SECTION 01524

CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Administrative and procedural requirements for Construction Waste Management.

B. Related Section 01352: LEED Requirements

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of waste and subsequent sale, recycling, reuse, or deposit in a Subtitle D landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS

A. General LEED Credit MR 2.1, 2.2: Develop waste management plan that results in end-of-Project rates for salvage/recycling of minimum 75 percent by weight of total waste generated by the Work. Owner's goal is to salvage and recycle as much nonhazardous waste as possible including the following materials:

1. Construction Waste:
    a. Site-clearing waste. Site clearing waste does not contribute to achievement of LEED credit and should not be counted as part of LEED documentation.
    b. Masonry and CMU.
    c. Lumber.
    d. Wood sheet materials.
    e. Wood trim.
    f. Metals.
    g. Roofing.
    h. Insulation.
    i. Carpet and pad.
    j. Gypsum board.

k. Piping.
l. Electrical conduit.
m. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
   1) Paper.
   2) Cardboard.
   3) Boxes.
   4) Plastic sheet and film.
   5) Polystyrene packaging.
   6) Wood crates.
   7) Plastic pails.
n. Other construction waste materials

1.4 SUBMITTALS

A. Waste Management Plan: Submit five [5] copies of plan within 7 days of the Notice to Proceed.

B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include separate reports for demolition and construction waste. Include the following information:
   1. Material category.
   2. Generation point of waste.
   3. Total quantity of waste in tons (tonnes).
   4. Quantity of waste salvaged, both estimated and actual in tons (tonnes).
   5. Quantity of waste recycled, both estimated and actual in tons (tonnes).
   6. Total quantity of waste recovered (salvaged plus recycled) in tons (tonnes).
   7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

C. Waste Reduction Calculations: Before request for Substantial Completion, submit fivc (5) copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work. Waste reduction calculations shall include waste documentation from previous on site contractors.

D. Records of Donations: Submit indicating receipt and acceptance of salvageable waste donated to individuals and organizations if and when donations occur. Indicate whether organization is tax exempt.

E. Records of Sales: Submit indicating receipt and acceptance of salvageable waste sold to individuals and organizations if and when sales occur. Indicate whether organization is tax exempt.

F. Recycling and Processing Facility Records: Submit record indicating receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices. Submit concurrently with waste reduction progress reports.

G. Subtitle D Landfill and Incinerator Disposal Records: Submit record indicating receipt and acceptance of waste by the open and active permitted Subtitle D landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices. Submit concurrently with waste reduction progress reports.

H. LEED Submittal: Submit LEED letter template for Credit MR 2.1 and 2.2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.

I. Qualification Data: For Waste Management Coordinator.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.6 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Include separate sections in plan for building demolition (if any) and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in Subtitle D landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each Subtitle D landfill and incinerator facility.

6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal at a Subtitle D landfill as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.
6. Savings in hauling and tipping fees by donating materials.
7. Savings in hauling and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

3.2 RECYCLING, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers in addition to construction waste.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical. Waste may be co-mingled at the site and separated at a recycling facility.
   1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
      a. Inspect containers and bins for contamination and remove contaminated materials if found.
   2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
   4. Store components off the ground and protect from the weather.
   5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

A. Packaging:
   1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
   2. Polystyrene Packaging: Separate and bag materials.
   3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
   4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees on-site.
   1. Comply with requirements in Division 2 Section "Landscaping" for use of chipped organic waste as organic mulch.

C. Wood Materials:
   1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
   2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

D. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
   1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in accordance to Section 02316.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials that cannot be recycled and used on site to an opean and active permitted Subtitle D Landfill site in accordance with Section 02316.

END OF SECTION

SECTION 02116

UNDERGROUND STORAGE TANK REMOVAL

PART 1 - GENERAL

1.1 SUMMARY

A. Work Summary: The work under this section consists of the removal, decommissioning, and destruction of underground storage tanks (USTs) discovered on CPS properties including but not limited to school property grounds, landscaped areas, playgrounds, ball fields, parkways, stadiums, and parking lot areas. The Contractor shall perform the work under this section in accordance with all Federal, State, County, and Local Rules and Regulations including but not limited to Illinois EPA, United States Environmental Protection Agency (USEPA), Illinois Office of the State Fire Marshal (OSFM), and Occupational Safety and Health Agency (OSHA) regulations. Appendix A, Suspect Underground Storage Tank Information, provides a list of USTs suspected of being present at the site, if any. If an underground storage tank is discovered during demolition/construction activities, the Contractor shall perform the following.

1. Submit the UST removal application to the City of Chicago Department of Environment within 48-hours of discovering the UST. The Board Authorized Representative will provide the Contractor with all required information to secure the UST removal permit.
2. Coordinate the UST removal schedule with the City of Chicago Department of Environment and the Chicago Fire Department.
3. Pump-out and dispose of product and sludge prior to removal of the UST from the site. Pump-out contaminated water and other miscellaneous liquids that may be present in the UST basin.
4. Remove and dispose of all of the UST piping, equipment, electric conduit, and accessories related to the UST.
5. Clean tank interior and dispose of tank washwater as special waste.
6. Excavate and stockpile materials that may be present around the UST. The Contractor may temporarily store excavated materials at the site. Such material may not be stored on site for more than 30 days unless directed otherwise by the Board Authorized Representative. Regardless of the duration excavated materials are stockpiled, excavated materials shall be placed on and covered by 6-mil polyethylene visqueen. The Contractor shall also provide a 12" to 18" berm around the stockpile.
7. Backfill the UST excavation using approved backfill material in accordance with project specifications. Copies of environmental analytical results of all backfill material verifying that these materials were analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters, and do not exceed the parameter values as listed in APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742. For samples from virgin sources, one representative sample must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from recycled sources, one sample per 1,000 tons of material must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. A copy of the analytical results shall be submitted at least one week prior to depositing backfill or top soil on site. The date of the analysis shall be within 60 days of importing such material to a school property. Excavated materials determined to be suitable for backfill

could be used as backfill in the vicinity of the UST basin excavation. The Contractor shall refer to the Architect/Engineer specifications for definition of suitable backfill materials.

8. If excavated material or soil requires off-site disposal, the Contractor shall collect and analyze representative soil sample for waste stream authorization. The sample shall be analyzed for the parameters required by the disposal facility. The Contractor shall secure all required permits for excavated material and soil disposal at a open and active permitted Subtitle D Landfill site within 10 calendar days of the UST removal.
9. The Contractor shall prepare waste manifests for the Managing Environmental Consultant's (MEC) signature prior to loading excavated materials and soils into hauling trucks. The Contractor shall provide copies of all daily reports, weight tickets, receipts, and waste manifests for the contaminated soil removal to the Board Authorized Representative and the MEC within 7 days of removing excavated materials and soils from the site.
10. Backfill and compact excavation areas using approved backfill materials that were analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters and do not exceed the parameter values as listed in do not exceed the parameter values as listed in Appendix B, Section 742. The Contractor shall provide documentation for each source of backfill materials certifying that backfill was analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters and that the backfill does not exceed parameter values as listed in Appendix B, Section 742, Table A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742.

1.2 DEFINITIONS

A. IEPA: Illinois Environmental Protection Agency.

B. Backfil**l**: Granular or cohesive material that is utilized to backfill the UST excavation to grade prior to the replacement of the paved surface, and which were analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters and do not exceed the parameter values as listed in Appendix B, Section 742, Table A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742.

C. Board Authorized Representative: The person or entity designated as the official representative of the Owner in connection with a project.

D. CPS**:** Chicago Public Schools.

E. Connected Piping: All underground piping including valves, elbows, joints, flanges, and flexible connectors attached to the UST system through which regulated substances flow.

F. Excavation Zone: The volume containing the tank system and backfill material bounded by the ground surface, walls, and floor of the pit and trenches into which the UST system is placed at the time of removal.

G. Hazardous Substance UST System: An underground storage tank system that contains a hazardous substance defined in section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (but not including any such substance regulated as a

hazardous waste under subtitle C) or any mixture of such substances and petroleum, and which is not a petroleum UST system.

H. Hazardous Waste: as defined by:
1. 40 CFR Part 261.
2. Illinois Environmental Protection Act 415 ILCS 5/3.220; and Section 809.103 of Title 35: Environmental Protection; Subtitle G: Waste Disposal; Chapter I: Pollution Control Board.
3. Section 3001 of the Resource Conservation and Recovery Act of 1976, P.L. 94-580.

I. Heating Oil: Petroleum that is No. 1, No. 2, No. 4-light, No. 4-heavy, No. 5-light, No. 5-heavy, and No. 6 technical grades of fuel oil; other residual fuel oils (including Navy Special Fuel Oil and Bunker C); and other fuels when used as substitutes for one of these fuel oils. Heating oil is typically used in the operation of heating equipment, boilers, or furnaces.

J. IDOT: Illinois Department of Transportation.

K. Liquid Trap: Sumps, well cellars, and other traps used in association with oil and gas production, gathering, and extraction operations (including gas production plants), for the purpose of collecting oil, water, and other liquids. These liquid traps may temporarily collect liquids or subsequent disposition or re-injection into a production or pipeline stream, or may collect and separate liquids from a gas stream.

L. Managing Environmental Consultant (MEC)**:** The entity that will perform environmental oversight on the behalf of the Chicago Public Schools.

M. Manifest: Manifest means the form provided or prescribed by IEPA and used for identifying name, quality, routing, and destination of special waste during its transportation from point of generation to the point of disposal, treatment, or storage.

N. Motor Fuel: Petroleum or a petroleum-based substance that is motor gasoline, aviation gasoline, No. 1 or No. 2 diesel fuel, or any grade of gasohol, and is typically used in the operation of a motor engine.

O. Noncommercial Purposes: With respect to motor fuel means not for resale.

P. Non-hazardous Special Waste: as defined in Title 35: Environmental Protection; Subtitle G: Waste Disposal; Chapter I: Pollution Control Board; Subchapter i: Solid Waste and Special Waste Hauling; Part 809: Non Hazardous Special Waste Classifications; Subpart A: General Provisions; Section 809.103.

Q. OSHA**:** Occupational Safety and Health Administration.

R. Operator: Any person in control of, or having responsibility for, the daily operation of the UST system.

S. Petroleum UST System: An underground storage tank system that contains petroleum or a mixture of petroleum with *de minimis* quantities of other regulated substances. Such systems include those containing heating oils, motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents, and used oils.

T. Pipe or Piping: A hollow cylinder or tubular conduit that is constructed of non-earthen materials.

U. Pipeline Facilities (including Gathering Lines): New and existing pipe rights-of-way and any associated equipment, facilities, or buildings.

V. Regulated Substance: includes but is not limited to petroleum and petroleum-based substances comprised of a complex blend of hydrocarbons derived from crude oil through processes of separation, conversion, upgrading, and finishing, such as motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents, and used oils. This includes:
1. Any substance defined in section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 (but not including any substance regulated as a hazardous waste under subtitle C), and
2. Petroleum, including crude oil or any fraction thereof that is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute).

W. Remediation Area: Remediation Area means any area on-site where underground storage tanks, special waste and/or non-hazardous special waste or soils that were analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) and exceed the parameters listed in Appendix B, Section 742, Table A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742, are present.

X. Release: Any spilling, leaking, emitting, discharging, escaping, leaching or disposing from an UST into surface/subsurface soils, groundwater or the environment.

Y. Residential Tank: A heating oil tank located on residential property used primarily consumptive use.

1.3 SUBMITTALS

A. The Contractor shall submit copies of the following to the Board Authorized Representative a minimum seven (7) calendar days prior to scheduling a UST removal:
1. Equipment and methods for adjacent structure protection and UST removal procedures prior to start of any Work.
2. Proof of OSHA training in compliance with the Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) for workers who will be involved in the UST and contaminated soil removal.
3. Name and address of the Illinois Environmental Protection Agency certified laboratory which will be used by the Contractor to perform the analytical testing prior to starting work.
4. Contractor's Site-Specific Health and Safety Plan. The plan shall comply with all OSHA requirements. The plan must be submitted to the Board Authorized Representative within 10 calendar days of issuance of the Notice-to-Proceed (NTP). The work shall be performed under the direct supervision of a trained experienced site supervisor. The plan should at a minimum include the following:
    a. Name key personnel and alternates responsible for site safety.
    b. Describe the risks associated with each operation conducted.
    c. Type of personnel training and responsibilities and to handle the specific hazardous situations they may encounter.

d. Describe the protective clothing and equipment to be worn by personnel during various site operations.
e. Describe any site specific medical surveillance requirements.
f. Describe the program for the periodic air monitoring, personnel monitoring, and environmental sampling if needed.
g. Describe the actions to be taken to mitigate existing hazards to make the work environment less hazardous.
h. Define site control measures including a site map.
i. Establish procedures for personnel and equipment and transporting trucks to ensure that impacted soils are not tracked off site on to non-impacted areas of the site.
j. Set forth the site Standard Operating Procedures (SOPs). SOPs are those activities that can be standardized (i.e., decontamination procedures and respirator fit testing).
k. Set forth a Contingency Plan for the safe and effective response to emergencies.

5. Operating licenses and permits for each special waste hauler and details of hauling routes from the site to the disposal facilities.
6. Copies of all daily reports, transport manifests, disposal receipts and treatment records. Copies shall be required on a weekly basis.
7. Any air sampling data collected during the course of the Work, including OSHA compliance air monitoring.
8. Disposal information for any soil, product, sludge, tank washwater, and liquid removed from the site. This information should include, at a minimum, the following:
   a. Facility name, address, and telephone Number.
   b. Site Contact.
   c. Permit Number.
9. Copies of UST(s) removal permit.
10. Copies of waste characterization analytical results for disposal of contaminated soil, product, sludge, tank washwater, and contaminated groundwater within one calendar day.
11. Certificate of Destruction from a steel reclamation facility within seven (7) calendar days after the tank removal.
12. Prior to backfilling, provide copies of analytical results of backfill materials verifying that the backfill was analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters and that the backfill does not contain contaminant values that exceed the parameters listed in APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742.

1.4 PROJECT CONDITIONS

A. Conditions of USTs: Chicago Public Schools assumes no responsibility for actual condition of the storage tank to be removed. Location and conditions of existing USTs are unknown at this time.

B. Condition of Piping and Conduit: Chicago Public Schools assumes no responsibility for actual condition of piping and conduit to be removed.

C. Contractor is totally responsible for handling and removal of all materials associated with UST(s) removal as required by Federal, State and local regulations.

D. Salvage Items: Reuse of items is not allowed unless specified otherwise. Storage tanks are to be rendered unusable before removing from job site.

E. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from the applicable governing agency and the Board Authorized Representative. Provide alternate routes around closed or obstructed traffic ways if required by the governing agency.

F. Damages: Promptly replace or repair any damage caused to adjacent pavement, utilities or facilities by removal operations at no additional cost. Work shall be performed to the satisfaction of Board Authorized Representative and MEC.

G. Utility Services: Maintain existing utilities and protect against damage during removal operations. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by Board Authorized Representative. Provide temporary services during interruptions to existing utilities as acceptable to the Chicago Public Schools and Board Authorized Representative.

1.5 QUALITY CONTROL

A. The removal of UST system(s) is governed by local, state and federal regulations and/or guidelines, which include, but are not necessarily limited to, the following:
   1. City of Chicago Code and Regulations.
   2. USEPA, 40 CFR Part 280, Vol.53 No. 185, dated September 23, 1988 or latest version.
   3. Title 41: Fire Protection Chapter I: State Fire Marshal, Parts 160, 170 and 180, Subpart A, dated April 1990 or latest version.
   4. National Fire Protection Association Code.
   5. All other USEPA, IEPA, City of Chicago, Illinois Department of Transportation (IDOT), and OSHA regulations.

1.6 RECORDKEEPING

A. The Contractor shall provide documentation of labor, equipment, materials, and laboratory analysis used for the removal and disposal of soils and liquids to the Board Authorized Representative and MEC on a weekly basis.

1.7 COORDINATION OF WORK

A. The Contractor shall coordinate and schedule the performance of work with the least disruption as possible to the daily site activities.

B. The Contractor shall obtain a permit to remove the tank from the site from the City of Chicago Department of Environment (CDOE) and Chicago Fire Department (CFD) within 48-hours of the discovery of any UST(s). The Contractor shall also schedule and coordinate the presence of the CFD and CDOE's representative on site the scheduled day of tank removal. The tank must not be removed from the ground without the CDOE and CFD representatives being present on site.

C. The Contractor shall provide Board Authorized Representative and MEC advance written notice (minimum 48-hours) of the anticipated removal date. The Contractor must coordinate all UST removal activities with Board Authorized Representative and MEC.

D. The Contractor shall cooperate with and coordinate work progress with Board Authorized Representative and MEC. Soils excavated from the UST basin shall be stockpiled near the excavation or at an area deemed suitable by the Board Authorized Representative and MEC. The Board Authorized Representative and MEC will inspect the stockpile soil and determine if the soil will be removed from the site or used as backfill. The Contractor shall assist the MEC with the use of its machinery and operator to inspect and obtain soil samples from the open excavation beneath or adjacent to the former location of the underground tank. The Contractor shall also visually inspect the underground storage tank for his own records. The Contractor shall record or otherwise document the closure activities. The cavity shall be backfilled with excavated soil and/or gravel the same day after removal and sampling activities unless directed by Board Authorized Representative to do otherwise. All backfill must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters and can not exceed the parameters values listed in APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742.

1.8 SPECIAL REQUIREMENTS

A. Qualifications
1. The UST Contractor(s) shall be fully experienced and knowledgeable in the safe work procedures and regulatory requirements for removing, cleaning and disposal of underground storage tanks in accordance with all applicable Federal, State, and Local regulations.
2. The UST Contractor(s) shall be capable of performing all work including providing necessary services, equipment, tools, labor and material for the removal, cleansing and disposal of underground storage tank and piping containing heating oil, and or petroleum, including the restoration of the site work area. The Contractor shall be capable of providing contingency services upon encountering soils or liquids that exceed APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters when so directed by the Board Authorized Representative and/or MEC.
3. The UST Contractor(s), Subcontractor(s) and their employees shall be thoroughly trained in safe work practices, procedures and regulatory requirements applicable to the removal, cleaning and disposal of underground storage tank systems containing heating oil and/or petroleum. The UST Contractor(s), Subcontractor(s) and their employees shall be responsible for removal, cleaning and disposal of tanks and associated soils, liquids and piping shall be properly trained and hold current certifications. The UST Contractor(s), Subcontractor(s) and their employees on site shall have received a minimum of 40 hours of health and safety instruction in accordance with OSHA 29 CFR part 1910.120(e).
4. The UST Contractor(s) must be currently registered with the Office of the Illinois State Fire Marshal as a Remover of Underground Storage Tanks (Decommissioning) in accordance with Illinois Administrative Code, Title 41: Fire Protection, Chapter 1: Office of the State Fire Marshal, Part 170: Storage, Transportation, Sale and Use of Petroleum and Other Regulated Substances, as amended.

1.9 PROTECTION OF FACILITIES

A. The Contractor shall protect existing structures, services and utilities against damage. Exercise care to protect any and all of the Owner's, Property Owner's and adjacent property including equipment, buildings, landscaping and fencing. Any damage shall be repaired to the satisfaction of the Owner, Property Owner or the Owner of the adjacent property at the Contractor's expense.

B. The Contractor shall, in writing, bring to the attention of the Board Authorized Representative and MEC any obstacles, impairments or other items that may prohibit the performance of work at least 72-hours prior to the start of work.

C. The Contractor shall take all necessary precautions to protect structures, equipment, pavement, walks, utilities, etc. against movement or settlement during the course of work.

PART 2 - PRODUCTS

2.1 REMOVAL OF TANK CONTENTS

A. The Contractor shall furnish all necessary materials and equipment complying with Federal, State County, and Local Rules and Regulations to fulfill the scope of work described herein.

2.2 TANK REMOVAL

A. The Contractor shall furnish all necessary materials and equipment complying with Federal, State County, and Local Rules and Regulations to fulfill the scope of work described herein.

2.3 REMOVAL AND DISPOSAL OF CONTAMINATED SOILS AT A OPEN AND ACTIVE PERMITTED SUBTITLE D LANDFILL SITE.

A. The Contractor shall furnish all necessary means, products, tools, and equipment required to fulfill the scope of work described in the Specifications 02316 and/or 02317 as applicable for this Project.

2.4 BACKFILL MATERIALS

A. The backfill material shall be consistent **with** the requirement**s** of the Architect/Engineer specifications. The backfill material shall not exceed the parameter values as listed in Appendix B, Section 742, Table A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 values for any 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) **parameters. For samples from virgin sources, one representative sample must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from recycled sources, one sample per 1,000 tons of material must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. The date of the analytical results shall be within 60 day of importing such material to the site.**

PART 3 - EXECUTION

3.1 UST CONTENTS REMOVAL PROCEDURES

A. Pump out tank contents:
   1. Drain product from piping back into the tank, taking care to avoid spilling product. Use only explosion proof pumps or hand pumps.
   2. Pump any existing fuel into temporary aboveground storage tanks. Do not pump sludge or water into temporary aboveground storage tanks.
   3. Remove petroleum products, sludge, water, and liquid wastes from the tank. The suction hose shall be maneuvered along the tank bottom so that the maximum possible quantity of liquid is stripped from the interior.
   4. Liquids shall be temporarily stored in above ground IDOT-approved containers or may be pumped directly into a tank truck for immediate disposal if the determination is made in advance. Waste removal from the site shall be performed only by properly licensed waste haulers in strict accordance with IEPA guidelines, including requirements for testing, laboratory analysis and manifesting. Coordinate location of temporary storage with the Board Authorized Representative and MEC.
   5. Residue from tanks, which may have contained leaded gasoline, shall be treated with caution. Tank residues shall be disposed of in accordance with all applicable state and federal laws and regulations. Provide documentation of the proper disposal of all tank product and wastes to the Board Authorized Representative and MEC.

3.2 UST REMOVAL PROCEDURES

A. Purge storage tanks of flammable and combustible gases:
   1. Observing all required safety precautions, disconnect all piping and compounds, except for the vent pipe which is to remain connected until purging is completed. Temporarily plug all other openings so that all vapors shall be forced through the vent opening. Vapors shall be purged by one of the several methods listed in API/1604-87.
   2. Instrument for detecting and measuring Low Explosion Limits (LEL) and oxygen levels shall be maintained and operated continuously at the job site at all times when work is being performed in areas which are or may become hazardous. Instrument shall be properly calibrated according to the manufacturer's specifications and checked and maintained accordingly.
   3. OSHA standards for confined space entry and hazardous material regulations shall be strictly followed.
   4. Disconnect and remove existing electrical lines to USTs pumps.

B. Excavate above and around the UST(s):
   1. Remove and dispose of all pavement, concrete and debris associated with the UST.
   2. The Contractor shall be responsible for locating all existing utilities, which will be encountered during removal operations. The Contractor shall protect the utilities as required to complete the work.
   3. Excavate soil above and around tanks. Excavating area shall be large enough to uncover the profile of the tank and piping to complete removal.
   4. Soils that exceed Appendix B, Section 742, Table A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 values for

35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters shall be disposed of in accordance with Section 02316 and/or 02317 as applicable.

