Fittings.

D. ANSI/AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.

E. ANSI/AWWA C500 - Gate Valves, 3 through 48 in NPS, for Water and Sewage Systems.

F. ANSI/AWWA C504 - Rubber Seated Butterfly Valves.

G. ANSI/AWWA C508 - Swing-Check Valves for Waterworks Service, 2 in through 24 in NPS.

H. ANSI/AWWA C509 - Resilient Seated Gate Valves 3 in through 12 in NPS, for Water and Sewage Systems.

I. ANSI/AWWA C600 - Installation of Ductile-Iron Water Mains and Appurtenances.

J. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

K. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

1.07 SUBMITTALS

A. Submit under provisions of Section 01 00 00

B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

1.08 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01 00 00.

B. Accurately record actual locations of piping mains, valves, connections, and invert elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.09 QUALITY ASSURANCE

A. Perform Work in accordance with municipality.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01 00 00.

B. Deliver and store valves in shipping containers with labelling in place.

PART 2 PRODUCTS

2.01 PIPE

A. Ductile Iron Pipe: ANSI/AWWA C151: Class 52 minimum.
1. Fittings: Ductile iron, standard thickness.
2. Joints: ANSI/AWWA C111, rubber gasket with rods.
3. Restrained Joints: ANSI A21.11.

2.02 GATE VALVES - 3 Inches (75 mm) and Over

A. ANSI/AWWA C500, Iron body, bronze trim, non-rising stem with square nut, single wedge, mechanical joint ends, control rod, post indicator, extension box and valve key.

B. ANSI/AWWA C509, Iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, mechanical joint ends, control rod, post indicator, extension box and valve key.

2.03 SWING CHECK VALVES - From 2 inches to 24 inches (50 mm to 600 mm)

A. ANSI/AWWA C508, iron body, bronze trim, 45 degree swing disc, renewable disc and seat, flanged ends.

2.04 BUTTERFLY VALVES - From 2 inches to 24 inches (50 mm to 600 mm)

A. ANSI/AWWA C504, iron body, bronze disc, resilient replaceable seat, water or lug ends, infinite position lever handle.

2.09 BEDDING MATERIALS

A. Bedding: Fill Type B as specified in Section 31 20 00.

2.10 ACCESSORIES

A. Serrated Silicon Bronze Wedges: Two per joint for 3” through 12” pipe, four for larger pipe. Each wedge is to be driven into the opening between the plain end and the bell until snug. When four wedges are used, they are inserted side by side, in pairs. Wedges can be used with push-on joints only.

B. Lead Tipped Gaskets for Mechanical Joint Connections: These gaskets shall be used when mechanical joint connections are utilized. (Clow F916 or approval equal). These gaskets are not required when retainer glands are used.

C. Conductive Push-On Gaskets: These gaskets may be used in lieu of the wedges. Metal contact strips which are molded or inserted into the gasket must insure positive electrical contact between pipes. A thorough cleaning of the gasket seating surface should be performed prior to assembly.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions under provisions of Section 01 00 00.

B. Verify that the existing water main size, location and invert are as indicated.

3.02 PREPARATION

A. Ream pipe and tube ends and remove burrs.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare pipe connections to equipment with flanges or unions.

3.03 BEDDING

A. Excavate pipe trench in accordance with Section 31 20 00 for work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth, compact to 95 percent. Backfill shall be Type B: MDOT CL II.

C. Backfill around sides and to top of pipe with fill, tamped in place and compacted to 95 percent. Backfill shall be Type B: MDOT CL II.

D. Maintain optimum moisture content of bedding material to attain required compaction density. Backfill shall be MDOT CL II.

3.04 INSTALLATION - PIPE

A. Maintain separation of water main from sewer piping in accordance with 2009 Michigan Plumbing Code.

B. Install pipe to indicated elevation to within tolerance of 5/8 inches.

C. Install ductile iron piping and fittings to ANSI/AWWA C600.

D. Route pipe in straight line.

E. Install pipe to allow for expansion and contraction without stressing pipe or joints.

G. Mega Lug or equal restraint joints shall be used at each elbow, tee or change of direction of pipe. Joint shall be restrained per Pipe Restraint Schedule at the end of this Section.

