

SECTION 01352

LEED REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general requirements and procedures for compliance with certain USGBC LEED prerequisites and credits needed for Project to obtain LEED Silver certification based on LEED for Schools.
 - 1. A copy of the LEED Project checklist is attached at the end of this Section for information only. See Attachment C.

1.2 DEFINITIONS

- A. Chain-of-Custody Certificates: Certificates signed by vendors and manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Certificates shall include evidence that vendor (the company that sells wood products to the building project contractors or subcontractors) is certified for chain of custody by an FSC-accredited certification body.
- B. LEED: Leadership in Energy & Environmental Design.
- C. Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.
- D. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.
 - 1. "Post-consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
 - 2. "Pre-consumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

1.3 SUBMITTALS

- A. General: Submit additional LEED submittals required by other Specification Sections.

- B. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.
- C. Project Materials Cost Data: Provide statement indicating total cost for building materials used for Project, excluding mechanical, electrical, and plumbing components, and specialty items such as elevators and equipment. Include statement indicating total cost for wood-based materials used for Project.
- D. LEED Action Plans: Provide preliminary submittals within thirty days of date established for the Notice to Proceed (NTP) indicating how the following requirements will be met, except where otherwise indicated:
1. Prerequisite to SS P1: Provide sediment and erosion control plan, specific to the site, that complies with the construction activities requirements listed in Phase I and Phase II of the National Pollutant Discharge Elimination System (NPDES) program or local requirement where more restrictive. Submit plan within fifteen days of NTP.
 2. Credit MR 2.: Waste management plan complying with Division 1 Section "Construction Waste Management." Submit plan within fifteen days of NTP.
 3. Credit MR 4.: List of proposed materials with recycled content. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.
 4. Credit MR 5.: List of proposed regional materials. Identify each regional material, including its source, cost, and the fraction by weight that is considered regional.
 5. Credit MR 7: List of proposed certified wood products and list of all wood products. Indicate each product containing certified wood, including its source and cost of certified wood products. Include total cost of all wood products.
 6. Credit EQ 3.1: Construction indoor-air-quality management plan.
 7. Credit EQ 4: List of proposed low-emitting materials. Identify which options (Option 1: Adhesives and Sealants, Option 2: Paints and Coatings, Option 3: Flooring Systems, Option 4: Composite wood and agrifiber, Option 5: Furniture and Furnishings and/or Option 6: Ceiling and Wall systems) will meet the requirements. Choose a minimum of four options.
- E. LEED Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans for the following:
1. Prerequisite SSpl: Construction Activity Pollution Prevention photos illustrating compliance.
 2. Credit MR 2.: Waste reduction progress reports complying with Division 1 Section "Construction Waste Management."
 3. Credit MR 4.: Recycled content.
 4. Credit MR 5.: Regional materials.
 5. Credit MR 7: Certified wood products.
 6. Credit EQ 3.1: Photographs demonstrating compliance with IAQ plan
 7. Credit EQ 4: Low-Emitting materials
 8. Contractor shall use a spreadsheet similar to the LEED Materials Table (Attachment D) to document progress with respect to MR 4, 5 and 7. Attachment D is provided as a sample only.

F. LEED Documentation Submittals:

1. Credit SS 7.2: Product Data for roofing materials indicating Solar Reflectance Index compliance for non-vegetated roof systems.
2. Credit SS 8.0: Product Data for interior and exterior lighting fixtures that stop direct-beam illumination from leaving the building site.
3. Prerequisite EA P3.0: Product data on HVAC equipment indicating absence of CFC refrigerants.
4. WE 3.1/3.2/3.3: Product Data for plumbing fixtures indicating flow.
5. Credit EA 4.: Product Data for new HVAC equipment indicating compliance with credit and use of refrigerants with low ozone depletion and global warming potential.

6. Credit EA 5: Product data and wiring diagrams for sensors and data collection system used to provide continuous metering of building energy-consumption performance.
7. Credit MR 2.: Comply with Division 1 Section "Construction Waste Management."
8. Credit MR 4.: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
9. Credit MR 5.: Product data for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

10. Credit MR 7: For all permanently-installed wood products, both FSC-certified and not, provide vendor invoices including prices for all wood products on a line-item basis. A vendor is defined as the company that sells wood products to building project contractors or subcontractors. Each vendor invoice must provide a line-item identification of each wood product, identify FSC products as FSC "Pure," FSC Mixed Credit" or FSC Mixed [NN] %. The \$ value of each line item and the vendor's chain-of-custody number must be shown on any invoice that contains FSC products.
11. Credit EQ 1.0: Product Data and Shop Drawings for carbon dioxide monitoring system and outdoor air flow measuring devices.
12. Credit EQ 3.1:
 - a. Construction indoor-air-quality management plan based on SMACNA IAQ Guidelines for Occupied Buildings under Construction, 1995, Chapter 3.
 - b. Product data for temporary filtration media.
 - c. Product data for filtration media used during occupancy.
 - d. Construction Documentation: At least six photographs at six different times during the construction period, for a total of at least 36 photos, along with a brief description of the SMACNA approach employed, documenting implementation of the indoor-air-quality management measures, such as protection of ducts and on-site stored or installed absorptive materials. All applicable SMACNA approaches described in the IAQ plan must be documented. Monthly photos will be required.
 - e. Provide documentation confirming that smoking was not allowed inside the building or within 25 feet of any opening during construction.