C. Storage tank removal:
1. Check tanks for combustible gases. Purge tanks again as necessary.
2. Remove all associated tank piping, and tank hold down components including straps and concrete dead-man.
3. Remove tank in accordance with API recommended practice 1604.
4. After tanks have been removed from the ground, place the tank on a stable level surface for inspection.

D. Storage tank cleaning:
1. Cut holes in tanks using non-sparking tools to facilitate tank cleaning. Only cold cut equipment shall be used. The total surface area of all the holes shall be a minimum of 2% of the total surface area of the tank, or minimum of 9 square feet each opposite side or end. The Contractor shall have fire extinguishers on-site during cutting of tanks.
2. Clean tanks in accordance with API recommended practice 2015.
3. UST(s) removed from the excavation zone shall be cleaned on-site the day of removal. The tank will then be temporarily stored on-site until proper disposal arrangements are made.

E. Disposal of tank cleaning washwater:
1. The Contractor shall submit samples of tank cleaning washwater and sludge to an independent laboratory for analysis as required by disposal facility. Submit copies of the analytical report and chain-of-custody form to the Board Authorized Representative and MEC.
2. Transporter of tank cleaning washwater and sludge shall be an Illinois licensed special waste hauler. The disposal facility shall be approved by the IEPA.
3. The Contractor shall prepare manifests required for transportation and disposal of washwaters and sludge. Submit copies of manifests to the Board Authorized Representative and MEC.

F. Disposal of storage tanks:
1. All tanks shall be taken to an appropriate disposal facility (e.g. scrap steel reclaimed or landfill). Tanks shall not be retained by the Contractor or reused in any manner.
2. Tanks shall be labeled with legible letters at least two inches high, as follow: TANK HAS CONTAINED (name of product)

NOT VAPOR FREE
NOT SUITABLE FOR STORAGE OF FOOD
OR LIQUIDS INTENDED FOR HUMAN
OR ANIMAL CONSUMPTION
DATE OF REMOVAL:(month/day/year)

In addition, tanks which have or may have contained leaded fuels shall be labeled as:

TANK HAS CONTAINED LEADED GASOLINE
LEAD VAPORS MAY BE RELEASED IF
HEAT IS APPLIED TO TANK SHELL

3. Tanks, piping and components shall be removed from the site on the same day the site is excavated. If transportation on the day of removal is not possible, materials shall be secured on-site until disposal agreements are made.
4. Provide a certificate of destruction signed by the Contractor and a representative of the disposal/recycling facility to the Board Authorized Representative and MEC.
5. The excavation must be securely fenced to prevent access by unauthorized personnel until backfilled per Specification 02318.

G. Storm Water Run-on/Run-off and Dewatering
1. The Contractor shall implement surface grading, pumping and/or combination of silt fence, sandbags, tarpaulins, plastic sheeting, and movable straw bales, as approved by the Board Authorized Representative and MEC, to prevent storm water runoff from entering the Tank Remediation Area.
2. Storm water that has come in contact with any portion of the contaminated soil as a result of the Contractor's failure to prevent contact with excavated soils or the excavation shall be collected and disposed of at the Contractor's own expense. or as determined by the Board Authorized Representative and MEC.

H. Soil Removal and Disposal
1. All excavation shall be performed in accordance with OSHA requirements and guidelines.
2. The Contractor shall excavate a maximum 2 feet around the USTs basin for the UST removal. The MEC will determine the extent of soils present that exceed Appendix B, Section 742, Table A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters, if present, at each UST basin. The extent of soil removal shall not extend beyond the proposed construction limit.
3. The Contractor shall collect a sufficient amount of representative soil samples for laboratory analysis to obtain a waste stream authorization from the disposal facility.
4. The Contractor shall submit the soil samples to the laboratory and pay for the cost of analyzing the constituents required by the disposal facility.
5. The MEC may collect soil samples for laboratory analysis or field Photo- ionization Detector (PID) screening. The Contractor shall provide the necessary equipment and manpower to assist the MEC in collecting soil samples at no additional cost to the Owner.

3.3 DISPOSAL OF MATERIALS

A. General: Remove daily from site accumulated debris, rubbish, and other materials resulting from piping and dispenser removal activities.

B. Removal: Dispose of materials removed from site in accordance with the 35 IAC regulations. Transport and legally dispose of all materials and equipment. Comply with manifest regulations of all removed and disposed equipment and materials. Materials that shall be removed include, but are not limited to, the following:
1. Underground Storage Tanks.
2. Piping.
3. Soils and sludges.
4. Paving materials, including but not limited to concrete and asphalt.
5. Product from storage tank and piping, and tank cleaning washwater.
6. Free product and liquids if encountered during the USTs removal process.

7. Liquids /water from excavation and dewatering operations.

3.4 SITE ASSESSMENT

A. Upon removal of the UST(s), the MEC may conduct a site assessment and collect soil samples as needed. A representative of the City of Chicago Department of Environment (CDOE) will also render an opinion as to whether a release has occurred.

B. In the event that no release is confirmed, the Contractor shall complete removal of the tank, disposal of the tank, and backfill the excavation.

C. In the event that a release is confirmed, the Contractor shall complete removal of the tank, dispose of the tank and excavate contaminated soil as determined by the Board Authorized Representative.

D. The excavation shall remain open until the sampling is completed. The Contractor is responsible for providing fencing and access control to prevent unauthorized access to the excavation by unauthorized personnel in accordance with applicable rules and regulations.

3.5 BACKFILLING OF THE EXCAVATION

A. The Contractor shall not backfill excavation areas without approval of the Board Authorized Representative and MEC. If the Contractor backfills the excavation area without obtaining approval from the Board Authorized Representative and MEC, the backfill materials shall be excavated, transported and disposed of at a permitted Subtitle D Landfill, if required, at the Contractor's own expense.

B. The UST basin shall be backfilled in accordance with the project specifications or as directed by the Board Authorized Representative. The Contractor shall utilize on-site suitable materials or imported granular CA-6 stone consistent with Illinois DOT gradation that does not exceed APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. Compact backfill materials in accordance with the project specification.

C. For each off-site source of backfill materials, the Contractor shall provide to the Board Authorized Representative and MEC laboratory analyses and certification that the imported materials do not contain contaminant values above APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from virgin sources, one representative sample must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from recycled sources, one sample per 1,000 tons of material must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. The date of the analytical results shall be within 60 day of importing such material to the site.

D. Site Restoration: Restore the site according to the Architect/Engineer design plan, or as directed by the Board Authorized Representative.

3.6 DUST CONTROL

A. The Contractor shall control dust by all necessary means, including but not limited to covering trucks, stockpiles and open materials, watering haul roads, sweeping paved roads, and limiting the speed of all on-site vehicles.

PART 4 - PAYMENT

4.1 CONTRACT PRICING

A. Pricing shall be in accordance with the contract documents.

END OF SECTION

SECTION 02119 - SPECIAL, NONHAZARDOUS SPECIAL, AND HAZARDOUS WASTE LIQUIDS REMOVAL AND DISPOSAL

PART 1 - GENERAL

1.1 Applicability:

A. These environmental requirements apply to all Special Waste, Nonhazardous Special and Hazardous Waste Liquids removed from Chicago Public School (CPS) properties, including but not limited to school buildings, property grounds, landscaped areas, playgrounds, ball fields, parkways, stadiums, and parking lot areas.

1.2 Introduction:

A. This part only applies to those materials that are classified as:

1. Special Wastes as defined in Title 35: Environmental Protection; Subtitle G: Waste Disposal; Chapter I: Pollution Control Board; Subchapter i: Solid Waste and Special Waste Hauling; Part 808: Special Waste Classifications; Subpart A: General Provisions; Section 808.110.
2. Nonhazardous Special Waste as defined in Title 35: Environmental Protection; Subtitle G: Waste Disposal; Chapter I: Pollution Control Board; Subchapter i: Solid Waste and Special Waste Hauling; Part 809: Non Hazardous Special Waste Classifications; Subpart A: General Provisions; Section 809.103.
3. Hazardous Wastes as defined by:
    a. 40 CFR Part 261;
    b. Section 3001 of the Resource Conservation and Recovery Act of 1976, P.L. 4-580
    c. Illinois Administrative Code Title 35, Section 721.103 (35 IAC 721.103).
4. Industrial Wastes as defined by:
    a. Sewage and Waste Control Ordinance - Metropolitan Water Reclamation District of Greater Chicago
    b. Environmental Remediation Wastewater Ordinance – Metropolitan Water Reclamation District of Greater Chicago
5. Hazardous Material (HM): materials identified and regulated by the Department of Transportation under 49 CFR 172.101

1.3 Summary

A. Related Documents: All terms and conditions of the Contract apply to this Section.

B. Work included: This specification is for the permitting, packaging, excavation, labeling, loading, hauling, and removal of special waste, nonhazardous special waste, and hazardous wastes from Chicago Public School properties. The Contractor shall perform the work under this section in accordance with all applicable local, county, IEPA, USEPA, OSHA and DOT regulations and shall perform the following:

1. Prior to packaging, labeling, loading, hauling, and removal of any special waste, nonhazardous special waste, and hazardous waste liquids from a Chicago Public School facility, obtain authorization for ultimate disposition of wastes from a facility approved by CPS.
2. Remove special waste, nonhazardous special waste, and hazardous waste liquids in accordance with the project specification. Conduct compatibility testing to ensure that incompatible materials are not intermingled.
3. Load special waste, nonhazardous special waste, and hazardous waste liquids into licensed special/hazardous waste trucks, trailers, containers or vessels for final disposition as per item B. 1., above.
4. Provide copies of all daily reports, transport manifests, volume tickets, and disposal receipts to the Board Authorized Representative on a daily basis.
5. Decontaminate areas where special waste, nonhazardous special waste, and hazardous waste liquids were spilled. Containerize decontamination residuals for final disposition as per item B. 1., above.
6. For areas where special waste, nonhazardous special waste, and hazardous waste liquids removal requires soil excavation and removal, refer to Specification 02061.

C. The Contractor shall comply with all applicable regulatory requirements and other federal, state or local laws, codes and ordinances that govern or regulate the handling, transportation and disposal of special waste, nonhazardous special waste, and hazardous waste liquids. The Contractor shall mark, label, placard, package and manifest special waste, nonhazardous special waste, and hazardous waste liquids as necessary in accordance with all applicable state, federal and local regulations. The Contractor shall ensure protection against spillage of special waste, nonhazardous special waste, and hazardous waste liquids. The Contractor shall handle all special waste, nonhazardous special waste, and hazardous waste liquids in accordance with all applicable federal, state and local laws, regulations and ordinance.

1.4 Definitions

A. Board Authorized Representative: means the entity responsible for overall project coordination and completion.

B. CDL means Commercial driver's License.

C. CFR means Code of Federal Regulations.

D. Discharge Authorization (DA) is a written authorization issued by the MWRDGC giving permission to discharge wastewaters to its sewer system and sewage treatment facilities.

E. DOT means Department of Transportation.

F. Hazardous Material (HM): materials identified and regulated by the Department of Transportation under 49 CFR 172.101

G. Hazardous Waste Liquids: Any Liquids or Sludges, any Chemicals, Groundwater, Stormwater, or Surface Runoff designated as a waste pursuant to:

1. 40 CFR Part 261
2. Illinois Administrative Code Title 35, Section 721.103 (35 IAC 721.103).
3. Section 3001 of the Resource Conservation and Recovery Act of 1976, P.L. 94-580

H. IEPA means Illinois Environmental Protection Agency.

I. Industrial Wastes as defined by:

1. Sewage and Waste Control Ordinance - Metropolitan Water Reclamation District of Greater Chicago
2. Environmental Remediation Wastewater Ordinance – Metropolitan Water Reclamation District of Greater Chicago

J. Manifest is the form provided or prescribed by IEPA and used for identifying name, quality, routing, and destination of special waste nonhazardous special waste, and hazardous waste soils during its transportation from point of generation to the point of disposal, treatment, or storage.

K. MWRDGC means the Metropolitan Water Reclamation District of Greater Chicago, the entity that owns and operates of the sewage system and issues discharge authorizations.

L. Remediation Area means any area on site where special, nonhazardous special, and hazardous waste liquids are present.

M. Special Waste Liquids means any Petroleum Liquids or Sludges, any Chemical, and any Groundwater, Stormwater, or Surface Runoff designated as a waste pursuant to:

1. Title 35: Environmental Protection; Subtitle G: Waste Disposal; Chapter I: Pollution Control Board; Subchapter i: Solid Waste and Special Waste

Hauling; Part 808: Special Waste Classifications; Subpart A: General Provisions; Section 808.110.

AND

2. Title 35: Environmental Protection; Subtitle G: Waste Disposal; Chapter I: Pollution Control Board; Subchapter i: Solid Waste and Special Waste Hauling; Part 809: Non-Hazardous Special Waste Classifications; Subpart A: General Provisions; Section 809.103.

N. USEPA means United States Environmental protection Agency.

1.5 Submittals

A. Prior to removal of any special, nonhazardous special, and hazardous waste liquids from the site, the Contractor shall provide the Board Authorized Representative with copies of the following submittals:

1. Name, address and telephone number of the facility and/or permitted/licensed disposal facility where special, nonhazardous special, and/or hazardous waste liquids are to be deposited. This information should include, at a minimum, the following:

    a. Name
    b. Address
    c. Telephone Number
    d. Site Contact
    e. Illinois Facility Identification Number
    f. USEPA Disposal Site ID numbers (for Hazardous Waste Sites only)
    g. State and Local Operational Permit Number(s)
2. Discharge Authorization and/or permit from the facility and/or licensed disposal facility where special, nonhazardous special, or hazardous waste liquids are to be deposited prior to removal from the site. The authorization must also include a statement indicating that the facility or licensed disposal facility has received a copy of the analysis report that classified the materials as a special, nonhazardous special, or hazardous waste liquids.
3. Name and address and telephone number of the laboratory that will be used by the Contractor to perform the analytical testing for waste characterization prior to starting work.
4. Contractor's Site-Specific Health and Safety Plan.
5. Proof of OSHA training in compliance with the Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) for applicable workers
6. Operating licenses and special waste or hazardous waste permits for each proposed transporter. Details of haul routes from site to the disposal facilities.
7. Copies of waste stream authorizations, and permits as applicable.
8. Copies of all daily reports, transport manifests, volume tickets and disposal receipts to the Board Authorized Representative on a daily basis.

9. Any air sampling data collected during the course of the Work, including OSHA compliance air monitoring.
10. Copies of equipment decontamination procedures for equipment and vehicles utilized to excavate and remove special, nonhazardous special, or hazardous waste liquids form the site.

B. Submittal Review:

1. Review of submittals or any comments made does not relieve the Contractor from compliance with the requirements of the drawings and specifications. The purpose of this check is to review for general conformance with the design concept of the project and general compliance with the information given in the contract documents. The Contractor is responsible for confirming and correlating all quantities and dimensions; electing techniques of construction; coordinating the Work; and performing the Work in a safe and satisfactory manner.

1.6 Notifications

A. The Contractor shall notify the Board Authorized Representative no less than forty-eight (48) business hours prior to loading and transporting any special, nonhazardous special, and hazardous waste liquids from the site.

1.7 Record keeping

A. The Contractor shall provide documentation of labor, equipment, materials and laboratory analysis used for the removal and disposal of special, nonhazardous special, or hazardous waste liquids when requested by the Board Authorized Representative. The contractor shall maintain copies of documentation in accordance with all regulatory requirements, but in any case for a period of at least 3 years from the date of disposal or treatment of the waste.

PART 2 - PRODUCTS

2.1 Removals and Disposal

A. The Contractor shall furnish all necessary means, products, tools, and equipment required.

PART 3 - EXECUTION

3.1 Authorizations

A. The Contractor shall obtain written authorization from the facility receiving special, nonhazardous special, or hazardous waste liquids. Contractor shall submit the names, addresses and telephone numbers of the facility receiving special, non-hazardous special, and hazardous waste liquids to the Board Authorized Representative.

B. Haulers for transportation of special wastes, non-hazardous special waste, or hazardous waste liquids shall hold a current, valid waste hauling permit pursuant to 35 IAC 809. All drivers must hold a current and valid Commercial Drivers License (CDL) and present the CDL whenever requested by any representative of the owner.

3.2 Material Sampling

A. The Contractor shall, at contractors' own cost, collect sufficient amount of representative sample(s) of materials being removed from the site to obtain authorization for the ultimate disposition of special, non-hazardous special or hazardous waste liquids. The contractor is responsible for acquisition of any required disposal permits and payment of all sampling, analysis costs and permitting fees.

B. The Contractor shall submit the sample(s) to the laboratory and pay for the cost of analyzing the constituents required for the ultimate disposition of special, non-hazardous special, or hazardous waste liquids.

C. The Board Authorized Representative's environmental consultant may collect samples for laboratory analysis or field Photo-ionization Detector (PID) screening. The Contractor shall provide the necessary equipment and manpower to assist the Board Authorized Representative's environmental consultant in sample collection at no additional cost to the CPS.

D. The Contractor shall immediately notify the Board Authorized Representative if materials requiring special handling are encountered in areas not identified in site drawings.

E. In the event the Contractor causes special waste, nonhazardous special waste, or hazardous waste liquids to be discharged onto, or come into contact with site surface materials including but not limited to soils, asphalt, concrete, bricks, gravel, and the surface cannot be decontaminated, the surface materials shall be considered special waste, nonhazardous special waste, or hazardous waste. The contractor shall submit the sample(s) to the laboratory and pay for the cost of analyzing the constituents required for the ultimate disposition of such materials. For removal and disposal of such materials refer to Specification 02317.

3.3 Decontamination

A. The Contractor shall remove special, nonhazardous special, or hazardous waste soils, dusts, rocks, etc. from the exterior of trucks, trailers, tankers, containers or other equipment leaving the site.

B. The Contractor shall clean the trucks, trailers, tankers or containers that are loaded with materials for disposal by removing clinging soils, dust, or debris from the exterior of the equipment.

C. The Contractor shall not allow equipment or trucks, trailers, tankers or containers to leave the site with any discharge or mud dripping or caked to the equipment or trucks.

D. The Contractor shall decontaminate equipment (tools, shovels, backhoes, etc.) with a jet washer or steam cleaner after completing removal work in the special, nonhazardous special, or hazardous waste liquid areas and prior to start working in new areas. All cleaning and/or decontamination residuals must be collected and disposed of as special, nonhazardous special, or hazardous waste liquids in accordance with applicable federal, state and local regulations.

E. The Contractor must transport all materials in closed or covered trucks, trailers, tankers or containers as applicable.

F. The contractor shall require all tankers or containers that hold special, nonhazardous special, or hazardous liquids to be decontaminated in accordance with applicable federal, state and local regulations prior to reuse.

3.4 Stockpiling

A. Contractor may stockpile special, non-hazardous special, or hazardous waste liquids on site for a maximum of five (5) working days. The Contractor shall be responsible for keeping such special, nonhazardous special, or hazardous waste liquids separated from materials that are not designated as special wastes, non-hazardous special waste, or hazardous waste. If special wastes, non-hazardous special waste, or hazardous waste liquids comes in contact with materials that are not designated as special wastes, non-hazardous special waste, or hazardous waste, the former non-special waste materials will now be considered special wastes, non-hazardous special waste, or hazardous waste, and the Contractor shall dispose of newly designated materials as special wastes, non-hazardous special waste, or hazardous waste at his/her own expense. The Contractor will be responsible for sampling analysis costs associated with Characterization of newly designated materials as special wastes, non-hazardous special waste, or hazardous waste.

B. The location of the stockpiled special wastes, non-hazardous special waste, or hazardous waste liquids on site shall be coordinated with the Board Authorized Representative. The Contractor shall keep special wastes, non-hazardous special

waste, or hazardous waste liquids labeled, containerized covered and/or sealed until subsequent loading, transportation and disposal. For temporarily stockpiled special wastes, non-hazardous special waste, or hazardous waste soils, refer to Specification 02317.

C. The Contractor shall not allow runoff from stored or stockpiled soil/materials to enter storm drains or leave the site.

D. Materials storage areas must be secured so as to permit authorized personnel only and should be labeled or placarded as required by law.

3.5 Loading

A. The Contractor shall load special, nonhazardous special or hazardous waste liquids directly from the site or from temporary stockpiles into hauling trucks, trailers, tankers or containers as applicable for subsequent transportation and ultimate disposition.

B. Traffic: Conduct special, nonhazardous special or hazardous waste liquids removal to ensure minimum interference with roads, streets, walks and other adjacent occupied and used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from the applicable governing agency and the Board Authorized Representative. Provide alternate routes around closed or obstructed traffic ways if required by the governing agency.

C. The Contractor is responsible for complying with State and local Road/Street weight limits.

3.6 Transportation

A. The special, nonhazardous special or hazardous waste liquids shall be transported by a licensed hauler, licensed in the state of Illinois to transport special wastes, non-hazardous special waste, or hazardous waste liquids as applicable. All packaging, labeling, marking, placarding, shipping name and shipping documentation shall be in conformance with DOT shipping requirements under 49 CFR 172.

B. All special, nonhazardous special or hazardous waste liquids must be transported directly to the disposal site from the site. Intermediate storage is not permitted unless previous approval was obtained from the Board Authorized Representative.

C. The Contractor shall provide and complete copies of all daily reports, transport manifests, volume tickets and receipts (as applicable) for transportation and

ultimate disposition of special, nonhazardous special or hazardous waste liquids to the Board Authorized Representative for review and signature as required.

D. The Transporter shall present evidence of Special Waste hauling permits and CDL upon request by the Board Authorized Representative.

3.7 Disposal

A. The Contractor shall provide copies of volume receipts from the facility accepting special, nonhazardous special or hazardous waste liquids to the Board Authorized Representative within two business days.

B. In the event the contractor causes special, nonhazardous special or hazardous waste liquids to discharge onto site surfaces and the surfaces cannot be decontaminated, the Contractor shall dispose of newly designated materials as special wastes, non-hazardous special waste, or hazardous waste at his/her own expense. The Contractor will be responsible for sampling analysis costs associated with Characterization of newly designated materials as special wastes, non-hazardous special waste, or hazardous waste. All materials shall be disposed of in accordance with Specification 02317.

3.8 Backfill

A. In the event the contractor causes special, nonhazardous special or hazardous waste liquids to discharge onto site surfaces and the surfaces cannot be decontaminated, the Contractor shall excavate and dispose of newly designated materials as special wastes, non-hazardous special waste, or hazardous waste at his/her own expense and in accordance with Specification 02317. The excavated area shall be backfilled in accordance with Specification 02318. The Contractor will be responsible for sampling analysis costs associated with Characterization of newly designated materials as special wastes, non-hazardous special waste, or hazardous waste.

PART 4 - QUALITY CONTROL

4.1 Requirements: The Contractor shall perform the following quality control measures to fulfill the scope of work:

A. Visual inspections shall be made daily by the Contractor and/or as directed by the Board Authorized Representative to assure that all remediation equipment, containment areas, and trucks, trailers tankers and containers are properly marked, covered or sealed, and/or functioning properly.