H. Establish elevations of buried piping to ensure not less than 5 ft of cover.

I. Install trace wire continuous over top of pipe.

J. Backfill trench in accordance with Section 31 20 00.

3.05 INSTALLATION - VALVES

A. Set valves on solid bearing.

B. Center and plumb valve box over valve. Set box cover flush with finished grade.

3.08 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 00 00.

B. Compaction testing will be performed in accordance with ANSI/ASTM D1557.

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

D. Frequency of Tests: 100 cubic yards of fill.

E. Hydrostatic Tests:

1. Watermains must be tested for leakage before the work is accepted. The lines shall be tested section by section by use of valves in the line or temporary plugs, but if conditions require, the Engineer may order any series of sections to be tested at one time.
2. The costs for testing shall in included in the cost of the pipe and appurtenances. No separate payment will be made for testing.
3. The Contractor shall furnish the pump, gauge and other necessary materials and equipment and labor to properly make the test, which shall be made in the Engineer's or Inspector's presence, and the methods used shall be herein specified.
4. The test shall be made at the high point in the line, which shall be determined by the Engineer.
5. The section or sections of the line to be tested shall be filled with water and the entrained air within the pipe expelled. The line shall be pumped up to a pressure of one hundred and fifty (150) pounds per square inch, and if the gauge holds, the test period shall be considered as started. The lines shall be continuously kept pumped to the specified one hundred and fifty (150) pounds per square inch pressure, for a six hour period, by pumping additional water into the line, and the amount of water so added shall be measured and considered to represent the leakage from the line under test during the testing period.
6. The leakage under the conditions of the test shall not exceed the values as shown in the following table

MAXIMUM ALLOWABLE LEAKAGE
IN GALLONS PER HOUR

Diameter of Pipe in Inches	Per 100 Joints
4	1.3
6	2.0
8	2.7
10	3.3
12	4.0
14	4.6
16	5.3
20	6.6
24	7.9
30	9.9
36	11.9

7. If the leakage exceeds the specified amount, the line shall be inspected for leaks.

F. Electrical Conductivity:

1. All cast iron, ductile iron or steel pipe and fittings furnished and installed under this contract shall be provided with electrical conductivity connections. Electrical conductivity connections shall be brass wedges or lead tipped gaskets as specified.

2. After installation of the mains, backfilling and the hydrostatic pressure tests are completed, the system (pipe line and hydrants) shall be tested for electrical continuity and current capacity.
3. It is imperative that all lines and appurtenances be filled with water prior to conductivity testing. The line will be tested in sections between hydrants. The hydrants and hydrant valves will be opened to bleed off any air in the lead. The hydrant will then be closed and the hydrant valve left open. Adjacent hydrants will serve as test section termini.
4. The Contractor will provide electric current of 100 to 150 amperes for the tests.
5. Direct current of 150 amperes, shall be passed through the pipe line for a period of five minutes. Current flow through the pipe shall be measured continously on a suitable ammeter and shall remain steady without interruption or excessive fluctuation throughout the five minute test. Insufficient current or intermitten current or arcing, indicated by large fluctuations of the ammeter needle, shall be evidence of defective electrical contact in the pipe line. The cause shall be isolated and corrected. Thereafter, the section in which the defective test occurred shall be retested as a unit and shall meet the test requirements to the satisfaction of the Engineer.
6. All electrical connections shall be capable of carrying 60 amps.
7. Any pipe cut and repaired with couplings shall have electrical connections.

3.09 SCHEDULES

A. As indicated on drawings.
B. Pipe Restraint Schedule, following this section.
C. Disinfection of Water Distribution System is specified in Section 33 13 00.