13. Credit EQ 3.2:
 - a. Signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed and statement that filtration media

was replaced after flush-out. Provide documentation verifying temperature, humidity and outside air volume during the flush-out.

- b. Product data for filtration media used during flush-out and during occupancy.

14. Credit EQ4.: Low-Emitting Materials

- a. Option 1: Adhesives & Sealants (1 point): Submit Certification demonstrating that all adhesives and 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.
- b. Option 2: Paints & Coatings (1 point): Submit Certification Demonstrating that all paints and coatings 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.
- c. Option 3: Flooring Systems (1 point): Submit Certification demonstrating that all flooring elements 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.
- d. Option 4: Composite Wood and Agrifiber Products (1 point): Submit Certification demonstrating that all composite wood and agrifiber products 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.
- e. Option 5: Furniture & Furnishings (1 point): Submit Certification demonstrating that Classroom furniture including all student and teacher desks, tables, and seats introduced into the project space that has been manufactured, refurbished or refinished within one year prior to occupancy must meet one of the requirements below. Salvaged and used furniture that is more than one year old at the time of occupancy is excluded from the credit requirements.

Method A: GREENGUARD Children & Schools Certified

OR

Method B: Calculated indoor air concentrations that are less than or equal to those established in table 1 for furniture systems and seating determined by a procedure based on the U.S. Environmental Protection Agency's Environmental Technology Verification (ETV) Large Chamber Test Protocol for Measuring Emissions of VOCs and Aldehydes (September 1999) testing protocol conducted in an independent air quality testing laboratory.

Table 1: Indoor Concentrations

Chemical Containment	Emission Limits Classroom Furniture	Emission Limits Seating
TVOC	0.5 mg/m ³	0.25 mg/m ³

Formaldehyde	50 parts per billion	25 parts per billion
Total Aldehydes	100 parts per billion	50 parts per billion
4 – Phenylcyclohexene (4-PCH)	0.0065 mg/m ³	0.00325 mg/m ³

OR

Method C: Calculated indoor air concentrations that are less than or equal to those established in Table 1 for furniture systems and seating determined by a procedure based on BIFMA M7.1-2005 and X7.1-2005 testing protocol conducted in an independent third party air quality testing laboratory.

- f. Option 6: Ceiling and Wall Systems (1 point): Submit Certification demonstrating that all gypsum board, insulation, acoustical ceiling systems and wall coverings 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.
15. Credit EQ 5: Product data demonstrating use of MERV 13 filters.
 16. Credit EQ 6.2: Product Data and Shop Drawings for sensors and control system used to provide individual airflow and temperature controls for minimum 50 percent of non-perimeter, regularly occupied space.
 17. Contractor shall use the LEED Materials Credit Documentation Sheet (Attachment A) and the LEED Low-Emitting Materials Credit Documentation Sheet (Attachment B), as appropriate for each LEED materials submittal.
 18. Contractor will provide LEED documentation and input LEED documents Online to demonstrate compliance with the following LEED credits: MRc2.1/2.2, MRc4.1/4.2, MRc5.1/5.2, MRc7, EQc3.1/3.2, EQc4.1/4.2/4.3/4.4.

1.4 QUALITY ASSURANCE

- A. LEED Coordinator: Engage an experienced LEED-Accredited Professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

PART 2 - PRODUCTS

2.1 RECYCLED CONTENT OF MATERIALS

- A. Credit MR 4.: Provide building materials with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 20 percent of cost of materials used for Project.
 1. Cost of post-consumer recycled content of an item shall be determined by dividing weight of post-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.

2. Cost of post-consumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing weight of post-consumer recycled content plus one-half of pre-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.
3. Do not include mechanical and electrical components in the calculation. Include only Div 2 through 10 in the calculation. If furniture is included in the materials calculations, also include Div 12.

2.2 REGIONAL MATERIALS

- A. Credit MR 5.: Provide a minimum of 20 percent of building materials (by cost) that are regional materials. Goal is 40%.

2.3 CERTIFIED WOOD

- A. Credit MR 7: Provide a minimum of 50 percent (by cost) of wood-based materials that are produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Wood products made from recycled wood that meets the requirements of MRc4.1/4.2 shall not be counted toward the requirements for FSC certified wood.