B. Damages: Promptly replace or repair any damage caused to building equipment and structures, and adjacent pavement, utilities or facilities by removal operations at no additional cost. Work shall be performed to the satisfaction of the Board Authorized Representative.

C. Utility Services: Maintain existing utilities and protect against damage during removal operations.

D. Contaminated Areas: Promptly clean and decontaminate any areas, which may become contaminated as a result of the contractor's actions.

PART 5 - MEASUREMENT AND PAYMENT

5.1 CONTRACT UNIT PRICING

A. Volume determination and pricing shall in accordance with the contract documents.

END OF SECTION

SECTION 02316

SOIL, FILL, BACKFILL, CU STRUCTURAL SOIL & CONSTRUCTION & DEMOLITION DEBRIS REMOVAL

PART 1 - GENERAL

1.1 APPLICABILITY:

A. These environmental requirements apply to all Chicago Public School (CPS) properties, including but not limited to schools and associated school property grounds, landscape areas, playground, ball field, parkway, stadium, and parking lot areas.

1.2 INTRODUCTION

A. Related Documents: All terms and conditions of the Contract apply to this Section.

B. Work included: This specification is for the excavation, stockpiling, loading, hauling, removal, and disposal of any soils (including non-special waste soils and non-hazardous special waste soils), fill, backfill, top soil, CU structural soil, and general construction and demolition debris from CPS properties. The contractor shall perform the work under this Section in accordance with all applicable local, county, state, and federal regulations. The work shall include the following:

1. 1. Removal and disposal
    a. Excavation of soils (including non-special waste soils and non-hazardous special waste soils), fill, backfill, top soil, CU structural soil, and general construction and demolition debris materials to the depth required to complete the proposed site preparation/construction work activities as specified in the Architect/Engineer drawings and specifications.
    b. Obtain authorization from a open and active permitted Subtitle D landfill indicating acceptance of materials at the facility. The authorization must be signed by the owner or authorized representative of the open and active permitted Subtitle D landfill and state that the facility complies with all local zoning codes and all local, state, and federal rules and regulations, that all required laboratory analyses have been received by the facility, and that the facility has agreed to accept the soils (including non-special waste soils, and non-hazardous special waste soils), fill, backfill, top soil, CU structural soil, and general construction and demolition debris materials. The authorization shall further state that the soils (including non-special waste soils and non-hazardous special waste soils), fill, backfill, top soil, CU structural soil, general construction and demolition debris materials are being accepted for permanent placement on site, and that the material will not be removed from the site unless required by a local, state or federal authority.
    c. Perform analytical testing by an IEPA-accredited laboratory for waste stream authorizations as necessary to secure all required disposal permits for all materials.
    d. Load and transport all materials to the approved open and active permitted Subtitle D landfill

e. Prepare daily reports, transport manifests, weight tickets and receipts (as applicable) prior to starting any soil removal activities.

f. Provide copies of all daily reports, transport/waste manifests, weight tickets, and disposal receipts (as applicable) to the Board Authorized Representative on a daily basis documenting proper disposal of soils (including non-special waste soils and non-hazardous special waste soils), fill, backfill, top soil, CU structural soil, and general construction and demolition debris materials.

2. Placement of backfill, top soil, CU structural soil

a. The contractor shall supply only backfill, top soil, and CU structural soil per project specifications and which does not exceed APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from virgin sources, one representative sample must be analyzed by an IEPA-accredited laboratory for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from recycled sources, one sample per 1,000 tons of material must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. The date of the environmental analysis of any backfill, top soil shall be within 60 days of importing such material to a school property.

1.3 DEFINITIONS

A. Agency means Illinois Environmental Protection Agency (IEPA).

B. Backfill means granular or cohesive material used to fill the excavation to design grade as referenced in design plans and specifications, and which does not exceed Title 35: Environmental Protection Subtitle G: Waste Disposal Chapter I: Pollution Control Board Subchapter F: Risk Based Cleanup Objectives, Part 742, Tiered Approach To Corrective Action Objectives, Appendix B values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters.

C. Board Authorized Representative means the person or entity designated as the official representative of the owner in connection with a project.

D. CU structural soil means a uniformly blended mixture of crushed stone, clay, loam and hydrogel as referenced in Specification 02901.

E. Fill means any earthen or non-earthen materials including but not limited to any sediment, granular or cohesive non-native earthen materials, cinders, ash, wood, and brick, concrete, and asphalt fragments, glass, and building debris encountered above naturally occurring undisturbed soils or bedrock in built-up areas.

F. General construction and demolition (C&D) debris means non-hazardous, uncontaminated materials resulting from construction, remodeling, repair, and demolition of utilities, structures, and roads as defined in Public Act 92-0574, The Environmental Protection Act, 415 ILCS 5 Section 3.160 and regulated under Title 35: Environmental Protection; Subtitle G: Waste Disposal; Chapter I: Pollution Control Board; Subchapter i: Solid Waste and Special Waste Hauling. C&D debris may include soil, wall coverings, reclaimed asphalt pavement, rock, plaster, glass, non-hazardous painted wood, drywall, plastics, non-hazardous coated wood, non-

asbestos insulation, bricks, wood products, roofing shingles, concrete, and general roof coverings.

G. Permitted Subtitle D landfill means any solid waste landfill facility in any state licensed and/or permitted to accept non-hazardous waste.

H. IEPA means Illinois Environmental Protection Agency.

I. IDOT means Illinois Department of Transportation.

J. Manifest means the form provided or prescribed by IEPA and used for identifying name, quality, routing, and destination of special waste during its transportation from point of generation to the point of disposal, treatment, or storage.

K. Hazardous waste means a waste, or combination of wastes, which has been identified by characteristics or listing as hazardous pursuant to Section 3001 of the Resource Conservation and Recovery Act of 1976, P.L. 94-580, 40 CFR part 261, Illinois Environmental protection Act 415 ILCS 5/3.220, and Section 809.103 of Title 35: Environmental Protection; Subtitle G: Waste Disposal; Chapter I: Pollution Control Board. A waste is classified as hazardous if it exhibits any of the following characteristics: 1) ignitability, 2) corrosivity, 3) reactivity, or 4) toxicity, and as defined in Illinois Administrative Code Title 35, Section 721.103 (35 IAC 721.103).

L. Managing Environmental Consultant (MEC) means the entity with overall responsibility for the direction and control of the environmental investigations, assessments, designs, and supervision of remediation work.

M. MSDS means Material Safety Data Sheet, required by OSHA for any substances that are toxic, caustic, or otherwise potentially hazardous to workers.

N. OSHA means Occupational Safety and Health Administration.

O. Remediation Area means any area on site where underground storage tanks, non-special waste and/or non-hazardous special waste, or soil that do not meet Tier 1 SROs for residential properties is present.

P. Soil means any granular or cohesive materials designated for removal as specified in the Architect/Engineer drawings and specifications and includes soils that are determined to be non-special and special waste.

Q. Special waste means any wastes as defined in Title 35: Environmental Protection; Subtitle G: Waste Disposal; Chapter I: Pollution Control Board; Subchapter i: Solid Waste and Special Waste Hauling; Part 808: Special Waste Classifications; Subpart A: General Provisions; Section 808.110,

AND

Any wastes as defined in Title 35: Environmental Protection; Subtitle G: Waste Disposal; Chapter I: Pollution Control Board; Subchapter i: Solid Waste and Special Waste Hauling; Part 809: Non Hazardous Special Waste Classifications; Subpart A: General Provisions; Section 809.103.

R. SROs mean soil remediation objectives for various exposure routes identified in 35 Illinois Administrative Code 742: Tiered Approach to Corrective Action Objectives (TACO).

S. Storm water means water deposited at the site in the form of rain, snow or other natural weather event.

T. TACO means TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES per 35 Illinois Administrative Code 742.

U. Top soil means soils placed to design grade and used to promote vegetative growth, and which does not exceed Title 35: Environmental Protection Subtitle G: Waste Disposal Chapter I: Pollution Control Board Subchapter F: Risk Based Cleanup Objectives, Part 742, Tiered Approach To Corrective Action Objectives, Appendix B values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters.

V. USEPA means United States Environmental Protection Agency.

1.4 SUBMITTALS

A. Copies of the following submittals shall be prepared and submitted to the Board Authorized Representative at contractor's own cost:
   1. Soil, fill, backfill, CU structural soil, construction and demolition debris removal
      a. Contractor's Site Specific Health and Safety Plan (HASP) for all workers engaged in excavation, stockpiling, loading, hauling, removal, and disposal of any soils (including non-special waste soils and non-hazardous special waste soils), fill, general construction and demolition debris from the property. The HASP shall comply with all OSHA requirements. The work shall be performed under the direct supervision of a trained experienced site supervisor. The plan should at a minimum include the following:
         1) Name key personnel and alternates responsible for site safety
         2) Describe the risks associated with each operation conducted
         3) Type of personnel training and responsibilities and to handle the specific hazardous situations they may encounter
         4) Describe the protective clothing and equipment to be worn by personnel during various site operations
         5) Describe any site-specific medical surveillance requirements
         6) Describe the program for the periodic air monitoring, personnel monitoring, and environmental sampling if needed
         7) Describe the actions to be taken to mitigate existing hazards to make the work environment less hazardous
         8) Define site control measures including a site map
         9) Establish procedures for personnel and equipment and transporting trucks to ensure that impacted soils are not tracked off site on to non-impacted areas of the site
         10) Set forth the site Standard Operating Procedures (SOPs). SOPs are those activities that can be standardized (i.e., decon procedures and respirator fit testing)
         11) Set forth a Contingency Plan for the safe and effective response to emergencies

b. Soil Management Plan outlining proposed excavation work sequences and procedures to separate each type of material to be removed from the site from clean materials. The Soil Management Plan shall show the locations of each type of material to be stored on site, location of clean materials to be stored at the site for reuse, and location of material to be stored on site for future disposal. The Soil Management Plan shall also include information regarding concrete and brick recycling procedures and name and address of the concrete and brick recycling sites that will be used as part of this project.

c. Name, address and telephone number of the open and active permitted Subtitle D landfill facility where soils (including non-special waste soils and non-hazardous special waste soils), fill, general construction and demolition debris are to be treated, stored, or disposed. This submittal must be made prior to removal of any materials from the site. This information should include, at a minimum, the following:
   1) Facility name and address and telephone number
   2) Site contact
   3) Facility identification number issued by Illinois, U.S. EPA, or other state licensing agencies for special waste disposal
   4) USEPA disposal site ID numbers (for hazardous waste sites only)
   5) State and/or local operational permit number(s) for the impacted construction and demolition debris disposal sites

d. Letter of authorization from the facility where soils (including non-special waste soils and non-hazardous special waste soils), fill, general construction and demolition debris are to be deposited prior to removal from the site. The authorization must be signed by the open and active permitted Subtitle D landfill facility representative and state that the facility complies with all local zoning codes and all local, state, and federal rules and regulations, that all required laboratory analyses has been received by the facility, and that the facility has agreed to accept the soils (including non-special waste soils, and non-hazardous special waste soils), fill, and general construction and demolition debris materials. The authorization shall further state that the soils (including non-special waste soils and non-hazardous special waste soils), fill, general construction and demolition debris fill materials are being accepted for permanent placement on site, and that the material will not be removed from the site unless required by a local, state or federal authority.

e. Copies of analytical results for each waste stream to be removed from the site as applicable. The name and address and telephone number of the laboratory that will be used by the contractor to perform analytical testing for waste stream authorization. The laboratory contracted to perform the analytical testing must be IEPA-accredited for the analysis being requested.

f. Storm Water Management Plan - prior to commencing work, the contractor shall provide a liquid materials handling plan. This plan shall stipulate provisions for dewatering, pumping, collection, temporary storage, and discharge or disposal of storm water, perched water and other liquids, contaminated and/or uncontaminated, at the site so as to facilitate soil removal and minimize disposal costs for contaminated fluids.

g. Copies of all daily reports, transport/waste manifests, weight tickets, and receipts (as applicable) to the Board Authorized Representative and/or Project Manager on a daily basis.

h. Any sampling data collected during the course of the work.

1.5 SUBMITTAL REVIEW

A. Review of submittals or any comments made does not relieve the contractor from compliance with the requirements of the drawings and specifications. The purpose of this check is to review for general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions; electing techniques of construction; coordinating the work; and performing the work in a safe and satisfactory manner.

1.6 NOTIFICATIONS

A. The contractor shall notify the Board Authorized Representative no less than forty-eight (48) business hours prior to loading and transporting any materials from the site.

1.7 RECORDKEEPING

A. The contractor shall provide documentation of labor, equipment, materials and disposal laboratory analysis used for soil removal, when requested by the Board Authorized Representative.

PART 2 - PRODUCTS

2.1 REMOVAL OF SOIL, FILL, BACKFILL, CU STRUCTURAL SOIL, AND CONSTRUCTION AND DEMOLITION DEBRIS

A. The contractor shall furnish all necessary means, products, tools, and equipment required to remove soil (including non-special waste soils and non-hazardous special waste soils), fill, backfill, CU structural soil and construction and demolition debris from the site as directed by the Board Authorized Representative.

PART 3 - EXECUTION

3.1 AUTHORIZATIONS

A. Obtain authorization from the open and active permitted Subtitle D landfill owner where soils (including non-special waste soils and non-hazardous special waste soils), fill, backfill, CU structural soil and construction and demolition debris are to be transported, stored, or disposed. The authorization must be signed by a facility representative and shall state that the facility has received a copy of one or more laboratory analyses of representative sample(s) collected from the site by the contractor and has agreed to accept the material. The authorization shall further state that the facility agrees to accept the material for permanent placement on their site and that the material will not be removed from their site unless required by a local, state or federal authority. The authorization shall further state that the facility complies with all local zoning codes, state, federal and local laws, rules, and regulations.

B. Obtain prior authorization from Board Authorized Representative to backfill excavations and utility lines, and apply top soil. All backfill, CU structural soil, and top soil shall comply with site specific project specifications.

C. Haulers for transportation of soils, backfill and top soil shall hold, and present upon request, a current valid Commercial Driver's License (CDL). Non-hazardous special wastes and hazardous wastes must be hauled by an IDOT-approved, licensed, and permitted transporter and must be visible during transportation.

3.2 MATERIAL SAMPLING

A. Soil, fill, backfill, CU structural soil, construction and demolition debris
   1. The contractor shall collect sufficient amount of representative sample(s) from each type of material being removed from the site for analytical testing to obtain authorization for the ultimate disposition of the materials. The contractor is responsible for acquisition of any required permits and payment of all fees.
   2. The contractor shall be responsible for obtaining liquid samples as needed for characterization for liquid disposal offsite or disposition onsite as applicable. The contractor is responsible to the acquisition of any required disposal permits and the payment of any fees associated with liquid disposal.
   3. The contractor shall submit the soil and liquid samples (as applicable) to the laboratory and pay for the cost of analyzing the constituents required for the ultimate disposition of soils and liquids.
   4. The MEC may collect samples for laboratory analysis or field Photo-ionization Detector (PID) screening, or liquid samples for laboratory analysis. The contractor shall provide the necessary equipment and manpower to assist the MEC to collect materials to be sampled at no additional cost to the project.
   5. The contractor shall immediately notify the Board Authorized Representative and MEC if any materials, (solid or liquid) requiring special handling (i.e., stained soil, soil with odors, or liquids) are encountered.
   6. All excavated soils, liquids, and other material shall be removed from the site in accordance with applicable federal, state, and local regulations.

3.3 EXCAVATION

A. The contractor shall perform excavation of soils (including non-special waste soils and non-hazardous special waste soils), fill, backfill, CU structural soil and construction and demolition debris as directed by the Board Authorized Representative.

B. All excavation shall be performed in accordance with OSHA requirements and guidelines.

3.4 HAULING

A. The contractor shall remove soils, dusts, rocks, etc. from the exterior of trucks, trailers, or other heavy equipment leaving the site before they leave the site.

B. The contractor shall clean the tractor-trailers or trucks that are loaded with materials for off site placement/salvage by removing clinging soils, or rocks from the exterior of the equipment.

C. The contractor shall not create dust and shall maintain adequate dust suppression equipment on site if conditions warrant.

D. The contractor shall maintain streets clean and free of mud and dirt.

E. The contractor shall conduct soil (including non-special waste soils and non-hazardous special waste soils), fill, backfill, CU structural soil and construction and demolition debris removal in a manner that ensures minimum interference with roads; streets, walks and other adjacent occupied and used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from the applicable governing agency and Board Authorized Representative. Provide alternate routes around closed or obstructed traffic ways if required by the governing agency.

3.5 TRANSPORTATION

A. The contractor shall remove soils, dusts, rocks, etc. from the exterior of trucks, trailers, or other heavy equipment leaving the site before they leave the site. The contractor shall provide and complete copies of all daily reports, weight tickets and receipts (as applicable) for transportation and ultimate off site placement of materials removed from the property to the Board Authorized Representative, review and signature as required.

3.6 DUST CONTROL

A. The contractor shall control dust by all necessary means, including but not limited to covering trucks, stockpiles and open materials, watering haul roads, sweeping paved roads, and limiting the speed of all on-site vehicles.

3.7 LIQUID (WATER) MANAGEMENT

A. The contractor shall subscribe to a weather notification system and manage the work so as not to accumulate storm water on the site during excavation.

B. Prior to commencing work, the contractor shall provide a Storm Water Management Plan. The Storm Water Management Plan shall stipulate provisions for dewatering, pumping, collection, temporary storage, and discharge or disposal of storm water, perched water and other liquids, contaminated and/or uncontaminated, at the site so as to facilitate soil removal and minimize disposal costs for contaminated fluids.

C. The contractor shall ensure that contamination of water, perched water and previously uncontaminated water or perched water does not occur by preventing the contact of such liquid with materials that exceed Title 35: Environmental Protection Subtitle G: Waste Disposal Chapter I: Pollution Control Board Subchapter F: Risk Based Cleanup Objectives, Part 742, Tiered Approach To Corrective Action Objectives, Appendix B, Table A values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. Earthen berms, plastic (polyethylene) sheeting, pumping, and other such means, as specified in the approved Storm Water Management Plan, may be used.

D. If the contractor, through negligence, allows storm water to contact materials that exceed Title 35: Environmental Protection Subtitle G: Waste Disposal Chapter I: Pollution Control Board Subchapter F: Risk Based Cleanup Objectives, Part 742, Tiered Approach To Corrective Action Objectives, Appendix B, Table A values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters, the water must be disposed of as water that exceeds Title 35: Environmental Protection Subtitle G: Waste Disposal Chapter I: Pollution Control Board Subchapter F: Risk Based Cleanup Objectives, Part 742, Tiered Approach To Corrective Action Objectives, Appendix B, Table A values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. The contractor will be responsible for the additional costs incurred for any disposal analysis and disposal costs.

3.8 QUALITY CONTROL

A. Visual inspections and damage repairs shall be made daily by the contractor and/or as directed by the Board Authorized Representative to assure that erosion, drainage and containment control measures are functioning properly.

B. The contractor shall take all necessary precautions to protect structures, equipment, pavement, walks and utilities against movement or settlement during the course of work.

C. Damages: Promptly replace or repair any damage caused to adjacent pavement, utilities or facilities by removal operations at no additional cost. Work shall be performed to the satisfaction of the Board Authorized Representative.

D. Utility services: Maintain existing utilities and protect against damage during removal operations.

PART 4 - MEASUREMENT AND PAYMENT

4.1 CONTRACT UNIT PRICING

A. Volume determination and pricing shall in accordance with the contract documents.

END OF SECTION

SECTION 02318

ACCEPTANCE OF BACKFILL, TOP SOIL & CU STRUCTURAL SOIL

PART 1 - GENERAL

1.1 APPLICABILITY:

A. These environmental requirements apply to all Chicago Public School (CPS) properties, including but not limited to, schools, and associated landscape, playground, ball field, parkways, stadium, and parking lot areas.

1.2 DEFINITIONS

A. Agency means Illinois Environmental Protection Agency (IEPA).

B. Backfill means any granular or cohesive material used to fill an excavation or bring property to design grade as specified in the Architect/Engineer drawings and specifications.

C. Board Authorized Representative means the person designated as the official representative of the owner in connection with a project.

D. CU Structural Soil means a uniformly blended mixture of crushed stone, clay, loam and hydrogel, as referenced in Specification 02901.

E. IEPA means Illinois Environmental Protection Agency

F. Managing Environmental Consultant (MEC) means the entity with overall responsibility for the direction and control of the environmental investigations, assessments, designs, and supervision of remediation work.

G. Top Soil means any soils placed to design grade and used to promote vegetative growth. All top soil shall not exceed Title 35: Environmental Protection Subtitle G: Waste Disposal Chapter I: Pollution Control Board Subchapter F: Risk Based Cleanup Objectives, Part 742, Tiered Approach To Corrective Action Objectives, Appendix B, Table A values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters.

1.3 SUBMITTALS

A. Copies of environmental analytical results of all backfill material, top soil and CU Structural Soil verifying that these materials do not exceed APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from virgin sources, one representative sample must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from recycled sources, one sample per 1,000 tons of material must be analyzed for 35

ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. A copy of the analytical results shall be submitted at least one week prior to depositing backfill or top soil on site. The date of the analysis shall be within 60 days of importing such material to a school property.

B. Name and address and telephone number of the laboratory that will be used by the Contractor to perform the environmental analytical testing for backfill, top soil and CU Structural Soil samples prior to starting work. The laboratory performing the analysis must be an IEPA accredited laboratory.

C. Copies of all daily reports, transport records and receipts to the Board Authorized Representative on a daily basis.

1.4 SUBMITTAL REVIEW

A. Review of submittals or any comments made does not relieve the Contractor from compliance with the requirements of the drawings and specifications. The purpose of this check is to review for general conformance with the design concept of the project and general compliance with the information given in the contract documents. The Contractor is responsible for confirming and correlating all quantities and dimensions; electing techniques of construction; coordinating the Work; and performing the Work in a safe and satisfactory manner.

PART 2 - PRODUCTS

2.1 BACKFILL, TOP SOIL, CU STRUCTURAL SOIL

A. The contractor shall supply only backfill, top soil and CU Structural Soil that does not exceed APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from virgin sources, one representative sample must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from recycled sources, one sample per 1,000 tons of material must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. The date of the environmental analysis of any backfill, top soil or CU Structural Soil shall be within 60 days of importing such material to a school property.

PART 3 - EXECUTION

3.1 AUTHORIZATIONS

A. Haulers for transportation of backfill, top soil or CU Structural Oil shall hold and present upon request a current, valid Commercial Driver’s License (CDL).

3.2 MATERIAL SAMPLING

A. The Contractor shall collect sufficient amount of representative (no composite samples) backfill, top soil and CU Structural Soil sample(s) for analytical testing sufficient to verify that these materials do not exceed APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. The contractor is responsible for payment of all backfill, top soil and CU Structural Soil sampling and analytical fees.

B. The MEC may collect backfill, top soil or CU Structural Soil samples for laboratory analysis on behalf of the contractor at no additional cost to the project.

C. The MEC may collect samples for laboratory analysis or field Photo-ionization Detector (PID) screening, or liquid samples for laboratory analysis. The Contractor shall provide the necessary equipment and manpower to assist the MEC to collect materials to be sampled at no additional cost to the project and in compliance with OSHA and all other Rules and Regulations.