END OF SECTION

PIPE RESTRAINT SCHEDULE

LENGTH OF RESTRAINT REQUIRED *(FEET)								DESIGN STRENGTH OF RESTRAINT REQUIRED (KIPS)**	
DEFLECTION ANGLE / PIPE SIZE	22 ½°	33 ¾°	45°	56 ¼°	67 ½°	78 ¾°	90 ° or TEE	45°	90 ° or TEE
6"	4'	8'	14'	20'	30'	37'	47'	3.0	6.0
8"	5'	10'	19'	28'	40'	52'	67'	4.0	12.0
10"	6'	14'	23'	36'	49'	63'	78'	5.0	18.0
12"	8'	17'	28'	42'	58'	75'	93'	8.0	26.0
14"	9'	18'	32'	47'	66'	87'	107'	10.0	36.0
16"	10'	20'	34'	51'	72'	94'	116'	14.0	46.0
18"	10'	22'	38'	58'	81'	105'	131'	18.0	59.0
20"	10'	22'	39'	59'	81'	106'	131'	22.0	73.0
24"	12'	26'	44'	68'	95'	123'	153'	31.0	103.0
30"	14'	31'	53'	79'	111'	143'	180'	47.0	162.0
36"	16'	36'	62'	93'	130'	169'	210'	69.0	234.0
42"	17'	39'	67'	101'	141'	184'	228'	93.0	319.0
48"	19'	43'	75'	113'	157'	206'	255'	123.0	417.0

* In each direction from point of deflection except for tee, at which only the branch where flow changes direction.
** If tie rods are used, add 1/8" to bar diameter as corrosion allowance.
Basis of design for above table:

1. Cover over pipe = 5.0 feet minimum.

2. Earth friction coefficient = $\frac{0.4}{1.5 \text{ safety factor}} = 0.26$

NOTE: The above length of restraint required is the minimum. For less cover or poor soil conditions, the restraint length shall increase as shown on the drawings or as directed by the Engineer.

SECTION 33 13 00

DISINFECTION OF WATER DISTRIBUTION SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Disinfection of potable water distribution and transmission system.

B. Testing and reporting results.

1.02 RELATED SECTIONS

A. Section 33 11 16 - Site Water Lines.

1.03 REFERENCES

A. ANSI/AWWA B300 - Standard for Hypochlorites.

B. ANSI/AWWA B301 - Standard for Liquid Chlorine.

C. ANSI/AWWA B302 - Standard for Ammonium Sulfate.

D. ANSI/AWWA B303 - Standard for Sodium Chlorite.

E. ANSI/AWWA C651 - Standards for Disinfecting Water Mains.

1.04 SUBMITTALS

A. Test Reports: Indicate results comparative to specified requirements.

B. Certificate: Certify that cleanliness of water distribution system meets or exceeds specified requirements.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01 00 00.

B. Disinfection report; record:
1. Type and form of disinfectant used.
2. Date and time of disinfectant injection start and time of completion.
3. Test locations.
4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
5. Date and time of flushing start and completion.
6. Disinfectant residual after flushing in ppm for each outlet tested.

C. Bacteriological report; record:

1. Date issued, project name, and testing laboratory name, address, and telephone number.
2. Time and date of water sample collection.
3. Name of person collecting samples.
4. Test locations.
5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
6. Coliform bacteria test results for each outlet tested.
7. Certification that water conforms, or fails to conform, to bacterial standards of Muskegon County Health Department.
8. Bacteriologist's signature and authority.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with ANSI/AWWA C651.

1.07 QUALIFICATIONS

A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three years documented experience.

B. Testing Firm: Company specializing in testing potable water systems, certified by the State of Michigan.

1.08 REGULATORY REQUIREMENTS

A. Conform to applicable code or regulation for performing the work of this Section.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of water system.

PART 2 PRODUCTS

2.01 DISINFECTION CHEMICALS

A. Chemicals: ANSI/AWWA B300, Hypochlorite, ANSI/AWWA B301, Liquid Chlorine, ANSI/AWWA B302, Ammonium Sulfate, and ANSI/AWWA B303, Sodium Chlorite.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping system has been cleaned, inspected, and pressure tested.

B. Perform scheduling and disinfection activity with start-up, testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

3.02 EXECUTION

A. Provide and attach required equipment to perform the work of this Section.

B. Introduce treatment into piping system.

C. Maintain disinfectant in system for 24 hours.

D. Flush, circulate and clean until required cleanliness is achieved; use municipal domestic water.

E. Replace permanent system devices removed for disinfection.

F. Pressure test system. Repair leaks and re-test.

3.03 QUALITY CONTROL

A. Provide analysis and testing of treated water under provisions of Section 00 10 00.

B. Test samples in accordance with ANSI/AWWA C651.

END OF SECTION

SECTION 33 31 00

SANITARY UTILITY SEWERAGE PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes site sanitary sewerage drainage piping, fittings and accessories, and bedding; and connection of drainage system to manholes.

1.2 SUBMITTALS

A. Product Data: Submit data indicating pipe, pipe accessories, and structures.

B. Manufacturer's Installation Instructions: Submit special procedures required to install Products specified.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Accurately record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

C. Perform Work in accordance with the 2009 Michigan Plumbing Code and MDOT Standards.

PART 2 PRODUCTS

2.1 SANITARY DRAINAGE

A. Sewer Pipe Materials:

1. Plastic Pipe: ASTM D2241, SDR 32.5, Class 125, Poly (Vinyl Chloride) (PVC) material; inside nominal diameter of 6 inches as indicated on drawings.
   a. Fittings: PVC, ASTM D2665 or ASTM D3034.
   b. Joints: ASTM F 477, Rubber Rings.

2.2 ACCESSORIES

A. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.3 CLEANOUTS

A. Cleanout Lid and Frame: Cast iron construction, hinged lid:
1. Lid Design: Checkerboard grill.
2. Nominal Lid and Frame Size: 4 inch diameter.

2.4 BEDDING AND COVER MATERIALS

A. Bedding: Fill as specified in Section 31 20 00.

B. Cover: Fill as specified in Section 31 20 00.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.

B. Remove large stones or other hard matter capable of damaging piping or impeding consistent backfilling or compaction.

3.3 BEDDING

A. Excavate pipe trench in accordance with Section 31 20 00 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 8 inches compacted depth.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE

A. Install PVC pipe, fittings, and accessories in accordance with ASTM D2321. Seal joints watertight.

B. Place pipe on minimum 6 inch deep bed of Type C filter aggregate.

C. Lay pipe to slope gradients noted on drawings with maximum variation from indicated slope of 1/8 inch in 10 feet.

D. Install Type C aggregate at sides and over top of pipe. Install top cover to minimum compacted thickness of 12 inches, compact to 95 percent. Use Type B material for backfill over bedding and cover.

E. Do not displace or damage pipe when compacting.

F. Connect to building sanitary sewer outlet, and manholes, through installed sleeves.

3.5 INSTALLATION - CLEANOUTS

A. Form bottom of excavation clean and smooth to correct elevation.

B. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings.

C. Mount lid and frame level in grout, secured to top section to elevation indicated.

3.6 FIELD QUALITY CONTROL

A. Request inspection prior to and immediately after placing aggregate cover over pipe.

B. Compaction testing will be performed in accordance with ASTM D1556.

C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

D. Frequency of Tests: 100 cubic yards.

E. Infiltration Test: Test in accordance with ASTM C969.

F. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.
   1. Take care not to damage or displace installed pipe and joints during construction of pipe supports, backfilling, testing, and other operations.
   2. Correct damaged or displaced pipe. Repeat tests for corrected sections of pipe.