3.3 HAULING

A. The Contractor shall not create dust and shall maintain adequate dust suppression equipment on site if conditions warrant.

B. The Contractor shall maintain streets clean and free of mud and dirt.

C. The Contractor shall place backfill, top soil and CU Structural Soil to ensure minimum interference with roads; streets, walks and other adjacent occupied and used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from the applicable governing agency and the Board Authorized Representative. Provide alternate routes around closed or obstructed traffic ways if required by the governing agency.

3.4 TRANSPORTATION

A. The Contractor shall provide and complete copies of all daily reports, weight tickets and receipts (as applicable) for transportation and ultimate placement of the backfill, top soil, and CU Structural Soil to the Board Authorized Representative, Project Manager and/or MEC for review and signature within 5 business days or as directed by the Board Authorized Representative.

3.5 BACKFILL

A. The backfill material shall be granular or cohesive material that meets the project specified requirements.

B. For each off-site source of backfill materials, the Contractor shall provide to the Board Authorized Representative, Project Manager and/or MEC as required, environmental laboratory analyses and certification that the imported backfill does not exceed APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO):

35 ILL. ADM. CODE 742 values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from virgin sources, one representative sample must be analyzed for Appendix B, Section 742 Table A parameters. For samples from recycled sources, one sample per 1,000 tons of material must be analyzed for Appendix B, Section 742 Table A parameters. The date of the analysis of any backfill shall be within 60 days of importing such material to a school property.

C. The contractor shall not place backfill material without approval of the Board Authorized Representative. If the Contractor backfills the excavation area without obtaining approval from the Board Authorized Representative, the backfill materials shall be excavated, if required, at the Contractor's expense.

3.6 TOP SOIL

A. The Top Soil material shall meet the project specified requirements as referenced in Specification 02900.

B. For each off-site source of top soil, the Contractor shall provide to the Board Authorized Representative as required, environmental laboratory analyses and certification that the imported top soil does not exceed APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from virgin sources, one representative sample must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from recycled sources, one sample per 1,000 tons of material must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. The date of the analysis of any backfill top soil shall be within 60 days of importing such material to a school property.

C. The contractor shall not place top soil without approval of the Board Authorized Representative. If the Contractor places top soil without obtaining approval from the Board Authorized Representative, the top soil shall be excavated, if required, at the Contractor's expense.

3.7 STRUCTURAL SOIL

A. CU Structural Soil shall meet the project specified requirements as referenced in Section 02901.

B. For each off-site source of CU Structural Soil, the Contractor shall provide to the Board Authorized Representative, Project Manager and/or MEC, as required, environmental laboratory analyses and certification that the imported materials do not exceed APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from virgin sources, one representative sample must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from recycled sources, one sample per 1,000 tons of material must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. The date of the analysis of any CU Structural Soil shall be within 60 days of importing such material to a school property.

C. The contractor shall not place CU Structural Soil without approval of the Board Authorized Representative. If the Contractor places CU Structural Soil without obtaining approval from the Board Authorized Representative, the CU Structural Soil shall be excavated, if required, at the Contractor's expense.

3.8 DUST CONTROL

A. The Contractor shall control dust by all necessary means, including but not limited to covering trucks, stockpiles and open materials, watering haul roads, sweeping paved roads, and limiting the speed of all on-site vehicles.

3.9 QUALITY CONTROL

A. The Contractor shall take all necessary precautions to protect structures, equipment, pavement, walks and utilities against movement or settlement during the course of work.

B. Damages: Promptly replace or repair any damage caused to adjacent pavement, utilities or facilities by removal operations at no additional cost. Work shall be performed to the satisfaction of the Board Authorized Representative.

C. Utility Services: Maintain existing utilities and protect against damage during placement of backfill, top soil and CU Structural Soil.

PART 4 - MEASUREMENT AND PAYMENT

4.1 CONTRACT PRICING

A. Volume determination and pricing shall be in accordance with the contract documents.

END OF SECTION

SECTION 04200

UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Masonry required to complete the Work

B. Options
1. Where “stone” is indicated built into masonry, provide either cast stone as specified or limestone as specified at contractor’s option.

1.2 SUBMITTALS

A. Product Data: Submit copies of manufacturer's specifications and instructions for reinforcing and accessory materials and proprietary materials.

B. Shop Drawings:
1. Submit Shop Drawings for stone in the form of cutting and setting drawings showing size, profiles, locations and anchoring.
2. Submit shop drawings for reinforcing detailing, fabrication, bending and placement of reinforcing bars. Comply with ACI 315 "Details and Detailing of Concrete Reinforcing" showing bar schedules, stirrup spacing, diagrams of bent bars, control joints and arrangement of masonry reinforcement.

C. Samples - Mortar:
1. Submit samples of colored mortar, showing the range of color which can be expected in the finished Work.

D. Samples - Concrete Masonry Units (CMU):
1. Submit 3 samples of each type of CMU unit. Select units to show the range of color and texture which can be expected in the finished Work.
a. Submit test reports conducted within last 6 months in accordance with ASTM C 140 demonstrating specification compliance.

2. Submit full size sample of each configuration of Ceramic Glazed Structure Clay Facing Tile (SGFT) and full color brochure.

E. Samples - Brick:
1. Submit 3 samples of exposed brick to Architects. Include the full range of exposed color and texture to be expected in the completed Work.
a. Submit test reports for test conducted on the brick proposed for use not more than twelve (12) months before submittal in accordance with ASTM C67 demonstrating specification compliance. Include initial rate of absorption.

2. Submit sufficient samples of each brick and other masonry unit to be utilized to the mortar batch plant, representing the full range of exposed color to be expected in the completed Work to construct prisms consisting of not more than 7 bricks for each different brick and brick combinations as they occur in the Work.

F. Samples - Stone: Submit three samples, **approximately 4-inch by 6-inch by 1-inch thick**having proposed finish and color. Include the full range of exposed color and texture to be expected in the completed Work.

G. Test Reports: Submit material test reports from a qualified independent testing laboratory complying with ASTM C1093 to be employed and paid by Contractor with affidavits/certifications indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:
1. Mortar to comply with physical properties requirements set forth in ASTM C270.
2. Clay masonry to comply with the physical properties requirement set forth in ASTM C216. Test report shall include compressive strength, 24 hour soak, 5 hour boil, saturation coefficient, efflorescence, and IRA (suction) tests.
3. Concrete masonry units to comply with physical properties requirement set forth in ASTM C90.

H. Certification: Plant mixed mortar and plant mixed grout: Submit statement from provider for each different cement product, name of manufacturer, brand, type and weight slips at the time of delivery for each 20 tons of mortar and grout.

I. Certification; Ground-Face CMU: Submit certification from the producer of the Ground-Face CMU stating that the units to be provided meet the soiling and cleanability requirements of ASTM C-744.

J. Insulation Certification: Submit a certification signed and dated by the insulation installer listing the type of insulation installed, the manufacturer, and R-value.

K. Certification, Reinforcing Bar: submit certification indicating each material and grade.

L. Certification, Joint Reinforcing: submit certification indicating type and size of joint reinforcement.

M. Certification Cast Stone: submit statement plant complies with requirements of Cast Stone Institute Technical Manual and the Architectural Precast Association. Submit manufacturers QAQC program.

N. LEED Submittals; LEED Credit MR 4.1 (and MR 4.2) and MR 5 (CMU): Submit separate certifications from the manufacturers of regular CMU, Glazed CMU, and Ground Faced CMU stating the following:
1. The percentage of recycled material in the product demonstrating compliance with specification requirements.
2. The percentage of replacement of Portland Cement by recycled product and the type of product.
3. The product was manufactured within 500 miles of the Project.

O. LEED Credit MR 4.1 (and MR 4.2) and MR 5 (Brick): Submit certification stating the percentage of recycled content of the brick (pre-consumer and post-consumer, if any; and that the location of the manufacturer is within 500 miles of the site, if so.

P. LEED Credit EQ 4: All adhesives and sealants installed in the building interior shall meet the testing and product requirements of the California Department of Health Services Standard Practice for The Testing Of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

Q.

1.3 QUALITY ASSURANCE

A. Materials:
   1. Do not change source or brands of masonry mortar materials during the Work.
   2. Obtain concrete masonry units (CMU) from one manufacturer, cured by one process and of uniform texture and color, for each type required for each continuous area and visually related areas.

B. Fire-Resistive ratings: Provide materials and construction identical to those of assemblies with fire-resistive ratings determined per ASTM E119 by a testing and inspection agency, by equivalent concrete masonry thickness, or other means, as acceptable to authorities having jurisdiction.

C. Regulatory Requirements: Comply with the applicable requirements of governing authorities and codes.

D. Unit Masonry Standard: Comply with TMS602/ACI530.1/ASCE6 current edition "Specifications for Masonry Structures," except as otherwise specified.

E. Coordination: Review installation procedures and coordinate with other Work that must be integrated with masonry.

F. Job Mock-Up: Prior to installation of masonry work, erect sample wall panel mock-up using materials, reinforcing, bond and joint tooling shown or specified. Build mock-up at the site, where directed, of full thickness unless otherwise shown, indicating the proposed range of color, texture and workmanship to be expected in the completed Work. Obtain Architect's acceptance of visual qualities of the mock-up before start of masonry work. Retain mock-up during construction as a standard for judging completed masonry work. Do not alter, move or destroy mock-up until Work is completed. Provide mock-up panel for each type of exposed unit masonry work.
   1. Construct mock-up separate from the Work. Do not incorporate mock-up into the Work.
   2. For cavity wall construction, construct the entire wall profile showing face brick, cavity, cavity wall insulation, concrete masonry unit backup, a grouted concrete masonry cell with reinforcing bar simulating a grout key, horizontal joint reinforcing, ties, base flashing, along base at corner condition, weep hole ventilators, and a typical lintel and sill showing flashing with end dams.

G. Preinstallation Conference: Conduct preconstruction conference at the project site.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver masonry materials to project in undamaged condition.

B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.

C. Store cementitious materials off the ground, under cover, and in dry location.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

1.5 PROJECT CONDITIONS

A. Masonry Protections:
   1. During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
      a. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
   2. Do not apply uniform floor or roof loads or concentrated loads for at least 3 days after constructing masonry walls or columns.
   3. Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar, and soil that comes in contact with such masonry.
   4. Protect base of walls from rain-splashed mud and mortar splatter.
   5. Protect sills, ledges, and projections from grout and mortar droppings.
   6. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes from grout and mortar droppings.

B. Frozen Materials: Do not use frozen materials or materials mixed or coated with ice or frost.

C. Frozen Work: Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing.

D. Cold Weather Construction: Comply with the cold weather requirements indicated in TMS 602/ACI 530.1/ASCE 6 and the following when the ambient temperature falls below 40° F or the temperature of masonry units is below 40° F, comply with the following:
   1. Temperature of masonry units shall not be less than 20° F when laid in the assembly. Remove visible ice on masonry units before using the unit.
   2. Heat mortar sand or mixing water to produce mortar temperatures between 40° F and 120° F at the time of mixing. Maintain mortar above freezing until used in masonry.

3. Use heat sources where ambient temperatures are between 20° F and 25° F, on both sides of the masonry under construction and install wind breaks when wind velocity is in excess of 15 mph.
4. Where ambient temperatures are below 20° F, provide an enclosure for the masonry under construction and use heat sources to maintain temperatures above 32° F within the enclosure.
5. Where mean daily temperatures are between 32° F and 40° F protect completed masonry from rain or snow by covering with a weather resistive membrane for 24 hours after construction.
6. Where mean daily temperatures are between 25° F, and 32° F completely cover completed masonry with a weather resistive membrane for 24 hours after construction.
7. Where mean daily temperatures are between 20° F and 25° F, completely cover completed masonry with insulating blankets or equal protection for 24 hours after construction.
8. Where mean daily temperatures are below 20° F, maintain masonry temperature above 32° F for 24 hours after construction by enclosure with supplementary heat, by electric heating blankets, by infrared heat lamps, or by other acceptable methods.

E. Hot Weather Construction: When the ambient air temperature **exceeds 100° F or exceeds 90° F with a wind velocity greater than 8 mph**, do not spread mortar beds more than 4 feet ahead of laying masonry units and set units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

A. Brick:
1. Face brick: Conforming to ASTM C 216, Grade SW, Type FBX having a maximum IRA of 30g/min-30 square inches
   a. Face Brick Type A: Endicott Gray Blend Smooth; 4”H x 4”D x 12”L.
   b. Face Brick Type B: Endicott Dark Iron Spot Smooth; 4”H x 4”D x 12”L.
2.
3. Match color and texture of samples on file, obtain acceptance of Architect.
4. Provide special shapes required to avoid exposing coring or where exposed faces do not match uncut faces.
5. Minimum net area compressive strength 1900psi per ASTM C90

B. Concrete Masonry Units (CMU):
1. Size: Nominal face dimensions of 16 inches long by 8 inches high (15-5/8 inches by 7-5/8 inches actual), unless otherwise indicated.
2. Special Shapes: Provide for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.
   a. Provide bullnose block for outside corners, unless otherwise indicated.
3. Hollow and Solid CMU: ASTM C90 minimum net area compressive strength of 1900 PSI.
   a. Medium weight: provide units having dry weight not exceeding 125 pounds per cubic feet.
   b. Light weight: provide units having dry weight not exceeding 105 pounds per cubic feet.

C. Ground-Face CMU: Conform to requirements of ASTM C90 for hollow or solid CMU except provide units with exposed faces (one or both as required) matching Architect's selections for color and texture to Architect's satisfaction.
   1. Products: Subject to compliance with requirements, provide products of one of the following:
      a. Trenwyth Industries TrendstonePlus or VerastonePlus
      b. Van Poppelen Bros SatinStone
   2. Basis for Design: Van Poppelen Bros "Ashton", SatinStone
   3. Weight: Provide medium weight units producing dry weight of not more than 125lbs. per cubic foot, except as acceptable for ground faced units.
      a. Provide units using aggregates complying with ASTM C33 or ASTM C331 as required to match color and texture of Architect's selections to Architect's satisfaction.
      b. Fill the ground surfaces with a cementitious grout having a minimum cured strength and durability equal to the block.
   4. Exposed Faces:
      a. Provide fine texture.
      b. Where ground-faces are shown or scheduled, provide CMU with exposed faces matching the color, texture and pattern of the Architect's sample.
      c. Where ground-faces are shown or scheduled, provide units having producers standard finish having resistance to Soiling and Cleansability complying with Paragraph 5.7 of ASTM C744.

D. Structural Glazed Tile (SGT): comply with ASTM C126, Grades, Types I and II as required, bed depth as required, Shapes furnished as shown on plans, color gloss or surface texture selected by Architect and as indicated on drawings , SGT to be manufactured by one of the following:
   1. Elgin Butler series 8P, unless noted otherwise.
   2. Equal

E. LEED Requirements: Provide each product meeting the following minimum requirements:
   1. For lightweight CMU, except ground faced, provide units containing a minimum 40 percent water-cooled expanded blast furnace slag manufactured within 500 miles of the Project.
   2. Replacement of a minimum 10 percent of the Portland Cement with Fly Ash and other pozzolans manufactured within 500 miles of the Project.
   3. The product has been manufactured within 500 miles of the Project.
   4. For ground faced CMU, the decorative aggregate was obtained 500 miles of the CMU manufacturing plant.

F. Materials - Mortar and Grout:
   1. Portland Cement: ASTM C 150, Type I.
   2. Masonry Cement: Not acceptable.
   3. Lime: ASTM C 207, Type S.
   4. Aggregate for Mortar: Sand, ASTM C 144, except for joints 1/4 inch and less (if any) use aggregate graded with 100 percent passing the No. 16 sieve.
   5. Water: Clean, free of deleterious materials which would impair strength or bond.
   6. Aggregate for Grout: ASTM C 404.

7. Pointing Mortar: Bagged Ceramic Tile Grout (sanded), to be mixed with an acrylic latex additive and manufactured by one of the following:
   a. Hydroment by Bostik
   b. Laticrete International
   c. Custom Building Products

G. Mortar Pigment: Compounded for use in mortar mixes by one of the following:
1. Bayer Corporation, Industrial Chemicals Div.: Bay ferrox Iron Oxide Pigments.
2. Davis Colors; True Tone Mortar Colors.
3. Solomon Grind-Chem Services,Inc.;SGS Mortar Colors

H. Reinforcing Bars: ASTM A615, Grade 60.
1. Where reinforcing bars are used, provide rebar positioners.

I. Continuous Wire Reinforcing:
1. Provide welded wire units prefabricated in straight lengths of not less than 10 feet, with matching corner ("L") and intersection ("T") units. Fabricate from steel wire complying with ASTM A 82, with deformed continuous side rods and plain cross rods, with unit width of 1-1/2 inches to 2 inches less than thickness of wall or partition.
2. For single wythe masonry, provide units fabricated as follows:
   a. Ladder type fabricated with single pair of side rods and perpendicular cross rods spaced not more than 16 inches O.C.
3. For multi-wythe masonry, provide units fabricated as follows:
   a. Use tab design with single pair of side rods and rectangular box eye-type cross tie of lengths required to extend through insulation and drainage material spaced not more than 16 inches O.C.; with side rods spaced for embedment within each face shell of backup wythe with loose pintle type ties extended to engage the outer wythe by at least 1 ½ inches. Similar to Dur-o Wall Ludar-eye. Anchors portion shall have a maximum offset not to exceed 1-1/4 inch.
4. Wire: Fabricate with 9-gauge side and cross rods, unless otherwise indicated.
   a. Provide zinc-coated (galvanized) wire ASTM A 641 for interior partitions.
   b. Provide hot-dipped galvanized finish after fabrication, ASTM A153, Class B-2, (1.5 ounce per square foot) for exterior walls.

J. Anchoring Devices:
1. Adjustable Anchors: Provide adjustable anchors which will permit horizontal and vertical movement of masonry but will provide lateral restraint, and as follows:
   a. For anchorage to steel framework, provide V-shaped 3/16 inch wire tie sections sized to extend to within 1 inch of face of masonry, hot-dipped galvanized finish conforming to ASTM A 153, Class B-2, (1.5 ounce per square foot).
   b. Furnish to steel fabricator for installation on web of steel members where masonry anchors are indicated on the drawing, and where masonry passes or abuts the member 1/8 inch (3.19mm) 7 inch high receptor angle having slotted flange, 5 inch slotted hole in one leg located 3/4inch from edge of angle to receive wire tie section similar to Dur-O-Wall D/A 700 series triangular ties or equivalent.
   c. Furnish to steel fabricator for installation on flange of steel member where masonry anchors are indicated on the drawings and where masonry passes or abuts the member. Provide ¼ inch crimped wire anchor in 8-foot lengths for welding to steel flange to receive wire tie section similar to Dur-O-Wall D/A 700 Series triangular ties or equivalent.

d. For anchorage of concrete masonry to concrete masonry at control joints provide joint stabilizing anchor similar to Dur-O-Wall D/A 2200 or equivalent. For anchorage of concrete masonry wall to non-load bearing concrete masonry walls, provide wire mesh hardware cloth masonry ties complying with ASTM A185.

2. Stone Anchors: Fabricate cramp anchors and dowels of stainless steel. Provide minimum 3/16 inch thick cramp anchors and minimum 3/8 inch diameter dowels.

K. Accessory Materials:

1. Bond Breaker Strips: 15 lb. asphalt impregnated building felt.
2. Pre-Molded Control Joint Strips: Solid rubber or PVC strips with a minimum Shore A durometer hardness of 70, designed to maintain lateral stability in masonry wall.
3. Compressible Filler: Expanded polyethylene.
4. Expansion Joint Filler: Closed cell neoprene 3/8 inch thick with peel off pressure sensitive adhesive on one side similar to Dur-O-Wall D/A 2010, rapid-soft joint or Hohmann & Barnard # NS Joint.
5. Weep-hole Ventilator: Continuous cellular flexible, ultraviolet resistant polypropylene. Dur-O-Wall Cell Vent, D/A 1006 or Hohmann & Barnard # QV vent width and height the same as brick head dimension. Color selected by Architect.
6. Precompressed Expansion for Sealant: Emseal 25
7. Mortar Collection Device: Free-draining mesh; made from polyethylene strands and shaped to avoid being clogged by mortar droppings, thickness required to fill cavity.
   a. Mortar Break; Advanced Building Products
   b. CavClear Masonry Mat; CavClear
   c. Mortar Net; Mortar Net
   d. Mortar Stop; Polytite

L. Concealed Acoustical Sealant: Non-drying, non-hardening, non-skinning, non-staining, non-bleeding, gunnable sealant.

1. Provide Sealants installed in the building interior (defined as inside of the weatherproofing system and applied on-site shall meet the testing and product requirements of the California Department of Health Services Standard Practice for the Testing of Volatile Organic emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

M. Through-Wall Flashing:

1. Rubberized Asphalt Sheet Flashing: Manufacturer's standard composite flashing product consisting of minimum 26-mil-thick pliable and highly adhesive rubberized asphalt compound bonded completely and integrally to 4-mil-thick, high-density, cross-laminated polyethylene film to produce an overall thickness of 30 mils. Manufactured by Carlisle, W. R. Grace, Illinois Products Corp. or Polyguard.
   a. At drips, provide minimum 2 inches wide by 0.015 inch thick continuous stainless steel with one side hemmed edged and bent down 1/4 inch (at 45°) to form a drip. Stainless steel to be 304 or 316 grade.
   b. Provide stainless steel edge for construction adhesive on top of foundation walls.

c. Provide prefabricated pre-formed corner boots of rubberized asphalt flashing material for outside corners and flashing end dams at lintels, sills, inner corners and all other types of end terminations.
d. Provide mastic and primer recommended by the flashing manufacturer

N. Cavity Wall Insulation:
1. Foil-faced, Polyisocyanurate Board Insulation: ASTM C1289, Type I, Class 2 or having the R-value stamped on the board faces. Minimum R Value: 6.7 per inch.

O. Limestone: Indiana oolitic limestone as quarried in Lawrence, Monroe, and Owen counties, Indiana; complying with ASTM C 568, Category II (medium density); and matching standards of the Indiana Limestone Institute of America's "Indiana Limestone Handbook" for the following:
1. Grade: Standard
2. Color: Gray
3. Finish: Smooth

P. Cast Stone: A combination of white and/or gray Portland Cement, natural sand, marble and/or quartz aggregate and natural and synthetic pigments cast to produce a unit with a minimum compressive strength of 6,000 psi and a maximum 5 percent absorption and reinforced as required for stresses of transportation, handling and loads imposed by construction where used as lintels. Comply with ASTM C 1364.

1. Provide cast stone by a manufacturer having at least 5 years experience. Provide statement plant complies with standards of Cast Stone Institute. Submit manufacturer's in-house QA/QC program.
a. American Art Stone
b. Continental Cast Stone
c. Dallas Cast Stone
d. Edwards
e. Russell

Q. Cavity Insulation with Integral Drainage Matting
1. Insulation: Polyisocyanurate rigid board insulation as specified.
2. Drainage Matting: fluid conducting-non-absorptive mold resistant high impact dimpled styrene drainage panel with permeable-face or polymer mesh consisting of woven textile product in random pattern having voids no greater than 1/4 inch in diameter bonded to the entire face of the insulation board by the manufacturer. Matting shall be integrally bonded to the entire face of the rigid board insulation by the manufacturer and shall be suitable for substantially continuous installation within the full height of the wall cavity.
a. Drainage mat thickness: 3/8 inch to 1/2 inch.

3. Masonry mat thickness shall allow no more than 5/8 inch tolerance between masonry mat and the masonry wythe.
4. Products:
a. Thermadrain; Thermadrain, Inc.
b. CavClear Insulation System: Archovations, Inc.

5. Adhesive: Type recommended by insulation board manufacturer and air barrier for application indicated.

R. Ground Face CMU Cleaner: Sure-Kleen Burnished Custom Masonry Cleaner or as recommended by the manufacturer.

2.2 MORTAR MIXES

A. General: Mortar for Unit Masonry, comply with ASTM C270, Proportion Specifications for Type "N" portland lime mortar (1:1:6) except where indicated otherwise
   1. Provide only plant mixed mortar as specified.

B. Mortar for Unit Masonry: Provide only premixed, pre-bagged mortar supplied from plant.
   1. Comply with ASTM C270, proportion specification for type "N" indicated in table 1.
   2. Minimum compressive strength of mortar 1800 psi.
   3. Provide only plant mixed mortar as specified. Mortar manufacturer must provide test results indicating the mortar's compliance with this specification.
   4. When used in ground face CMU and in brick, colored mortars are to be selected by the architect to match masonry units.

C. Grout: Portland cement, sand, gravel and water, proportioned as required ASTM C476 to provide a 28-day minimum compressive strength of 2000 psi. Mix grout to obtain on 8 inches to 10 inches slump unless otherwise indicated.
   1. At the contractors option, Self Consolidating Grout (SCG) can be used and must meet ASTM C476 and the following requirements:
      a. T20 between 2 to 5 seconds
      b. Visual Stability Index (VSI) to be zero
      c. A total spread range between 22 inches to 30 inches when mixed with the appropriate amount of water.

D. Plant Mixing Mortar and Grout:
   1. Proportion mortar to comply with required type per ASTM C270.
      a. Have tests conducted by independent laboratory for compressive strength and bond strength for each masonry composite and submit results.
      b. If specified compressive strength cannot be obtained by adjusting mortar mix within specified range of the mortar type specified, immediately notify the Architect and provide recommendations.
      c. Conduct separate tests for each brick and separate tests utilizing different brick or other masonry units as combination occurs on the job.
   2. Dry mix materials utilizing equipment designed to insure uniform blending and precision measuring devices to insure uniformity from batch to batch.
   3. Deliver and maintain at site bulk dry blended ingredients in enclosed container.
   4. Add only clean water at the site.
   5. Provide required certificates.

2.3 STONE FABRICATION

A. Fabricate to profiles. Provide holes and sinkages as required.

B. Fabricate in lengths shown, or if not shown, in approximately 4 foot sections. Allow for 3/8 inch joints. Provide drips and wash surfaces on all projecting portions.

C. Provide minimum two cramp anchors at top and bottom between panel units and minimum 2 dowels per coping and sill unit.

D. Provide mitered corners.

2.4 FIELD QUALITY CONTROL

A. Owner will employ a testing laboratory experienced in performing types of masonry field quality control tests for engineered masonry indicated.
   1. Perform the following field tests, a minimum of 3 sample each, per 5000 square feet of wall area.
      a. Mortar compression test per ASTM C780
      b. Grout prism test per ASTM C1019
      c. Concrete masonry prism test per ASTM C1314
      d. Flexural bond strength of brick when brick are structural test per ASTM C1072
      e. Cone slump test for grout as required

B. Evaluation of Quality Control Tests: Masonry work, in absence of other indications of noncompliance with requirements, will be considered satisfactory if results from construction quality control tests comply with minimum requirements indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry.

B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

C. Start of work will evidence acceptance of conditions.

3.2 PREPARATION

A. Lay out partitions on floors and locate door frames.

B. Reinforcing: Remove loose rust, ice and contaminates before placing units.

3.3 INSTALLATION

A. Tolerances: Erect masonry within the following tolerances from the specified dimensions:
   1. Dimension of elements.
      a. In cross section or elevation ..... -1/4 in., +1/2 in.
      b. Mortar joint thickness
         Bed ..... ±1/8 in.

Head	-1/8 in., +1/4 in.
Collar.....	-1/4 in., +3/8 in.

c. Grout space or cavity width..... -1/4 in., +3/8 in.

2. Elements

a. Variation from level:

Bed joints	±1/4 in. per 10 ft.
.....	±1/2 in. maximum
Top surface of bearing walls.....	±1/4 in. per 10 ft.
.....	±1/2 in. maximum

b. Variation from plumb ..... ±1/4 in. per 10 ft.
..... ±3/8 in. per 20 ft.
..... ±1/2 in. maximum

c. True to a line..... ±1/4 in. per 10 ft.
..... ±3/8 in. per 20 ft.
..... ±1/2 in. maximum

d. Alignment of columns and walls (bottom versus top)
..... ±1/2 in. for bearing walls
..... ±3/4 in. for non-bearing walls

3. Location of elements

a. Indicated in plan ..... ±1/2 in. per 20 ft.
..... ±3/4 in. maximum

b. Indicated in elevation ..... ±1/4 in. per story height
..... ±3/4 n. maximum

4. In placing of reinforcement (See Article 3.4E of ACT 530.1)

B. Installation, General:

1. Comply with TMS 602/ACI 530.1/ASCE 6 Current Edition and this Specification.
2. Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match Work immediately adjacent to the opening.
3. Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide required pattern and to fit adjoining Work neatly. Use full-size units without cutting wherever possible.
4. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to properly locate openings, movement type joints, returns and offsets. Avoid the use of less than half-size units at corners, jambs and wherever possible at other locations.
5. Lay up walls plumb and true to comply with specified tolerances, with courses level, accurately spaced and coordinated with other Work.
6. Where shown or scheduled, provide special units and bond.
7. Lay all other exposed masonry in the bond pattern shown or, if not shown, lay in running bond with vertical joint in each course centered on units in courses above and below (except in one - third running bond where required by unit size).
8. Lay concealed masonry with all units in a wythe bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than 4 inches horizontal face dimensions at corners or jambs.
9. Discard units with cracked faces, chipped edges, or corners or other defects that affect appearance or performance.

C. Mortar Bedding and Jointing:

1. Lay brick and other solid masonry units with solidly filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.
2. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed cross webs in mortar in starting course and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced and filled with grout.
3. Maintain joint widths except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8 inch joints.
4. Tool exposed joints slightly concave, except as otherwise shown.
5. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials.
6. Rake-out joints 1/2 inch in glazed CMU or SGFT and point with pointing mortar selected by Architect.
7. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.
8. Remove mortar protruding into cells of CMU, which are to be grouted.

D. Stone Work: Set units in full bed of mortar with all vertical joints full. Fill dowel, anchor and similar holes solid. Wet joint surface thoroughly before setting; for surfaces which are soiled, clean bedding and exposed surfaces with fiber brush and soap powder followed by thoroughly rinsing with clear water.
   1. At copings and sills and where stone joints are shown to be sealed or caulked, install head joints free of mortar.

E. Composite Walls:
   1. Fill the collar joint solidly with mortar by parging the in-place wythe and laying units into the parging.
   2. Provide weephole ventilator in head joints of exterior wythe of composite wall located immediately above ledges and flashing, spaced maximum 2 feet O.C. and recess 1/8 inch from face of masonry.
   3. Install weephole ventilation so that the back of the ventilation comes into contact with the interior wythe surface

F. Cavity Walls:
   1. Keep cavity clean of mortar droppings and other materials during construction.
   2. Tie exterior wythe to back up with continuous horizontal joint reinforcing as specified.
   3. Provide weephole ventilator in head joints of exterior wythe of cavity wall; locate immediately above flashing, space maximum 2 feet O.C. and recess 1/8 inch from face of masonry.
   4. Install weephole ventilation so that the back of the ventilation comes into contact with cavity drainage material surface.
   5. Cut units of insulation to fit tight to each other, reinforcing and abutting construction, install small pads of adhesive spaced approximately 1 foot O.C. both ways on inside face or attach to inside face with plastic fasteners secured to wire ties. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
   6. Install mortar collection device at all through wall flashing locations. Provide units the full width of the cavity with ends butted to provide continuous coverage and provide paths for moisture to reach weeps.

G. Stopping and Resuming Work:
1. Rake back 1/2 unit length for one half running bond or 1/3 unit length for one-third running bond in each course; do not tooth, stop and resume brickwork and CMU at control or expansion joints. Clean exposed surfaces of set masonry, wet units lightly (if required) and remove loose masonry units and mortar prior to laying fresh masonry.

H. Built-In Work:
1. As the Work progresses, build in items specified under this and other Sections and as required to complete the Project. Fill in masonry solidly around built-in items.
2. Fill space between hollow metal frames and masonry solidly with mortar.
3. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
4. Fill cores in hollow units with grout minimum 3 courses (24-inches) under bearing plates, beams, lintels, posts and similar items unless otherwise indicated.
5. At openings and cutouts, fill open spaces between edges of hollow masonry units and fixtures, electrical boxes, cabinets, ducts and other flush or penetrating items, with continuous bead of acoustical sealant.

I. General:
1. Place all anchors and ties, for secure anchorage and bonding of masonry.
2. Install anchors, ties and joint reinforcement to achieve full mortar encapsulation. Lap joint reinforcement minimum of 6 inch at end of 10 feet sections.
3. Embed anchors and ties at least 1/2 inch in mortar of outer face shell of hollow units and 1-1/2 inch in mortar of solid masonry.
4. Provide minimum of 5/8 inch mortar cover for anchors, ties, and longitudinal wires of joint reinforcement when exposed to earth or weather and 1/2 inch mortar cover when not exposed to earth or weather.
5. Do not disturb or bend ties or anchors after embedding in grout or mortar.
6. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
7. Provide continuity at corners and wall intersections by use of prefabricated “L” and “T” sections for single wythe CMU walls.

J. Anchors:
1. Anchor masonry to structural members as detailed on drawings, such members to comply with the following:
   a. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise shown. Keep open space free of mortar or other rigid materials.
   b. Anchor masonry to structural members with metal anchors embedded in masonry joints and attached to structure.
   c. Space anchors as indicated, but not more than ~~16~~ inches O.C. vertically and 32 inch O.C. horizontally.

K. Ties and Joint Reinforcement:
1. Bond masonry wythes with specified continuous wire reinforcing at 16 inch O.C. vertically.

L. Control and Expansion Joints:

1. General: Provide horizontal and vertical expansion, control and isolation joints in masonry where shown. Provide related masonry accessory items as the masonry work progresses. Do not span joint reinforcement or other obstructions through movement joints unless provisions are made to prevent in-plane restraint of wall movement.
2. Vertical and Horizontal Expansion Joints in Brick: Leave joints open for installation of joint filler, backer rod and sealant.
3. Control Joints in concrete block: Install preformed control joint gaskets designed to fit standard sash block where indicated on drawing or form a continuous vertical joint in CMU and rake mortar joint back 3/4 inch and provide backer rod and sealant.

M. Lintels:
1. Install steel lintels. Plumb and level.
2. Provide masonry lintels where shown and wherever openings of more than 1 foot are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Thoroughly cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.
    a. Unless otherwise shown, provide one horizontal reinforcing bar for each 4-inch of wall thickness, of size number not less than the number of feet of opening width.
    b. For hollow masonry unit walls, use U-shaped lintel units with reinforcing bars and filled with grout.
    c. Provide 8 inches minimum bearing at each jamb for 8 inches wide units.
    d. Provide 12 inches minimum bearing at each jamb for 12 inches wide units.

N. Flashing:
1. Provide flashing in masonry work at, or above, all shelf angles, lintels, ledges and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior. Seal penetrations in flashing with material recommended by flashing manufacturer before covering with mortar.
2. Prepare surfaces to be smooth and free from projections which might puncture flashing.
3. Where horizontal surfaces of cast in place concrete are irregular or not level, provide a thin leveling bed of mortar before installing flashing.
4. At lintels and shelf angles, install flashing on steel surface with no mortar above or below.
5. At masonry and concrete surfaces, install flashing with a full bed of mortar between flashing and course above. Seal flashing penetrations with manufacturer recommended mastic before covering with mortar
6. Install rubberized asphalt flashing to comply with manufacturer’s instructions and as follows:
    a. Where indicated, install stainless steel drip edge to extend the drip strip a minimum of 1/4 inch beyond the face plane of the brick wall, unless otherwise indicated. Install the drip edge on top of the lintel or shelf angle set into a continuous bed of adhesive. Lap end joints of drip edge by overlapping not less than 2 inches and sealing lap with elastic sealant.
    b. Apply primer to all material in contact with flashing to maximize adhesion of through-wall flashing.
    c. Verify the width of flashing pieces to be installed by field measurement.

    d. Flashing should extend, uninterrupted, from outer wythe of masonry into the concrete masonry back-up. Terminate interior leg of flashing by extending flashing ½ the width of CMU into CMU backing wythe.

e. Carefully fit flashing around projections, columns, walls, etc. Install flashing continuous around inside and outside corners using prefabricated corner boots. Form membrane to correct profile without wrinkles or buckles, and protect from entering the wall to the outside.
f. Extend flashing to within ½ 1/2 inch of the outside face of wall and adhere to drip edge or terminate as detailed on the drawings.
g. Extend drip edge past opening to furthest end dam and make it symmetrical.
h. Provide prefabricated end dams at termination of all flashing at columns, ends of lintels, inner corners or similar end conditions.
i. Lap flashing joints a minimum of 6 inches, set in mastic recommended by manufacturer and press tightly to seal.

3.4 INSTALLATION OF REINFORCED UNIT MASONRY

A. Install reinforced unit masonry to comply with requirements of TMS 602/ACI 530.1/ASCE 6 Current Edition.

B. Construct formwork and shores to support reinforced masonry elements during construction. Construction formwork to conform to shape, line, and dimensions shown. Make sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

C. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

D. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

E. Terminate all grout lifts 1-1/2 inches above the mortar joint at the bottom of the concrete masonry unit to form a grout key.

3.5 REPAIR, POINTING

A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. During the tooling of joints, enlarge voids or holes, except weepholes, and completely fill with mortar.

C. Point up all joints at corners, openings and adjacent Work to provide a neat, uniform appearance, prepared for application of sealants.

3.6 CLEANING

A. Cleaning exposed, concrete masonry, including ground face, glazed CMU and SGT surfaces: Wipe off excess mortar as the Work progresses. Dry brush at the end of each day's Work.

B. Final Cleaning of Brick Work:
   1. After mortar is thoroughly set and cured, clean sample wall area of approximately 20 square feet as follows. Obtain Architect's acceptance of sample cleaning before proceeding to clean rest of masonry work.
   2. Protect stone and non-masonry surfaces from contact with cleaner.
   3. Protect landscape and soil from contact with masonry cleaner. Provide neutralizing solution application if contact occurs.
   4. Mix and apply the cleaning agent as recommended by the manufacturer.
   5. Working areas not larger than 150 square feet at a time, thoroughly wet the masonry surface.
   6. Apply the cleaning solution liberally with a natural fiber brush.
   7. Allow cleaning solution to remain on the wall for approximately 5 minutes. Do not allow the cleaning solution to dry on the wall.
   8. Scrape off excess mortar deposits. Use of metal scrapers is discouraged. Use of wire brushes is forbidden.
   9. Reapply cleaning solution.
   10. Rinse thoroughly with fresh water at a pressure not to exceed 300psi with fan tipped nozzle.
   11. When working from staging, keep area below surface wet.

END OF SECTION

SECTION 05121

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes architecturally exposed structural-steel framing as indicated on the Drawings.

1. Requirements in Division 5 Section "Structural Steel" also apply to AESS framing.

B. The materials in this Section are part of the overall USGBC "Leadership in Energy and Environmental Design" LEED prerequisites and credits needed for Project to obtain LEED Silver certification based on LEED for Schools 2007 requirements. See Section 01352 LEED Requirements and this section for more information.

1.2 DEFINITIONS

A. Architecturally Exposed Structural Steel: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication of AESS components.

Provide erection drawings clearly indicating which members are considered as AESS members.

2. Include details that clearly identify all of the requirements listed in sections 2.3 “Fabrication” and 3.2 “Erection” of this specification. Provide components for exposed AESS consistent with concepts shown on the architectural or structural drawings.
1. Indicate welds by standard AWS symbols. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds**.**
2. Indicate type, size, and length of bolts. Indicate orientation of bolt heads.
3. Clearly indicate which surfaces or edges are exposed and what class of surface preparation is being used.
4. Indicate special tolerances and erection requirements as noted on the drawings or defined herein.

B. LEED Submittal:

1. Product Data as required to show compliance with the following credits:

a. LEED Credit MR 4.1 and Credit MR 4.2: Submit product data for products having recycled content indicating percentages by weight of post-consumer and pre-consumer recycled content.

1) Include statement indicating cost for each product having recycled content.

b. LEED Credit MR 5.1 and Credit 5.2: Submit product data for products that have been extracted, harvested, or recovered, as well as manufactured within 500 miles of the Project site.

1) Include a statement indicating the percentage by weight which is extracted, harvested, or recovered within 500 miles of the Project site.

2. See Section 01352 LEED Requirements and this Section for more information. Submit Materials Credit Documentation Sheet attached to Section 01352 for products in this section, including back-up documentation.

C. Samples: Submit samples of AESS to set quality standards for exposed welds.

1. Two steel plates, 3/8 by 8 by 4 inches, with long edges joined by a groove weld and with weld ground smooth.
2. Steel plate, 3/8 by 8 by 8 inches, with one end of a short length of rectangular steel tube, 4 by 6 by 3/8 inches, welded to plate with a continuous fillet weld and with weld ground smooth and blended.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

B. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.

1.6 PROJECT CONDITIONS

A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

A. LEED Requirements: Provide at least 90% recycled steel content steel sections produced within 500 miles of the site.

B. Metal Surfaces, General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.

1. Category 2 AESS: AESS that is within 20 feet vertically and horizontally of a walking surface and is visible to a person standing on that walking surface.

C. Provide fine-grain killed steel of structural shapes within groups 4 or 5 of AISC grouping for tensile property classification.

D. Steel shapes: ASTM A 992, except where other type steel is shown; ASTM A 36 for plates, bars, channels, angles and miscellaneous detail materials.

E. Hollow Structural Sections: ASTM A 500, Grade B.

F. Anchor Rods: ASTM F 1554, Grade 36, unless otherwise indicated.

G. Headed Stud Type Shear Connectors: ASTM A 108, Grade 1015 through 1020, cold-finished carbon steel; with dimensions complying with AISC Specifications.

H. High-Strength Threaded Fasteners: A. Per section 05120

I. Electrodes for Welding: Comply with AWS Code.

J. Structural Steel Primer Paint for Architecturally Exposed Structural Steel:

1. Exterior Surfaces; Organic Zinc-rich primer; Tnemec 90-97, Tnemec-Zinc. Other manufacturer's products will be considered subject to meeting the performance criteria specified herein.

K. Non-Metallic Shrinkage-Resistant Grout: Pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with ASTM C1107. Grout shall have a minimum compressive strength of 5000 psi at 28 days when tested in conformance with ASTM C 109.

2.2 FABRICATION

A. In addition to special care used to handle and fabricate AESS, comply with the following:

1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes.
2. Use special care in handling and shipping of AESS both before and after shop painting
3. Grind sheared, punched, and flame-cut edges smooth.
4. Fabricate with exposed surfaces free of mill marks.
5. Fabricate with exposed surfaces free of seams to maximum extent possible.
6. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
7. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
8. Fabricate to the tolerances specified in AISC 303 for steel that is designated AESS.
9. Seal-weld open ends of hollow structural sections with 3/8-inch closure plates.

B. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Cleaning Corrosion-Resisting Structural Steel: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

E. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.3 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened, Pretensioned, or Slip critical as specified on the drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.
2. Use weld sizes, fabrication sequence, and equipment that limit distortions to allowable tolerances.
3. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS is exposed to weather.
4. Provide continuous welds of uniform size and profile where AESS is welded.
5. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch.
6. Make butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch. Do not grind unless required for clearances or for fitting other components, or unless directed to correct unacceptable work.
7. Remove backing bars or runoff tabs; back-gouge and grind steel smooth.
8. At locations where welding on the far side of an exposed connection of AESS occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
9. Make fillet welds oversize and grind to uniform profile with smooth face and transition.
10. Make fillet welds of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

2.4 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials.

B. Surface Preparation:

1. SP-6 “Commercial blasting” where section is to receive zinc-rich primer.

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment.

1. If possible, locate welded tabs for attaching temporary bracing and safety cabling where they will be concealed from view in the completed Work.

B. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

1. Erect AESS to the tolerances specified in AISC 303 for steel that is designated AESS.

C. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

D. Erect pre-painted finish pieces using padded slings or other methods such that they are not damaged. Provide padding as required to protect while rigging and aligning member’s frames. Weld tabs for temporary bracing and safety cabling only at points concealed from view in the completed structure or where approved by the Architect during the pre-installation meeting. Methods of removing temporary erection devices and finishing the AESS members shall be approved by the Architect prior to erection.

3.3 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened, Pretensioned, or Slip critical as specified on the drawings..
2. Orient bolt heads in same direction for each connection and to maximum extent possible in same direction for similar connections.

B. Weld Connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.

1. Remove backing bars or runoff tabs; back-gouge and grind steel smooth.
2. Remove erection bolts, fill holes, and grind smooth.
3. Fill weld access holes and grind smooth.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect AESS as specified in Division 5 Section "Structural Steel." The testing agency will not be responsible for enforcing requirements relating to aesthetic effect.

B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

3.5 REPAIRS AND PROTECTION

A. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Grind steel smooth.

END OF SECTION 05121

SECTION 07115

BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Dampproofing where indicated and as specified.

1.2 SUBMITTALS

A. Product Data: Submit complete printed data for each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.5 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt dampproofing to be performed according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Gardner
2. Henry
3. Kranak
4. Koppers.
5. Meadows
6. Sonneborn; Degussa
7. Tamms

2.2 BITUMINOUS DAMPPROOFING

A. Cold-Applied, Emulsified-Asphalt Dampproofing:

1. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.

2.3 MISCELLANEOUS MATERIALS

A. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.

B. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.

C. Protection Course, Asphalt-Board Type: Premolded, 1/8-inch- (3-mm-) thick, multi-ply, semirigid board consisting of a mineral-stabilized asphalt core sandwiched between layers of asphalt-saturated felt, and faced on 1 side with polyethylene film.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Applicator present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.

1. Begin dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory condition has been corrected.

3.2 PREPARATION

A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

B. Clean substrate of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

3.3 APPLICATION

A. Comply with manufacturer’s written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.

1. Apply additional coats if recommended by manufacturer or required to achieve coverages indicated.
2. Allow each coat of dampproofing to cure 24 hours before applying subsequent coats.
3. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as “reinforced,” by embedding an 8-inch- (200-mm-) wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat required for embedding fabric is in addition to other coats required.