3.7 SCHEDULE

A. Sanitary Sewer Pipe: PVC sanitary pipe of sizes and at locations indicated on drawings.

B. Cleanouts as indicated on drawings.

END OF SECTION

SECTION 33 41 00

STORM UTILITY DRAINAGE PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes site storm sewerage drainage piping, fittings and accessories, and bedding; connection of drainage system to municipal sewers and catch basins; connection of downspouts to site storm sewer piping.

1.2 SUBMITTALS

A. Product Data: Submit data indicating pipe, and pipe accessories.

B. Manufacturer's Installation Instructions: Submit special procedures required to install Products specified.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Accurately record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the 2009 Michigan Plumbing Code.

PART 2 PRODUCTS

2.1 STORM DRAINAGE

A. Sewer Pipe Materials:
   1. Reinforced Concrete Pipe: ASTM C76, Class III with Wall Type B; mesh or bar reinforcement; inside nominal diameter of 12 inches, bell and spigot end joints.
   2. Reinforced Concrete Pipe Joint Device: ASTM C443, rubber compression gasket joint.
   3. Plastic Pipe: ASTM D1785, Schedule 40 polyvinyl chloride (PVC) material; inside nominal diameter of 4 inches, bell and spigot solvent sealed joint end.

2.2 ACCESSORIES

A. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

B. Concrete: Specified in Section 03 30 00.

C. Pipe to Pipe Tap connector: Trelleborg Pipe Seals Milford, Inc.; Kor-N-Tee Pipe-to-Pipe Connector; No. S006-5

2.3 CATCH BASINS

A. Lid and Frame: Cast iron construction, as specified on drawings:

B. Shaft Construction and Cone Top Section: Reinforced precast Concrete pipe sections, lipped male/female joints, as detailed and specified on drawings.

C. Base Pad: Cast-In-Place Concrete of type specified in Section 03 30 00.

2.4 CLEANOUTS

A. Cleanout Tee with Brass Plug: Cast iron construction, for downspout connection and clean out.
1. Nominal Size: 6 inch as indicated on plumbing drawings.

2.5 BEDDING AND COVER MATERIALS

A. Bedding: Type C fill as specified in Section 31 20 00.

B. Cover: Type B fill as specified in Section 31 20 00.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify trench cut and excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with Type B engineered fill per Section 31 20 00.

B. Remove large stones or other hard matter capable of damaging piping or impeding consistent backfilling or compaction.

3.3 BEDDING

A. Excavate pipe trench in accordance with Section 31 20 00 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Place bedding material at trench bottom, level materials in continuous layer not exceeding **8** inches compacted depth.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with ASTM C12 and ASTM D2321. Seal joints watertight.

B. Place pipe on minimum 4 inch deep bed of Type C filter aggregate.

C. Lay pipe to slope gradients noted on drawings with maximum variation from indicated slope of 1/8 inch in 10 feet.

D. Install aggregate at sides and over top of pipe. Install top cover to minimum compacted thickness of 12 inches, compact to 95 percent.

E. Do not displace or damage pipe when compacting.

F. Connect to building downspouts, municipal storm sewer system, manholes, and catch basins.

3.5 INSTALLATION - CATCH BASINS AND CLEANOUTS

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place Cast-In-Place Concrete base pad, with provision for storm sewer pipe end sections.

C. Level top surface of base pad; sleeve concrete shaft sections to receive storm sewer pipe sections.

D. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings.

E. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.6 FIELD QUALITY CONTROL

A. Request inspection prior to and immediately after placing aggregate cover over pipe.

B. Compaction testing will be performed in accordance with ASTM D1557.

C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

D. Frequency of Tests: 100 cubic yards.

E. Infiltration Test: Test in accordance with ASTM C969.

F. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

1. Take care not to damage or displace installed pipe and joints during construction of pipe supports, backfilling, testing, and other operations.
2. Correct damaged or displaced pipe. Repeat tests for corrected sections of pipe.

3.7 SCHEDULE: (As indicated on drawings).

END OF SECTION