B. On Concrete: Apply one fibered brush or spray coat at not less than 3 gal./100 sq. ft. (1.2 L/sq. m).

3.4 INSTALLATION OF PROTECTION COURSE

A. Below grade and where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing material manufacturer's written recommendations for attaching protection course. Support protection course with spot application of trowel-grade mastic where not otherwise indicated.

3.5 CLEANING

A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

END OF SECTION

SECTION 07261

SELF-ADHERING AIR AND VAPOR BARRIER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings

B. Book 1: Project Information, Instructions to Bidders, and Execution Documents

C. Book 2: Standard Terms and Conditions for Construction Contracts

D. Book 2A: Standard Terms and Conditions Procedures Manual

1.2 SECTION INCLUDES

A. Section includes: Self-adhering, air and vapor barrier in exterior wall assemblies over gypsum board sheathing) and where shown and specified.
   1. Work includes leaving the site after the initial barrier sheet has been installed and to return after the structural girts have been installed.
   2. Work to include striping in of fasteners and structural girt supports required for exterior cladding system installed by others.
   3. Work to include termination of barrier to all adjacent construction and to ensure barrier performance.

1.3 PERFORMANCE REQUIREMENTS

A. Material Performance:
   1. Air permeance not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 0.3 in. water (1.57 pounds per square foot) when tested according to ASTM E 2178.
   2. Vapor permeance of 0.1 perms or less when tested according to ASTM E 96.

B. Assembly Performance:
   1. Air and vapor barrier assembly that has an air leakage not to exceed 0.040 cubic feet per square foot per minute under a pressure differential of 0.3 in. water (1.57 pounds per square foot) when tested in accordance with ASTM E 2357 and Vapor permeance of 0.1 perms or less when tested according to ASTM E 96:
      a. Provide an assembly capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope and transfer the load to the structure without damage or displacement.
      b. Provide an assembly that does not displace adjacent materials under full load.
      c. Provide an assembly joined in an airtight and flexible manner to the air barrier material of adjacent assemblies, allowing for the relative

movement of assemblies due to thermal and moisture variations and creep, and anticipated seismic movement.

d. Provide connections to prevent air leakage and vapor migration at all adjacent construction.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each product proposed for use in the system, manufacturer's printed instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, technical data, and tested physical and performance properties.
   1. Submit letter from primary materials manufacturer indicating approval of products not manufactured by primary manufacturer.
   2. Include statement that materials are compatible with adjacent construction.
   3. Submit reports indicating that field peel-adhesion test on all materials to which sealants are adhered have been performed and the changes made, if required, to other approved materials, in order to achieve successful adhesion.
   4. Include statement that materials/system has been tested and will comply with performance requirements of this specification.

B. Shop Drawings: Submit shop drawings showing locations and extent of air and vapor barrier assemblies and details of each condition and intersections with adjacent construction of other envelope assemblies and materials utilizing shop drawings for them, membrane counter-flashings, and details showing the following:
   1. How gaps in the construction will be bridged, including inside and outside corners.
   2. How materials that cover the air and vapor barrier are stripped-in to maintain air-tight condition.
   3. How miscellaneous penetrations such as conduits, pipes, electric boxes, mechanical fasteners, and similar items are sealed.
   4. Include VOC content of each material, and applicable legal limit in the jurisdiction of the project.
   5. Include statement that materials are compatible with adjacent construction.
   6. Include recommended values for field adhesion test on each substrate.

C. Samples: Submit samples, 3 by 4 inch minimum size of each material required.

D. Quality Assurance Program:
   1. Submit evidence of installer current accreditation and certification under the Air Barrier Association of America's (ABAA) Quality Assurance Program. Submit certification number of installers.

E. Field Test Results of Mock-Up: Submit test results of air leakage test and water leakage test of mock-up in accordance with specified standards, including retesting if initial results are not satisfactory.

F. Compatibility: Submit letter from manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent construction and that cleaning materials used during installation are chemically compatible with adjacent materials construction.

G. Submit three (3) fully executed copies of installer's warranty.

H. Certification: Submit a statement signed by the system manufacturer stating that manufacturers shop drawings and system details were reviewed and found to be acceptable.

I. Closeout submittal: At completion of the installation, submit a statement from the ABAA's on-site representative that the installed system complies with the system manufacturer's installation details.

J. LEED Submittals:
1. Credit MR 4.1 (recycled content 10%, post-consumer + ½ pre-consumer) and 4.2 (recycled content 20%, post consumer + ½ pre-consumer): Submit product data stating the percentage of post-consumer and pre-consumer (post-industrial) recycled content by weight. Submit material cost for same.
2. Credit MR5.1 (Regional Materials, 10% Extracted, Processed & Manufactured Regionally) and Credit MR5.2 (Regional Materials, 20% Extracted, Processed & Manufactured Regionally: Submit a statement from the material manufacturer stating the distance between the place of extraction, processing, and manufacture and the project location. Regionally Extracted Materials are materials that have their source as a raw material from within a 500-mile radius of the project site.
3. Credit EQ 4.1: Manufacturers' product data for interior sealants, including printed statement of VOC content and compliance.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Currently accredited by the Air Barrier Association of America (ABAA) whose applicators are certified in accordance with the ABAA Quality Assurance Program.

B. Manufacturer: Obtain primary materials from a single manufacturer regularly engaged in manufacturing air and vapor barrier membrane as specified. Obtain secondary materials from a source acceptable to the primary materials manufacturer.

C. Accredited Laboratory Testing for Materials: Laboratory accredited by International Accreditation Service Inc. (IAS), American Association for Laboratory Accreditation (A2LA), or the Standards Council of Canada (SCC).

D. Pre-installation Conference: Conduct conference at Project site.
1. Include installers of other construction connecting to air barrier, Contractor, Architect, and Commissioner's Representative.
2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures,

sequence of installation, testing and inspecting procedures, and protection and repairs.

E. Field Quality Assurance: Implement the ABAA Quality Assurance Program requirements. Cooperate with ABAA inspectors and independent testing and inspection agencies engaged by the Owner (if any). Do not permit covering of the air and vapor barrier membrane until it has been inspected, tested and accepted.

F. Mock-Up: Build mock-up of barrier on exterior wall assembly where directed by Architect, minimum 10 ft. by 10ft.
1. Coordinate construction of mockup to permit inspection and testing before external insulation and cladding is installed.
2. If the Architect determines mockups do not comply with requirements, reconstruct mockups and apply barrier until mockups are approved.
3. Remove mock-up when acceptable to the Architect.

G. Mock-Up Tests for Air and Water Infiltration: Test mock-up at Contractor's expense for air and water infiltration in accordance with ASTM E 1186 (air leakage location), ASTM E 783 (air leakage quantification), and ASTM E 1105 (water penetration). Use smoke tracer to locate sources of air leakage. If deficiencies are found, reconstruct mock-up and retest until satisfactory results are obtained. Deficiencies include air leakage beyond values specified, uncontrolled water leakage, unsatisfactory workmanship.
1. Perform the air leakage tests and water penetration test of mock-up prior to installation of cladding and trim but after installation of all fasteners for cladding and trim and after installation of other penetrating elements having been flashed in.
2. Perform additional tests as necessary to achieve specified performance criteria after initial testing.

H. Mock-Up Tests for Membrane Adhesion: Test mock-up at Contractor's expense of membrane for adhesion at in accordance with ASTM D 4541 using a Type 1 pull tester except that the disk used shall be 100mm in diameter and the membrane shall be cut through to separate the material attached to the disk from the surrounding material. Perform test after curing period recommended by the manufacturer. Record mode of failure and area which failed in accordance with ASTM D 4541.
1. Modify products or procedures and retest until successful.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacture, and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air and vapor barrier membrane manufacturer. Protect stored materials from direct sunlight.

C. Handle materials in accordance with manufacturer's recommendations.

1.7 PROJECT CONDITIONS

A. Temperature: Install air and vapor barrier within range of ambient and substrate temperatures recommended by air and vapor barrier manufacturer. Do not apply air and vapor barrier to a damp or wet substrate.

B. Field Conditions: Do not install air and vapor barrier in snow, rain, fog, or mist. Do not install air and vapor barrier when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the manufacturer.

1.8 WARRANTY

A. Installation Warranty: Provide installer's 2 year warranty from date of Substantial Completion, including all components of the air and vapor barrier assembly, against failures including loss of air tight seal, loss of watertight seal, loss of adhesion, loss of cohesion, failure to cure properly.

PART 2 - PRODUCTS

2.1 MATERIALS/SYSTEM

A. Sheet Air and Vapor Barrier: Self-adhering membrane composed of flexible facing material coated completely on one side with adhesive material, formed into flexible sheets, interleaved with disposable release liner. Provide associated accessories including primer, seam tape, mastic, fluid and sealant recommended by manufacturer. Subject to compliance with requirements, provide a system by one of the following:
1. Carlisle Coatings and Waterproofing:
2. Grace Construction Products
3. Henry
4. Tremco
5. W. R. Meadows

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions under which air and vapor barrier assemblies will be applied, with Installer present, for compliance with requirements.
1. Verify that surfaces and conditions are suitable prior to commencing work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.
2. Do not proceed with installation until after minimum concrete curing period recommended by air and vapor barrier manufacturer.
3. Ensure that the following conditions are met:

a. Surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants.
b. Concrete surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions.
c. Masonry joints are flush and completely filled with mortar, and all excess mortar sitting on masonry ties has been removed.

4. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263 and take suitable measures until substrate passes moisture test.
5. Verify sealants used in sheathing are compatible with membrane proposed for use.

3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Ensure clean, dust-free, and dry substrate for air and vapor barrier application.
1. Prime masonry, concrete substrates with conditioning primer.
2. Prime glass-fiber surfaced gypsum sheathing an adequate number of coats to achieve required bond, with adequate drying time between coats.
3. Prime wood, metal, and painted substrates with primer.
4. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air and vapor barrier and at protrusions.

3.3 INSTALLATION

A. Self-Adhering Sheet Air and Vapor Barrier: Install membrane to provide continuity throughout the building envelope. Install materials in accordance with ABAA recommendations and manufacturer's recommendations and the following:
1. Provide materials and installation to bridge and seal the following, but not limited to, air leakage pathways and gaps:
a. Connection of the wall air and vapor barrier system to the roof air and vapor barrier system.
b. Connection of the wall air and vapor barrier system to the foundation.
c. Expansion joints.
d. Openings and penetrations of window frames, storefront and curtain wall.
e. Barrier precast concrete and other envelope systems.
f. Piping, conduit, duct, and similar penetrations.
g. Masonry ties, screws, bolts and similar penetrations.
h. All other air leakage pathways in the building envelope.
2. Apply primer at rate recommended by manufacturer prior to membrane installation. Allow primer to dry completely before membrane application. Apply as many coats as necessary for proper adhesion.
3. When membrane is properly positioned, press into place and roll membrane with roller immediately after placement.
4. Apply membrane sheets to shed water naturally without interception by a sheet edge, unless that edge is sealed with permanently flexible termination mastic.

5. Position subsequent sheets of membrane applied above so that membrane overlaps the membrane sheet below by a minimum of 2 inches (50 mm), unless greater overlap is recommended by manufacturer. Roll into place with roller.
6. Overlap horizontally adjacent pieces a minimum of 2 inches (50 mm), unless greater overlap is recommended by manufacturer. Roll seams with roller.
7. Seal around all penetrations with termination mastic, extruded silicone sealant, membrane counterflashing or other procedure in accordance with manufacturer's recommendations.
8. Connect air and vapor barrier in exterior wall assembly continuously to all adjacent construction and seal penetrations, using accessory materials and methods in accordance with the manufacturer's recommendations.
9. At changes in substrate plane, provide transition material (bead of sealant, mastic, extruded silicone sealant, membrane counterflashing or other material recommended by manufacturer) under membrane to eliminate all sharp 90 degree inside corners and to make a smooth transition from one plane to another.
10. Provide mechanically fastened non-corrosive metal sheet to span gaps in substrate plane and to make a smooth transition from one plane to the other. Membrane shall be continuously supported by substrate.
11. At through-wall flashings, girts or other supports systems for exterior cladding. Provide an additional 6 inch wide strip of manufacturer's recommended membrane counterflashing to seal top of through-wall flashing to membrane. Seal exposed top edge of strip with bead of mastic as recommended by manufacturer.
12. At deflection and control joints, provide backup for the membrane to accommodate anticipated movement.
13. At expansion and seismic joints provide transition to the joint assemblies.
14. Apply a bead or trowel coat of mastic along membrane seams at reverse lapped seams, rough cuts, and as recommended by the manufacturer.
15. At end of each working day, seal top edge of membrane to substrate with termination mastic.
16. Inspect installation prior to enclosing assembly and repair punctures, damaged areas and inadequately lapped seams with a patch of membrane lapped as recommended by manufacturer.

3.4 FIELD QUALITY CONTROL

A. Owner's Inspection: At Owners option, owner will engage a qualified independent testing and inspection agency. Cooperate with Owner's inspection agency. Allow access to work areas and staging. Notify Owner's agency in writing of schedule for Work of this Section to allow sufficient time for observation. Do not cover Work of this Section until testing and inspection is accepted.

B. Air Barrier Association of America Installer Audits: Contractor shall perform and pay for ABAA installer audit certification. Allow access to work areas and staging. Do not cover Work of this Section until installer audit is accepted.

C. Testing Quantity: All testing of newly installed barrier shall be as specified by ABAA.

D. Testing Method: Testing method shall include Bubble Gun Testing per ASTM 1186; Adhesion Testing per ASTM 4541, and Thickness Testing per manufacturer. All tests shall be in accordance with ABAA.

E. All work that fails the field tests shall be re-executed until the installation passes the field testing. Modify methods of installation of subsequent work to incorporate required corrections identified by the testing process and approved by architect and commission representative and ABAA manufacturers authorized rep.

3.5 PROTECTING AND CLEANING

A. Protect air and vapor barrier assemblies from damage during application and remainder of construction period, according to manufacturer's written instructions.
   1. Coordinate with installation of materials which cover air and vapor membrane, to ensure exposure period does not exceed that recommended by the air and vapor barrier manufacturer.
   2. Do not allow materials to come in contact with chemically incompatible materials.
   3. Do not expose membrane to sunlight longer than as recommended by the manufacturer.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and acceptable to the primary material manufacturer.

END OF SECTION

SECTION 07262

FLUID APPLIED AIR AND VAPOR BARRIER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings

B. Book 1: Project Information, Instructions to Bidders, and Execution Documents

C. Book 2: Standard Terms and Conditions for Construction Contracts

D. Book 2A: Standard Terms and Conditions Procedures Manual

1.2 SECTION INCLUDES

A. Section includes: Fluid applied, air and vapor barrier in exterior wall assemblies (on exterior face of interior wythe of CMU or concrete in masonry cavity walls) and where shown and specified.
   1. Work to include termination of barrier to all adjacent construction and to ensure barrier performance.

1.3 PERFORMANCE REQUIREMENTS

A. Material Performance:
   1. Air permeance not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 0.3 in. water (1.57 pounds per square foot) when tested according to ASTM E 2178.
   2. Vapor permeance of 0.1 perms or less when tested according to ASTM E 96.

B. Assembly Performance:
   1. Air and vapor barrier assembly that has an air leakage not to exceed 0.040 cubic feet per square foot per minute under a pressure differential of 0.3 in. water (1.57 pounds per square foot) when tested in accordance with ASTM E 2357 and a vapor permeance of 0.1 perms or less when tested according to ASTM C 96:
      a. Provide an assembly capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope and transfer the load to the structure without damage or displacement.
      b. Provide an assembly that does not displace adjacent materials under full load.
      c. Provide an assembly joined in an airtight and flexible manner to the air barrier material of adjacent assemblies, allowing for the relative movement of assemblies due to thermal and moisture variations and creep, and anticipated seismic movement.

d. Provide connections to prevent air leakage and vapor migration at all adjacent construction.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each product proposed for use in the system, manufacturer's printed instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, technical data, and tested physical and performance properties.
1. Submit letter from primary materials manufacturer indicating approval of products not manufactured by primary manufacturer.
2. Include statement that materials are compatible with adjacent construction.
3. Submit reports indicating that field adhesion test on all materials to which sealants are adhered have been performed and the changes made, if required, to other approved materials, in order to achieve successful adhesion.
4. Include statement that materials/system has been tested and will comply with performance requirements of this specification.

B. Shop Drawings: Submit shop drawings showing locations and extent of air and vapor barrier assemblies and details of each condition and intersections with adjacent construction of other envelope assemblies and materials utilizing shop drawings for them, membrane counter-flashings, and details showing the following:
1. How gaps in the construction will be bridged, including inside and outside corners.
2. How materials that cover the air and vapor barrier are stripped-in to maintain air-tight condition.
3. How miscellaneous penetrations such as conduits, pipes, electric boxes, mechanical fasteners, and similar items are sealed.
4. Include VOC content of each material, and applicable legal limit in the jurisdiction of the project.
5. Include statement that materials are compatible with adjacent construction.
6. Include recommended values for field adhesion test on each substrate.

C. Samples: Submit samples, 3 by 4 inch minimum size of each material required.

D. Quality Assurance Program:

1. Submit evidence of installer current accreditation and certification under the Air Barrier Association of America's (ABAA) Quality Assurance Program. Submit certification number of installers.

2. The air barrier system shall be installed according to the methods prescribed by the Air Barrier Association of America and the manufacturer's current specification and installation guidelines.

E. Field Test Results of Mock-Up: Submit test results of air leakage test and water leakage test of mock-up in accordance with specified standards, including retesting if initial results are not satisfactory.

F. Compatibility: Submit letter from manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent construction and that cleaning materials used during installation are chemically compatible with adjacent materials construction.

G. Submit three (3) fully executed copies of installer's warranty.

H. Certification: Submit a statement signed by the system manufacturer stating that manufacturers shop drawings and system details were reviewed and found to be acceptable.

I. Closeout submittal: At completion of the installation, submit a statement from the ABAA's on-site representative that the installed system complies with the system manufacturer's installation details.

J. LEED Submittals:
1. Credit MR 4.1 (recycled content 10%, post-consumer + ½ pre-consumer) and 4.2 (recycled content 20%, post consumer + ½ pre-consumer): Submit product data stating the percentage of post-consumer and pre-consumer (post-industrial) recycled content by weight. Submit material cost for same.
2. Credit MR5.1 (Regional Materials, 10% Extracted, Processed & Manufactured Regionally) and Credit MR5.2 (Regional Materials, 20% Extracted, Processed & Manufactured Regionally: Submit a statement from the material manufacturer stating the distance between the place of extraction, processing, and manufacture and the project location. Regionally Extracted Materials are materials that have their source as a raw material from within a 500-mile radius of the project site.
3. Credit EQ 4.1: Manufacturers' product data for interior sealants, including printed statement of VOC content and compliance.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Currently accredited by the Air Barrier Association of America (ABAA) whose applicators are certified in accordance with the ABAA Quality Assurance Program.

B. Manufacturer: Obtain primary materials from a single manufacturer regularly engaged in manufacturing air and vapor barrier membrane as specified. Obtain secondary materials from a source acceptable to the primary materials manufacturer.

C. Accredited Laboratory Testing for Materials: Laboratory accredited by International Accreditation Service Inc. (IAS), American Association for Laboratory Accreditation (A2LA), or the Standards Council of Canada (SCC).

D. Pre-installation Conference: Conduct conference at Project site.
1. Include installers of other construction connecting to air barrier, Contractor, Architect, and Commissioner's Representative.
2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures,

sequence of installation, testing and inspecting procedures, and protection and repairs.

E. Field Quality Assurance: Implement the ABAA Quality Assurance Program requirements. Cooperate with ABAA inspectors and independent testing and inspection agencies engaged by the Owner (if any). Do not permit covering of the air and vapor barrier membrane until it has been inspected, tested and accepted.

F. Mock-Up: Build mock-up of barrier on exterior wall assembly where directed by Architect, minimum 10 ft. by 10ft.
1. Coordinate construction of mockup to permit inspection and testing before external insulation and cladding is installed.
2. If the Architect determines mockups do not comply with requirements, reconstruct mockups and apply barrier until mockups are approved.
3. Remove mock-up when acceptable to the Architect.

G. Mock-Up Tests for Air and Water Infiltration: Test mock-up at Contractor's expense for air and water infiltration in accordance with ASTM E 1186 (air leakage location), ASTM E 783 (air leakage quantification), and ASTM E 1105 (water penetration). Use smoke tracer to locate sources of air leakage. If deficiencies are found, reconstruct mock-up and retest until satisfactory results are obtained. Deficiencies include air leakage beyond values specified, uncontrolled water leakage, unsatisfactory workmanship.
1. Perform the air leakage tests and water penetration test of mock-up prior to installation of cladding and trim but after installation of all fasteners for cladding and trim and after installation of other penetrating elements having been flashed in.
2. Perform additional tests as necessary to achieve specified performance criteria after initial testing.

H. Mock-Up Tests for Membrane Adhesion: Test mock-up at Contractor's expense of membrane for adhesion at in accordance with ASTM D 4541 using a Type 1 pull tester except that the disk used shall be 100mm in diameter and the membrane shall be cut through to separate the material attached to the disk from the surrounding material. Perform test after curing period recommended by the manufacturer. Record mode of failure and area which failed in accordance with ASTM D 4541.
1. Modify products or procedures and retest until successful.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacture, and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air and vapor barrier membrane manufacturer. Protect stored materials from direct sunlight.

C. Handle materials in accordance with manufacturer's recommendations.

1.7 PROJECT CONDITIONS

A. Temperature: Install air and vapor barrier within range of ambient and substrate temperatures recommended by air and vapor barrier manufacturer. Do not apply air and vapor barrier to a damp or wet substrate.

B. Field Conditions: Do not install air and vapor barrier in snow, rain, fog, or mist. Do not install air and vapor barrier when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the manufacturer.

1.8 WARRANTY

A. Installation Warranty: Provide installer's 2 year warranty from date of Substantial Completion, including all components of the air and vapor barrier assembly, against failures including loss of air tight seal, loss of watertight seal, loss of adhesion, loss of cohesion, failure to cure properly.

PART 2 - PRODUCTS

2.1 MATERIALS/SYSTEM

A. Fluid-Applied Air and Vapor Barrier: Use regular or low-temperature formulation depending on site conditions, within temperature ranges specified by manufacturer. Provide related accessories including primer, seam tape, mastic, fluid and sealant recommended by manufacturer. Subject to compliance with requirements, provide a system by one of the following:
1. Carlisle Coatings and Waterproofing
2. Grace Construction Products
3. Henry
4. Tremco
5. W. R. Meadows

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions under which air and vapor barrier assemblies will be applied, with Installer present, for compliance with requirements.
1. Verify that surfaces and conditions are suitable prior to commencing work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.
2. Do not proceed with installation until after minimum concrete curing period recommended by air and vapor barrier manufacturer.
3. Ensure that the following conditions are met:
   a. Surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants.

b. Masonry joints are flush and completely filled with mortar, and all excess mortar sitting on masonry ties has been removed.

4. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263 and take suitable measures until substrate passes moisture test.
5. Verify sealants used in sheathing are compatible with membrane proposed for use.

3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Ensure clean, dust-free, and dry substrate for air and vapor barrier application. Mask off adjoining Surfaces to prevent overspray and spillage.

B. Prime substrate for application of sheet membrane transition strips as recommended by manufacturer and as follows:
1. Prime masonry, substrates with conditioning primer.
2. Prime glass-fiber surfaced gypsum sheathing an adequate number of coats to achieve required bond, with adequate drying time between coats.
3. Prime wood, metal, and painted substrates with primer.
4. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air and vapor barrier and at protrusions.

C. Prime substrate for application of fluid-applied air and vapor barrier if recommended by manufacturer based on project conditions and as follows.

3.3 INSTALLATION

A. Air and Vapor Barrier Installation: Install transition strip materials and fluid-applied air and vapor barrier to provide continuity throughout the building envelope. Install materials in accordance with ABAA recommendations and manufacturer's recommendations and as follows, unless manufacturer recommends other procedures in writing based on project conditions or particular requirements of their recommended materials:
1. Provide materials and installation to bridge and seal the following, but not limited to, air leakage pathways and gaps:
a. Connection of the wall air and vapor barrier system to the roof air and vapor barrier system.
b. Connection of the wall air and vapor barrier system to the foundation.
c. Expansion joints.
d. Openings and penetrations of window frames, storefront and curtain wall.
e. Barrier precast concrete and other envelope systems.
f. Piping, conduit, duct, and similar penetrations.
g. Masonry ties, screws, bolts and similar penetrations.
h. All other air leakage pathways in the building envelope.

2. Apply primer for transition strips at rate recommended by manufacturer. Allow primer to dry completely before transition strip application. Apply as many coats as necessary for proper adhesion.
3. Apply primer for fluid-applied air and vapor barrier as recommended by fluid-applied air and vapor barrier manufacturer. Based on manufacturer's recommendation, no primer may be required for the fluid-applied materials.
4. Apply fluid-applied air and vapor barrier using equipment and methods recommended by manufacturer, to achieve a dry film thickness as recommended by the manufacturer.
5. Apply fluid-applied air and vapor barrier and transition strips to shed water naturally without interception by a sheet edge, unless that edge is sealed with permanently flexible termination mastic.
6. Position subsequent sheets of transition strips applied above so that membrane overlaps the membrane sheet below by a minimum of 2 inches (50 mm), unless greater overlap is recommended by manufacturer. Roll into place with roller.
7. Overlap horizontally adjacent pieces of transition strips a minimum of 2 inches (50 mm), unless greater overlap is recommended by manufacturer. Roll seams with roller.
8. Seal around all penetrations with termination mastic, extruded silicone sealant, membrane counterflashing or other procedure in accordance with manufacturer's recommendations.
9. Connect air and vapor barrier in exterior wall assembly continuously to all adjacent construction and seal penetrations.
10. At changes in substrate plane, provide transition material (bead of sealant, mastic, extruded silicone sealant, membrane counterflashing or other material recommended by manufacturer) under membrane to eliminate all sharp 90 degree inside corners and to make a smooth transition from one plane to another.
11. Provide mechanically fastened non-corrosive metal sheet to span gaps in substrate plane and to make a smooth transition from one plane to the other. Membrane shall be continuously supported by substrate or as recommended by the manufacturer.
12. At through-wall flashings, provide an additional 6 inch wide strip of manufacturer's recommended membrane counterflashing to seal top of through-wall flashing to membrane or as recommended by manufacturer. Seal exposed top edge of strip with bead of mastic or as recommended by manufacturer.
13. At deflection and control joints, provide backup for the membrane to accommodate anticipated movement.
14. At expansion and seismic joints provide transition to the joint assemblies.
15. Apply a bead or trowel coat of mastic along membrane seams at reverse lapped seams, rough cuts, and as recommended by the manufacturer.
16. At end of each working day, seal top edge of membrane to substrate with termination mastic.
17. Do not allow materials to come in contact with chemically incompatible materials.
18. Do not expose membrane to sunlight longer than as recommended by the manufacturer.
19. Inspect installation prior to enclosing assembly and repair punctures, damaged areas and inadequately lapped seams with a patch of membrane lapped as recommended by manufacturer.

3.4 FIELD QUALITY CONTROL

A. Owner's Inspection: At Owners option, owner will engage a qualified independent testing and inspection agency. Cooperate with Owner's inspection agency. Allow access to work areas and staging. Notify Owner's agency in writing of schedule for Work of this Section to allow sufficient time for observation. Do not cover Work of this Section until testing and inspection is accepted.

B. Air Barrier Association of America Installer Audits: Contractor shall perform and pay for ABAA installer audit certification. Allow access to work areas and staging. Do not cover Work of this Section until installer audit is accepted.

C. Testing Quantity: All testing of newly installed barrier shall be as specified by ABAA.

D. Testing Method: Testing method shall include Bubble Gun Testing per ASTM 1186; Adhesion Testing per ASTM 4541, and Thickness Testing per manufacturer. All tests shall be in accordance with ABAA.

E. All work that fails the field tests shall be re-executed until the installation passes the field testing. Modify methods of installation of subsequent work to incorporate required corrections identified by the testing process and approved by architect and commission representative and ABAA manufacturers authorized rep.

3.5 PROTECTING AND CLEANING

A. Protect air and vapor barrier assemblies from damage during application and remainder of construction period, according to manufacturer's written instructions.
   1. Coordinate with installation of materials which cover air and vapor membrane, to ensure exposure period does not exceed that recommended by the air and vapor barrier manufacturer.
   2. Do not allow materials to come in contact with chemically incompatible materials.
   3. Do not expose membrane to sunlight longer than as recommended by the manufacturer.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and acceptable to the primary material manufacturer.

END OF SECTION

SECTION 12503
MOTORIZED SHADES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Motor operated window daylighting shades.
   1. Provide motorized shade at the following locations:
      a. Library
      b. Gymnasium

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's complete technical data.
   1. Submit color charts for color selection by the Architect.

B. Sample: Submit samples of shade pattern showing full range of color and pattern variations.

C. Maintenance Instructions: Submit 2 copies of manufacturer's recommended maintenance practices for shades.

D. Wiring Diagrams: Submit wiring diagrams for controls.

1.3 QUALITY ASSURANCE

A. Uniformity of Manufacture: Provide shades as produced by a single manufacturer.

B. Fire Test Performance: Provide shades which comply with NFPA No. 701 and California small-scale flame resistance test, as determined by an independent testing laboratory acceptable to authorities having jurisdiction.

C. Installer's Qualifications: Engage installer who is certified in writing by shade manufacturer as qualified for installation of shades.

D. Field Measurements: Take field measurements, as necessary, prior to preparation of final shop drawings and fabrication. Coordinate window shade system with other work.

E. Pre-Installation Conference: Prior to installation of shades, conduct a general orientation meeting attended by the installer, manufacturer, Architect, Board's representative and Contractor. Review the installation procedures related to installation of shades and establish provisions related to security and damage control.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Basis-of-Design Shade Roller and Hardware: Subject to compliance with requirements, provide MechoShade Systems, or a comparable product by one of the following:
   1. Chicago Shade Makers, Inc.

2. Draper
3. Hunter Douglas
4. MechoShade Systems
5. Vimco

2.2 SHADE CLOTH

A. At Library: Visually Transparent Single-Fabric Shadecloth: MechoShade Systems, Inc., Thermoveil 0900, 0-1 percent visually translucent extra dense linear weave pattern; single thickness non-raveling 0.030 thick vinyl fabric, woven from 0.018 diameter extruded vinyl yarn comprising of 21 percent polyester and 79 percent reinforced vinyl. Manufacturers, shadecloth content, colors, material solar-optical properties, material openness factor and material UV blockage, that are determined solely by the Architect in writing to be aesthetically equivalent and meet all performance requirements to those listed above may be acceptable.
   1. Color: To be selected by Architect from manufacturer’s full range of colors.

B. At Gymnasium: Vinyl Room Darkening Shadecloth (Single-Fabric): MechoShade Systems, Inc., "0700 series", blackout material, washable and colorfast laminated and embossed vinyl coated fabric, 0.012 inches thick blackout material and weighing 0.81 lbs. per square yard, with a minimum of 62 threads per square inch in colors selected from manufacturer's available range. Manufacturers, shadecloth content, colors, that are determined solely by the Architect in writing to be aesthetically equivalent and meet all performance requirements to those listed above may be acceptable.
   1. Color: To be selected by Architect from manufacturer’s full range of colors.

C. Shade cloth shall show no streaks and evidence of bleeding, of holes or cracking.

D. Fire retardant coatings shall be maintained so as to retain the effectiveness of the treatment under service conditions encountered in actual use.

2.3 ROLLER AND HARDWARE

A. Rollers: Extruded aluminum tube, 6063 alloy, with internal keyway to engage drive system. Tube shall be extruded designed to prevent deflection for all spans. Shade tube shall be self-aligning and self-leveling. Tubes shall be diameter required for shade lengths but not less than 1-1/2”.

B. Bottom Bar: The bottom hem of each shade shall enclose an aluminum bar or tube or solid hardwood designed to prevent lateral deflection painted to match the color of the shade fabric. Fabric shall be sewn or heat-sealed, closed to prevent removal of bottom bar.

C. Mounting Brackets: Provide manufacturer's standard mounting brackets, but not less than 1/8" thick sheet steel. Brackets shall be reversible for left hand or right hand operation for mountings as necessary. Brackets shall be installed so that mechanism is concealed from view when fully assembled within the shade pocket. Brackets shall act as protective retainer for tube and shade assembly preventing accidental dislocation of tube and shade by vibration.

D. Shade Enclosure (Valance Box/Ceiling Pocket): Provide manufacturer's standard extruded aluminum shade full enclosure box with removable closure on horizontal face.

E. Blackout Side Channels: Manufacturer's standard side channel with light seal and retention system designed to guide and hold shade within channel through full range of shade.

2.4 MOTORIZED ROLLER SHADE OPERATOR

A. General: Provide factory-assembled motorized shade operation systems designed for lifting shades of type, size, weight, constructions, use, and operation frequency indicated. Provide operation systems of size and capacity and with features, characteristics, and accessories suitable for Project conditions and recommended by shade manufacturer, complete with electric motors and factory-prewired motor controls, remote-control stations, remote-control devices, power disconnect switches, enclosures protecting controls and all operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with the building electrical system.

B. Comply with NFPA 70.

C. Electric Motors: UL-approved or –recognized, asynchronous, totally enclosed, insulated, capacitor-start motors, complying with NEMA MG 1, with thermal overload protection, brake, permanently lubricated bearings, and limit switches; sized by shade manufacturer to start and operate size and weight of shade considering service factor or considering Project's service conditions without exceeding nameplate ratings.
   1. Service Factor: According to NEMA MG 1, unless otherwise indicated.
   2. Motor Characteristics: Single phase 110 V, 60 Hz.
   3. Motor Mounting: Within manufacturer's standard roller enclosure.

D. Remote Controls: Electric controls with NEMA ICS 6, Type 1 enclosure for recessed or flush mounting. Provide the following devices for remote-control activation of shades.

   1. Control Stations: Maintained contact, three-position, toggle style, wall switch-operated control station with open, close, and center off functions.

E. Limit Switches: Adjustable switches interlocked with motor controls and set to automatically stop shade at fully raised and fully lowered positions.

F. Operating Function: Stop and hold shade at any position at open.

2.5 FABRICATION

A. Prior to fabrication, verify actual opening dimensions by accurate site measurements. Adjust dimensions for proper fit at openings. Cooperate with other trades for securing housings to substrates and other finished surfaces.

B. Provide shades as complete operating assemblies, complete with all housings, operators, chains, fillers, tubes, brackets, end caps, hardware, shade cloth, and other accessories required for operation.

C. Fabricate window treatment components from non-corrosive, non-staining, non-fading materials which are compatible with each other, and which do not require lubrication during normal expected life.

D. Fabricate each shade to completely fill the opening, from head-to-sill and jamb-to-jamb.

E. Each shade shall hang flat without buckling or distorting. The edge, when trimmed, shall hang straight without curling or reveling. An unguided roller shade cloth shall roll true and straight without shifting sideways more than + 1/8". Provide hem weights for woven shades and an exposed hem tube for blackout shades.

F. Exposed metal shall be prefinished with baked on enamel.

G. Color: Selected by the Architect.

H. Shades shall be sized to descend from shade pocket to lowest horizontal windowsill member.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions under which window treatment is be applied. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Starting of work will be construed as acceptance of the surfaces and conditions within any particular area.

3.2 INSTALLATION

A. Install shades in manner indicated to comply with manufacturer's instructions. Position units level, plumb, secure, at proper height and location relative to adjoining windows or skylights and other related work. Securely anchor units with proper clips, brackets, and anchorages, suited to type of substrate indicated.

B. Adjust for smooth operation. Adjust shade and shade cloth to hang flat without buckling or distortion. Replace any units or components which do not hang properly or operate smoothly.

3.3 CLEANING AND PROTECTION

A. Touch up damage finishes and repair minor damage in order to eliminate evidence or repair. Remove and replace work that cannot be satisfactorily repaired.

B. Cleaning: Clean exposed surfaces, including metal and shade cloth, using non-abrasive materials and methods recommended by the shade cloth manufacturer. Remove and replace work which cannot be cleaned satisfactorily.

C. Protect installed units to ensure their being in operating condition, without damage, blemishes, or indication of use at completion of project. Repair or replace damaged units as directed by Architect.

END OF SECTION

SECTION 16555
GYMNASIUM STAGE LIGHTING SYSTEM

PART 1 - GENERAL

1.1 SCOPE

All materials, components, and services necessary to provide a complete system indicated in this Section, as specified herein and shown on related Drawings, including:

A. Preparation and submission of complete shop drawings and samples for review prior to fabrication.

B. Verification of dimensions and conditions at the job site.

C. Shipment of equipment to the job site and the secured storage of all non-fixed equipment.

D. Installation and completion in accordance with these Specifications, related Drawings, the Equipment Manufacturer's recommendations, established trade criteria, and all applicable code requirements.

E. The inspection, demonstration, and necessary adjustment of the completed installation by the Manufacturer's engineering personnel.

F. Preparation and submission of complete record drawings and operational and maintenance data and certificates.

1.2 WORK INCLUDED

A. Stage lighting control consoles and control accessories.

B. Remote control panels and receptacles.

C. Network data system.

D. Dimmers and emergency dimmers.

E. Wiring devices.

F. Theatrical luminaires and accessories.

The above is for reference only and is not intended to define the limits of the work for a complete installation.

1.3 RELATED WORK IN OTHER SECTIONS

A. General requirements for all electrical work.

B. Electrical service.

C. General lighting system.

D. Theatrical rigging system.

E. Theatrical sound and communications system.

1.4 QUALIFICATIONS

A. All dimming and control system equipment shall be provided by a qualified Stage Lighting Manufacturer.

B. The Manufacturer shall have at least ten (10) years experience in the fabrication of similar equipment.

C. If requested, the Manufacturer shall submit a representative list of installations during the above period.

D. Subject to the above requirements, the equipment indicated herein shall be by one of the following manufacturers:

1. Dimming and control

a. Electronic Theatre Controls, Middleton, Wisconsin

b. Strand Lighting, Cypress, California

2. Wiring devices

a. Electronic Theatre Controls, Middleton, Wisconsin

b. Southeast Stage Rigging & Curtains, Greenville, South Carolina

c. Strand Lighting, Cypress, California

d. Union Connector, Roosevelt, New York

E. Other manufacturers may be considered with the prior review by the Architect. Manufacturers seeking review must contact the Architect not later than fourteen (14) days prior to bid date.

F. The dimming and control system shall be provided by a qualified theatrical dealer, who shall have at least five (5) years experience in the sales and installation of similar systems and who shall be factory certified to provide warranty service for all of the equipment in this Section. Dealer shall be a current member (Dealer category) of the Entertainment Services & Technology Association.

G. Dealer shall be responsible for the integration, operation, and performance of all elements of the system described in this Section. Dealer shall provide all warranty work and equipment upgrades as called for in this Section. The dealer shall be available for product service onsite within (24) hours of a call for service.

H. Subject to the above requirements, the equipment indicated herein shall be provided by one of the following dealers:

1. Chicago Spotlight, Chicago, Illinois 312-455-1171

2. Designlab Chicago, Chicago, Illinois 773-265-1100

3. Grand Stage, Chicago, Illinois 312-332-5611

4. Intelligent Lighting Creations, Arlington Heights, Illinois 847.933.9792

I. Other dealers may be considered with the prior review. Dealers seeking review must contact the Architect not later than fourteen (14) days prior to bid date.

1.5 SUBMITTALS

A. With bid.

1. Identification of qualified Theatrical Dealer providing system.

2. All deviations and exceptions from specification must be revealed with bid. Deviations and exceptions from specification submitted after this time shall not be accepted.

3. Manufacturer shall indicate any additional wire or conduit runs that are not shown in the Drawings that will be required to install Manufacturer's system.

B. Shop drawings. The Manufacturer shall submit reproducible drawings to the Architect for review and action prior to fabrication:

1. Dimensions, components, and finishes of all equipment and accessories.

2. All system assemblies and major sub-assemblies, cabinets, and enclosures, including notation of type and manufacture of switches, pilot lights, locks, hardware, and electrical and electronic connectors.

3. Block schematics of system internal wiring and system element interconnection.

4. Quantities of each component and sub-assembly.

5. Indication by boxed caption of any and all variations from contract Drawings and Specifications, whether or not these variations have been formally or informally accepted by the Architect.

C. Samples. Within sixty (60) days of receipt of order, the Manufacturer shall submit to the Architect for review prior to fabrication samples of any equipment component requested by the Theatre Consultant. Samples shall not be included in quantities of equipment specified but shall be returned.

D. Final submittal. As a condition for final review, the Manufacturer shall submit to the Architect:

1. Receipts for delivery of all non-installed items, i.e., all items designated, "deliver to Owner."

2. Three (3) bound sets to the Architect and one (1) bound set to the Theatre Consultant:

3. "As built and approved" drawings and equipment data sheets showing all systems and components as installed, including all field modifications.

4. Documentation of Data Network system, noting system layout, all panel locations, and all wire lengths. Documents shall indicate the device IP address, MAC/NIC address, Hub Number, and Port number, where applicable. Subnet Masks and Subnet documentation shall be provided where applicable.

5. Operating and maintenance manuals.

6. Parts lists.

7. Training videos as noted below.

8. Certificates of warranty, as set forth below.

1.6 TESTING AND INSTRUCTION

A. Upon completion of all installation work, the Contractor and Dealer shall certify in writing to the Architect that the work is complete and ready for final observation. Final observation shall be scheduled by the Owner, the Architect, and the Theatre Consultant within fourteen (14) days following the Contractor's notice of completion.

B. System testing shall include testing of control data network, documenting traffic utilization within the Network Data System requirements noted below in this Section. Testing shall also include verification of Wireless Handheld Remotes operational range as required in Part 2 of this Section.

C. After system checkout and adjustment, the Dealer’s factory certified technician shall operate the system for the review of the Owner, the Architect, and the Theatre Consultant.

D. Necessary adjustments or modifications shall be made as required.

E. As a condition of final completion, the Dealer’s factory certified technician shall instruct the Owner's staff or representatives, under the observation of the Architect and Theatre Consultant, in the operation and maintenance of the system.

1. Initial Instruction: This instruction session shall be scheduled for a minimum duration of six (6) hours. While it may be possible to schedule this instruction session to coincide with the system checkout, such coincidence shall not be assumed. Instruction shall be scheduled by the Owner, the Architect, and the Theatre Consultant to occur within fourteen (14) days following the Contractor's written notice.

2. Follow-up Instruction: This instruction session shall take place not less than thirty (30) days nor more than six (6) months from the initial instruction. This instruction shall be

scheduled by the Owner, shall be scheduled for a minimum duration of four (4) hours and will cover topics requested by the Owner.

F. The Dealer shall provide to the Owner video instructions on the operation and maintenance of the system. Information contained in video will cover all points of operation and maintenance covered in the instruction session with Owner's staff. A videotaped recording of the actual instruction session is acceptable. Provide four (4) full copies of video instruction. Video format shall be DVD.

1.7 GENERAL REQUIREMENTS

A. General Conditions of the project contract, work schedules, and site regulations apply to this work.

B. This work shall comply with local codes and applicable NEC and UL standards, and all components shall carry pertinent UL labels.

C. The Contractor shall provide full insurance against loss or damage during shipment, storage, installation, and testing. Certification of such coverage shall be furnished to the Architect within thirty (30) days of award of contract.

D. Warranty

1. The Manufacturer shall unconditionally warrant all equipment and systems provided under this Section to be free from defects in materials and workmanship for a period of at least twelve (12) months from the date of final acceptance of all work of this Section. Lamps and normal wear and tear are exempted.

2. Appropriate additional equipment to replace equipment removed for service shall be provided at the job site at no expense to the Owner to replace any and all equipment that must be removed for service. Replacement control console(s) must of the same model as those removed for service.

3. Warranty service shall be performed by personnel in the employ of the Manufacturer and shall not be sub-contracted or assigned to another company, service, or individual unless the Owner has approved such assignment in writing, in which event the Manufactuer shall nevertheless be responsible to the Owner for such work.

E. For a period of two (2) years following acceptance, the Manufacturer shall provide and install, at no cost to the Owner, all control console operating system upgrades. Thereafter the Manufacturer shall notify the Owner of all operating system upgrades for the life of the control console. Manufacturer shall keep system user's name and address in a database for this purpose. All upgrades shall include a full written description of operational modifications. Operating system upgrades shall be designed so as to allow existing data to be accessed and upgraded.

F. For a period of five (5) years following acceptance, the Manufacturer shall maintain service capability by guaranteeing a factory-authorized representative available for on-site service calls within twenty-four (24) hours of notification by Owner of a need for service.

PART 2 - PRODUCTS

2.1 GENERAL

A. All components shall be new, in good condition, and under warranty.

B. All components shall bear UL labels and labels identifying the manufacturer, model number, and serial number. All such labels shall be permanently attached in a conspicuous location.

C. Unless otherwise described elsewhere in this Specification, all control and receptacle face plates shall be black anodized aluminum or black painted steel, and all labels and legends shall be permanently engraved with white lettering on black plastic lamicoid labels permanently attached with epoxy cement and at least two (2) steel rivets. Minimum text height if not specified

elsewhere: 1/4" inch. Dry transfer, decals, plastic "dymo," or other types of adhesive labels shall not be used. All face plates shall have beveled edges and rounded corners.

D. Control signal protocols and connector types

1. All control signal protocol and connector types shall comply with the following Standards:

a. ANSI E1.11 – 2004 / Entertainment Technology USITT DMX-512-A Asynchronous Serial Digital Data Transmission Standard for Controlling Lighting Equipment and Accessories.

b. ANSI E1.17 – 2006 Entertainment Technology – Architecture for Control Networks.

c. ANSI E1.20 – 2006 Entertainment Technology – RDM Remote Device Management over DMX512 Networks.

E. All multi-conductor connectors shall be wired in accordance with the recommended practice RP-1 as published by the U. S. Institute for Theatre Technology.

F. All control, signal, and video connectors shall be of substantial construction and shall be of the locking or latching type. All plate-mounted connectors shall be bolted to faceplates - rivets shall not be acceptable.

G. All components requiring external electrical connections of more than eight (8) conductors shall include barrier-type terminal strips properly sized and permanently labeled.

H. All keys for devices in each theatre (i.e., control console, entry panels, dimmer racks, etc.) shall be keyed identically. Provide a total of (2) keys for each keyed device.

I. Where specification allows for "approved equal," substitutions shall be proposed to the Architect at least ten (10) days prior to bid date.

2.2 STAGE LIGHTING CONNECTORS

A. 20-Ampere devices

1. Connectors shall be 20-ampere slip pin, 2 wire plus ground, with integral strain relief.

2. Male plugs: Union Connector 2P&GM.

3. Female connectors: Union Connector 2P&GF.

4. Flush receptacles: Union Connector 2P&GF-FL.

5. Equivalent devices by Advanced Devices, Inc. Bates® Plug shall be acceptable.

B. Quantities per lighting instrument specifications, cable specifications, and schedule.

2.3 CONTROL CONSOLE

The system described below is based upon general performance criteria common to the Strand “200 24/48” and ETC "SmartFade ML" systems. No other system shall be considered unless specifically approved at least 10 days prior to bid date.

A. Physical requirements
The console shall be deadfront, modular in construction, with plug-in control components, completely wired internally, and shall contain, but not be limited to, the following components:

1. Keypad for patching, level setting, and cue recording.

2. Keypad for display selection.

3. Min. 12" CRT to display patch, submaster, stage and preview channel levels, and cue sheet.

4. Playback controls, including split crossfader.
5. Minimum twenty-four (24) submaster/backup potentiometers.
6. All control potentiometers shall be flat path, direct drive, and shall be scale calibrated from 0 to 10 in half steps.
7. Library storage for recording of all patch, submaster, and cue information.
8. Switch for power on and off.
9. Dimmer rack temperature warning light. Note: if warning light is not integral to the Control Console, provide separate panel containing warning light.
10. Locking connections for power and dimmer control. Control connectors shall be equal to 5-pin XLR, Switchcraft D5F. Smaller or less substantial connectors shall not be acceptable.

B. Operational requirements

1. Dimmers shall be electronically assigned to control channels by means of a keypad.
2. Dimmers shall be electronically assigned to backup controllers by means of a keypad.
3. Channels shall be electronically assigned to submasters at proportional levels by means of a keypad.
4. Channel levels shall be set and adjusted by means of a keypad and encoding wheel.
5. Cues shall be recorded, along with fade times and sequencing, by means of a keypad.
6. Cues shall be played back manually or automatically by means of a split crossfader.
7. It shall be possible to dynamically override and modify a cue playback.
8. It shall be possible to record and modify cues "blind."
9. It shall be possible to play back prerecorded special effects.
10. The CRT shall provide a dynamic display of channel levels on stage or in a "blind" cue, and patch and submaster information.
11. The internal (RAM) memory shall store at least 600 cues.
12. Pile-on crossfades and overlapping scenes shall function on a highest-level-takes-precedence basis.
13. In the event of a loss of power, an internal battery backup power supply shall hold all memory information for up to 24 hours.
14. The control output signal shall be multiplexed and shall require no more than eight (8) conductors.

C. In single-channel mode, the Control Console shall provide at least 48 control channels and at least 125 dimmers.

D. In two-scene preset mode, the Control Console shall provide at least 24 channels.

E. Console shall include:

1. One (1) set of 25-foot multi-conductor control cables terminating in locking connectors appropriate for mating with the Control Receptacle Panel.
2. Vinyl dust covers for the console and CRT.
3. Integral Work lights (2) mounted to console.

F. Install in the Dimmer Closet as shown in the Drawings.

2.4 DIMMERS

A. General

1. The dimmer pack(s) shall be the SmartPack Portable unit as manufactured by Electronic Theatre Controls, Inc., or equal. SmartPack packs shall be UL Listed (UL FILE #E152039) and CSA Approved, and shall be so labeled when delivered.

a. Approved Equals:

i. Strand “A21” Dimmer Cabinet

ii. ETC “Paradigm” Architectural Dimming System.

2. The SmartPack dimmer pack(s) shall consist of either six 20A dimmers or twelve 10A dimmers as shown in the Drawings.

3. All of the required packs shall be rack mounted as shown in the Drawings.

4. Each dimmer space shall be clearly labeled with circuit/dimmer number and channel number such as “HL-xx.”

5. The rack shall incorporate a front locking door to cover all user-operable portions of its components.

6. An engraved lamicoid label shall be bolted or riveted to the front of the rack, to read:

(Name of Venue)

DIMMER RACK (Number)

DIMMERS (Beginning no.)—(End no.)/

CHANNEL NUMBER (Beginning no.)-(End no.)

Schuler Shook Theatre Planners

(Year of Commissioning)

B. Thermal

1. The pack(s) shall employ a cross-flow low noise fan that provides front-to-back cooling for better airflow in a stacked application. The continuous duty fan shall maintain the temperature of all dimmers under full load provided the ambient temperature does not exceed 95°F (35°C).

2. The pack(s) shall operate safely in an environment having an ambient temperature between 32ºF (0ºC) and 95ºF (35°C), and humidity between 30-95% (non-condensing).

3. The pack(s) shall have a 96% or better power efficiency, assuming full load with maximum dissipation. The efficiency calculation is based on 3% of connected load (Max. 3,100 BTUs).

C. Electrical

1. The pack(s) shall operate on either three phase, four wire + ground, 120/208V AC 60Hz, or single phase, three wire + ground, 120/240V AC 60Hz, at an amperage sufficient to power the rack (120 amps max). The pack shall operate within a voltage range from 85 - 140VAC, 47 - 63 Hz.

2. The internal power feed terminations shall be designed for easy conversion from three-phase to single-phase power. Strain relief for up to 6/5 SO cable shall be provided for power input to the terminal lug.

3. Output connections shall be spring loaded compression terminals.

4. The rear panel shall also have two RJ45 connectors (input and output) for SmartLink rack-to-rack communication. SmartLink shall provide synchronization of the presets and the sequence across multiple packs. When used in conjunction with a SmartLink I/O Panel, a remote button station shall be able to trigger the presets and the sequence.

5. The front panel shall include recessed semi-protected circuit breakers. The magnetic circuit breakers shall be fully rated to eliminate nuisance tripping.

D. Electronics

1. The control panel on the pack shall have a power status LED indicator (Blue) and a DMX status LED indicator (Green). A 6-button blue phosphorescent keypad and a two-line-by-20-character backlit LCD shall be provided for menu navigation for system control, configuration, and control status.

2. The pack(s) shall receive DMX512 control protocol. Addressing shall be set via the 6-button keypad. Any dimmer may be patched to any DMX channel.

3. The dimmers shall be SCR-based and shall be capable of dimming multiple load types: incandescent, low voltage, 2-wire and 3-wire fluorescents. The dimmers shall consist of modular SCR and bonded heat sink assemblies with superior thermal transfer, surge and short circuit immunity. Dimmers employing triac power devices, pulse transformers, or other isolating devices not providing at least 2,500V RMS isolation between control and power components, shall not be acceptable.

4. The dimmers shall contain high quality 200uS toroidal filters to reduce the rate of current rise time resulting from switching the SCRs. The filter shall limit objectionable harmonics, reduce lamp filament sing and limit radio frequency interference on line and load conductors. Rise time shall be measured at the worst-case slew rate (about 50 percent) from 10 to 90 percent of the output waveform with the dimmer operating at full load.

5. 2,500V of optical isolation shall be provided between the DMX512 inputs and the control electronics as well as between control and power components.

6. The dimmers shall respond to control changes in less than 25 milliseconds. Dimmer outputs shall exhibit no oscillating or hunting for levels. Dimmers set to the same level shall output within ±1V of each other, regardless of phase or electronic module control. Each dimmer channel shall smoothly control loads from 10 watts to the rated load of the dimmer. DMX512 update speed shall be 40Hz.

7. The output curve for each dimmer shall be selectable from the following options:

   a. IES modified square law

   b. Linear

   c. Switched (50% threshold, non-regulated)

   d. Fluorescent with adjustable cut-off

   e. Adjustable Pre-Heat

8. From the control panel, it shall be possible to record up to 32 presets. Presets shall be programmable by recording current dimmer levels (as set by DMX), by entering dimmer levels on the facepanel directly, or a combination of both methods. Indication of an active preset shall be visible on the LCD display.

9. The presets may be recorded sequentially as a Sequence with programmable fade and hold times, which shall allow for stand-alone operation. Indication of an active sequence shall be visible on the LCD display.

10. A Standby / Control power switch shall be located on the front panel. It may be used to start up and shut down operation of the SmartPack. The unit shall always power-up in the last

used mode and settings and shall be ready for use without user intervention. The Power Up Behavior setting shall ensure the unit restores to its previous state (preset, sequence) when power is cycled.

11. Pack setup shall be user programmable. The control panel shall provide the following setup features:
    a. Set Menu Mode – Normal or Advanced
    b. Set language – English, French, German and Spanish
    c. Adjust LCD Contrast
    d. DMX Start Address (Normal Mode) or DMX Patching (Advanced Mode)
    e. DMX Loss Behavior – Hold Last Look, Wait and Fade, Fade to Preset
    f. Select Dimmer Curves
    g. Fluorescent Start Voltage
    h. Power Up Behavior
    i. Restore Defaults

E. Install as shown in the Drawings.

2.5 EMERGENCY TRANSFER DIMMERS

A. The Emergency Transfer Dimmers shall be housed in a dedicated enclosure, separate from all other dimmers.

B. The Emergency Transfer Dimmers shall be designed to operate at a voltage of 120/208 volts, 60 hz., normally fed from the building emergency system.

C. The operation of the Emergency Transfer Dimmers shall be as follows:
    1. The transfer dimmers shall operate in a normal fashion under normal conditions.
    2. The transfer shall include a power sensing circuit to determine when normal power to the main Dimmer Rack has been interrupted. In the event of a power interruption, control electronics for the transfer dimmers shall bring the dimmers to FULL.
    3. The transfer shall include an interconnection to the building fire alarm system. Activation of the fire alarm system shall bring the dimmer to FULL.
    4. The system shall incorporate a potentiometer to adjust the brightness level of each dimmer powering emergency lights when the controller is at "0". This potentiometer shall be capable of adjusting the low-end output of the dimmer from 0-70 volts.

D. Acoustical requirements
    1. Dimmers shall be equipped with firing circuitry and filtering designed to reduce "filament sing" attributable to rapid SCR switching of the AC waveform. Rise time shall not be less than 500 microseconds measured at 90 degree conduction angle, at the dimmer's full rated load.

E. The emergency transfer dimmers shall comply with all aspects of the current City of Chicago Electrical Code, Article 700.

F. Include control of dimmers as shown on the Drawings.

G. Install as shown on the Drawings.

2.6 ENTRY PANELS

A. General

1. The Button station shall be the SmartLink Button Station as manufactured by Electronic Theatre Controls, Inc., or equal. It shall be a remote station on an Echelon LinkPower network that can play presets stored in a host product such as a SmartPack dimmer pack, SmartSwitch Relay panel or in the Control Electronics Module (CEM+) of a Sensor+ dimmer rack. The station shall consist of a dual function (program/play) push-button with an integral LED for each corresponding look.

2. Standard stations shall control 5 or 10 backup looks. If control of more than 10 backup looks is required, custom stations shall be provided.

3. The system shall support up to four stations without an additional power supply.

B. Electrical

1. Button station wiring shall be an Echelon® Link power network. Link power shall utilize low-voltage Class II unshielded twisted pair, type Belden 8471 or equivalent, and one #14 ESD drain wire (when not installed in grounded metal conduit).

2. The station shall operate on ± 21 VDC provided by the CEM+ via the Link power network (for more than 4 stations, an additional power supply shall be required). The number of stations shall be limited by the available power.

3. Station wiring must be topology free. It may be point-to-point, bus, loop, home run or any combination of these.

4. Network insulation displacement connectors shall be provided with all stations.

5. The stations shall retain their memory regardless of connection status to system power.

C. Physical

1. Control station electronics shall mount directly behind the faceplate. A terminal block shall be supplied for contractor terminations. The entire assembly shall mount into a single gang back box. Back boxes for the flush mounted stations shall be industry standard back boxes. The manufacturer shall supply back boxes for surface mounted stations.

2. Station faceplates shall be constructed of ABS plastic and shall use no visible means of attachment. All Button stations shall be available with white, signal white, ivory, gray or black faceplates and buttons.

3. The face of the panel shall be recessed and covered by a hinged latching cover with a clear view panel.

D. Panels shall be mounted and installed as shown in the Drawings.

E. All labels and legends shall be permanently engraved directly into the faceplate, or the surrounding faceplate of the panel's enclosure. Engravings shall be filled with paint of a contrasting color.

2.7 WIRING DEVICES

A. General Requirements

1. All device number and letter labeling shall be provided with matching character fonts.

2. Device labeling

a. Circuit numbers and amperage shall be engraved into the face plate and filled with epoxy paint, or engraved onto black plastic lamicoid labels permanently attached with epoxy cement and a minimum of two (2) steel rivets. Letters shall be not less than one

inch high and shall be white for standard 20-amp stage circuit numbers and yellow for all other numbers.

3. Receptacle configuration as shown in the Drawings.
4. Exterior finish shall be flat black baked enamel (for steel) or black anodized (for aluminum) unless noted otherwise.
5. Devices with multiple voltages shall provide continuous voltage barriers separating each voltage.
6. All components requiring external electrical connections of more than eight (8) conductors shall include barrier-type terminal strips properly sized and permanently labeled.
   a. For drop boxes the terminal strips shall be sized to accept a range of wire from #10 to 12.
   b. For all other devices the terminal strips shall be sized to accept a range of wire from #12 to #6
7. Units shall be UL listed and carry a UL label.

B. Plug boxes

1. Plug boxes shall be constructed of 16-gauge steel or extruded aluminum. Knockouts shall be provided on all sides of the back box.

C. Drop boxes

1. Drop boxes shall be portable, entirely enclosed, and constructed of 16 gauge steel or extruded aluminum. End plates shall be filleted to prevent any sharp edges. The bottom shall contain two C-clamps and one load rated eyebolt with 11/16” i.d. eye for attachment to pipe batten. The offstage side shall contain "Kellems" type mesh grips to support the entrance of the multi-conductor cable.

D. Gridiron junction boxes

1. Gridiron junction boxes shall be constructed of 20-gauge steel.
2. Exterior finish shall include safety yellow stripes.
3. Access shall be by means of a removable cover plate. Knockouts shall be provided in all sides for contractor wiring and multi-conductor cables.
4. Each flexible cable entry shall have a "Kellems" type mesh grip attached to the box.

E. Multi-conductor cables

1. Cables shall be rated at 600 volts, minimum 90 degrees Celsius, with two (2) conductors for each 20-ampere circuit required plus one grounding conductor for every three (3) circuits.
2. Permanently installed cables shall be cord type SC or SO.
4. Wire size shall be minimum #12 AWG, or larger as code requirements dictate.
5. Sizes and lengths as indicated in the Drawings and schedules.

F. Cable clamps

1. Cable clamps shall hold multi-conductor cables at the batten, before they enter the plug strip and as otherwise shown in the Drawings.
2. Provide and install one (1) per multi-conductor cable per plug strip.

G. Locations, quantities, sizes and circuits as shown in the Drawings.

H. Install as shown in the Drawings.

2.8 ELLIPSOIDAL REFLECTOR SPOTLIGHTS – FIXTURE TYPE F31

A. Specifications

1. Wattage: 575, 750 watt.
2. Socket shall be mounted and shielded to withstand maximum lamp seal temperatures without substantial deterioration.
3. Reflector: Molded borosilicate, ellipsoidal, double flatted. Dichroic coatings to produce 95% minimum reflectance of visible light and 90% minimum transmission of infrared radiance.
4. Shutters: Four (4) stainless steel, operating in two (2) different planes. Shutter gate shall be rotating and locking, permitting flexible shutter cuts.
5. Pattern slot: accepts standard pattern (template) holder.
6. Iris: in addition to shutters, when specified.
7. Lenses: Aspheric, with anti-reflective coating to reduce light loss. Lenses shall be reasonably clear, with no perceptible discoloration or clouding.
8. Lamp adjustment: Vertical, horizontal, and axial adjustment.
9. Wiring: Three (3) 36 inch type SF-2 leads in fiberglas sleeve.
10. Connector shall be factory installed prior to shipment to job site.
11. Color frame: free of burrs and sharp edges; painted or anodized flat black.
12. Lamp: provide (1) per fixture, plus additional lamps. Lamp wattage, type, and total quantity shown in Schedule.
13. As part of the work of this Section, experienced theatrical technicians shall provide the following assembly and alignment services at the job site prior to delivery to Owner:
    a. Uncrating from factory containers and disposal of containers.
    b. Full assembly, including installation of C-clamps, safety cables, color filters and lamps.
    c. Lamp alignment to cosine (hot center) distribution.
    d. Hang and focus the fixtures according to the lighting layout shown in the Electrical Drawings.

B. Acceptable units (categorized by field angle)

36 degree:	ETC 436-400SC-B Approved Equal

C. Quantities per Schedule.

D. Install in accordance with Drawings and this Section.

2.9 BORDERLIGHTS – FIXTURE TYPE F32

A. Specifications

1. Each unit shall consist of a continuous assembly of individual compartments, each compartment containing lamp and color frame holder. Wired in four (4) circuits with feed-thru connectors.
2. Wattage: 150 watts per compartment.
3. Lamps: PAR 38 Flood, 120 watt

5. Color frame: Combination color frame, for use with roundels or color media. One (1) per compartment, free of burrs and sharp edges; painted or anodized flat black.
6. Roundels: tempered glass, stripped roundel for lighting spread. Install in matching pattern for all striplights: red, blue, green, clear.
7. Wiring: Feed: Four (4) 36” 3-wire leads with plug.
   Feed-Thru: (4) 36” 3-wire leads with receptacle.
8. Mounting hardware: One (1) complete set of hanging brackets per unit.
9. Lamp: provide (1) lamp per compartment, plus additional lamps. Lamp wattage, type, and total quantity shown in Schedule.
10. As part of the work of this Section, experienced theatrical technicians shall provide the following assembly and alignment services at the job site prior to delivery to Owner:
    a. Uncrating from factory containers and disposal of containers.
    b. Full assembly, including installation of brackets, C-clamps, color frames and roundels, and lamps.
    c. Hang and focus the fixtures according to the lighting layout shown in the Electrical Drawings.

B. Acceptable units: Altman R40
   Lighting and Electronics 65-16

C. Quantities per Schedule.

D. Install in accordance with Drawings and this Section.

2.10 ACCESSORIES

A. Stage cable

1. 20-ampere cable shall be 12-3 type SO cord with male plug at one end and female connector at other end.
2. Cable lengths shall be identified with the length near the receptacle end of the cables with 1/4" high black numbers on a colored background and sealed with clear shrink tubing. Colors as follows:
   a. 100’ cables – blue
   b. 50’ cables – green
   c. 25’ cables – red
   d. 10’ cables – yellow
   e. 5’ cables – white
3. Each cable shall have (1) "Velcro" tiewrap permanently attached to the insulation near the female connector.
4. Refer to section 2.02 for specification of connectors.

B. Safety cables

1. Minimum 1/8" aircraft cable, with 2" diameter loops on each end, seized by swaged copper sleeves; one loop shall include an operable spring clip rated for 200 pounds breaking strength, Acco 2450-7 or approved equal. Finished cable length: 36 inches.

C. Color media

1. 20" x 24" sheets of theatrical color media.

2. Roscolux, Lee Filters, and Gamcolor media.

3. Colors per Drawings. Provide sufficient quantity for all scheduled fixtures, plus 100% spare color cut to size.

D. Quantities, lengths, and types per Drawings and Schedule.

E. Install in accordance with Drawings and this Section. Deliver remainder to Owner.

2.11 SCHEDULE OF QUANTITIES

Section		Description	Quantity
2.2		Connectors	1 for each unit, installed
2.3		Control Console - Theatre	1
2.3	E1	Control cables	1 set
	E2	Dust covers, console and CRT	1 set
2.4		Dimmer Racks	as required
2.4		Dimmers	per Drawings
2.5		Emergency Dimmers	per Drawings
2.6		Entry Panels	per Drawings
2.7		Wiring Devices	per Drawings
2.8		Ellipsoidal Reflector Spotlights	per Drawings
2.9		Borderlights	per Drawings
2.10	a.	Stage cable - 25 ft	4
		10 ft	6
		5 ft	12
	b.	Safety cables	1 per Ellipsoidal / 2 per Borderlight, installed
	c	Color Media	per Drawings and this Section

Lamps - 26-30° Ellipsoidal Spotlights – 575 watt quartz ..... as required plus 20% spares

Borderlights – 120 watt Flood - quartz ..... as required plus 20% spares

Color frames: One for each unit, plus 50% spares.

C-clamps: One for each unit or hanging trunion, installed.

PART 3 - EXECUTION

3.1 FABRICATION

A. Racks and cabinets shall be welded assemblies of sheet steel or aluminum or bar size angles, channels, and tees or aluminum extrusions forming rigid enclosures to support internal components.

B. Operating elements shall be mechanically safe and electrically "dead."

C. All steel parts and panels shall be cleaned and primed with rust inhibiting primer. Exterior finishes shall be epoxy resin or baked enamel in matte black, or in Manufacturer's standard color where not specified.

D. All internal wiring shall be factory completed. All wiring shall be in harnesses and bound. No loose or randomly routed wires shall be permitted.

E. All wire sizes and insulations shall comply with NEC, UL, and local codes and meet or exceed electronics industry standards.

3.2 PACKING AND SHIPPING

A. Equipment shall be wrapped and sealed in polyethylene and substantially crated for shipment. Crates shall clearly indicate equipment contained, nature of components, and theatre site allocation.

B. Dimmers shall be individually packaged.

3.3 INSTALLATION

A. Install all items in conformity with standard trade practices and Manufacturer's recommendations.

B. Consult and coordinate work with trades doing adjoining work.

C. Position all items accurately as indicated in the Drawings, and true to plumb line and level. Maintain maximum headroom and clearance at all points.

D. Do not uncrate, unpack, unwrap, or install control console, video monitor(s), remote controls, or other auxiliary control components until construction is complete and environment is clean and dust-free.

E. Install and focus all stage lighting instruments as indicated in Drawings. Align all ellipsoidal spotlights for cosine (hot center) alignment as part of the focusing work. Install all color media. Secure (1) safety cable to each spotlight, (2) safety cables to each striplight. Lock all focuses in place with hand tools, so that 5 pounds of force at the lens tube will not move the instrument from its focus.

1. Provide the following frontlight washes as shown in Drawings:
    a. Front Areas: Stage Left, (1 unit), Center Stage (2 units), Stage Right (1 unit).
    b. Front Blue Wash: (4 units)
    c. Front Pink Wash: (4 units)
2. Provide the following striplight washes as shown in Drawings:
    a. Downstage: four-color washes (4 units)
    b. Midstage: four-color washes (4 units)
    c. Upstage/Cyc: four-color washes (4 units)

END OF SECTION 16555