2.4 LOW-EMITTING MATERIALS

- A. Comply with a minimum of four of the following six options:
- B. Option 1: Adhesives & Sealants (1 point): all adhesives and 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.
- C. Option 2: Paints & Coatings (1 point): all paints and coatings 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.
- D. Option 3: Flooring Systems (1 point): all flooring elements 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.
- E. Option 4: Composite Wood and Agrifiber Products (1 point): all composite wood and agrifiber products 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.

- F. Option 5: Furniture & Furnishings (1 point): Classroom furniture including all student and teacher desks, tables, and seats introduced into the project space that has been manufactured, refurbished or refinished within one year prior to occupancy must meet one of the requirements below. Salvaged and used furniture that is more than one year old at the time of occupancy is excluded from the credit requirements.

Method A: GREENGUARD Children & Schools Certified

OR

Method B: Calculated indoor air concentrations that are less than or equal to those established in table 1 for furniture systems and seating determined by a procedure based on the U.S. Environmental Protection Agency's Environmental Technology Verification (ETV) Large Chamber Test Protocol for Measuring Emissions of VOCs and Aldehydes (September 1999) testing protocol conducted in an independent air quality testing laboratory.

Table 1: Indoor Concentrations

Chemical Containment	Emission Limits Classroom Furniture	Emission Limits Seating
TVOC	0.5 mg/m ³	0.25 mg/m ³
Formaldehyde	50 parts per billion	25 parts per billion
Total Aldehydes	100 parts per billion	50 parts per billion
4 – Phenylcyclohexene (4-PCH)	0.0065 mg/m ³	0.00325 mg/m ³

OR

Method C: Calculated indoor air concentrations that are less than or equal to those established in Table 1 for furniture systems and seating determined by a procedure based on BIFMA M7.1-2005 and X7.1-2005 testing protocol conducted in an independent third party air quality testing laboratory.

- G. Option 6: Ceiling and Wall Systems (1 point): all gypsum board, insulation, acoustical ceiling systems and wall coverings 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.
- H. The General Contractor shall review the manufacturers and products listed in the Technical Specifications, and verify compliance with the referenced Credit EQ 4 (California) standard. The Contractor shall obtain necessary manufacturer tests and certification to demonstrate compliance with the referenced standard. If such certification is not immediately available, the measures necessary to demonstrate compliance shall not impact project cost or schedule. If compliance cannot be met, the applicable guidelines below shall be used for interior finishes.
1. Adhesives & Sealants: Provide product data and MSDS for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Adhesives, sealants and Sealant Primers shall meet the South Coast Air Quality Management District (SCAQMD) Rule #1168, corresponding to an effective date of July

- 1, 2005 and rule amendment date of January 7, 2005. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D (EPA Method 24). Comply with the following limits:
 - a. Wood Glues: 30 g/L.
 - b. Metal to Metal Adhesives: 30 g/L.
 - c. Adhesives for Porous Materials (Except Wood): 50 g/L.
 - d. Subfloor Adhesives: 50 g/L.
 - e. Plastic Foam Adhesives: 50 g/L.
 - f. Carpet Adhesives: 50 g/L.
 - g. Carpet Pad Adhesives: 50 g/L.
 - h. VCT and Asphalt Tile Adhesives: 50 g/L.
 - i. Cove Base Adhesives: 50 g/L.
 - j. Gypsum Board and Panel Adhesives: 50 g/L.
 - k. Rubber Floor Adhesives: 60 g/L.
 - l. Ceramic Tile Adhesives: 65 g/L.
 - m. Multipurpose Construction Adhesives: 70 g/L.
 - n. Fiberglass Adhesives: 80 g/L.
 - o. Contact Adhesive: 80 g/L.
 - p. Structural Glazing Adhesives: 100 g/L.
 - q. Wood Flooring Adhesive: 100 g/L.
 - r. Structural Wood Member Adhesive: 140 g/L.
 - s. Special Purpose Contact Adhesive (contact adhesive that is used to bond melamine covered board, metal, unsupported vinyl, Teflon, ultra-high molecular weight polyethylene, rubber or wood veneer 1/16 inch or less in thickness to any surface): 250 g/L.
 - t. Top and Trim Adhesive: 250 g/L.
 - u. Plastic Cement Welding Compounds: 350 g/L.
 - v. ABS Welding Compounds: 400 g/L.
 - w. CPVC Welding Compounds: 490 g/L.
 - x. PVC Welding Compounds: 510 g/L.
 - y. Adhesive Primer for Plastic: 650 g/L.
 - z. Sheet Applied Rubber Lining Adhesive: 850 g/L.
 - aa. Aerosol Adhesive, General Purpose Mist Spray: 65 percent by weight.
 - bb. Aerosol Adhesive, General Purpose Web Spray: 55 percent by weight.
 - cc. Special Purpose Aerosol Adhesive (All Types): 70 percent by weight.
 - dd. Other Adhesives: 250 g/L.
 - ee. Architectural Sealants: 250 g/L.
 - ff. Nonmembrane Roof Sealants: 300 g/L.
 - gg. Single-Ply Roof Membrane Sealants: 450 g/L.
 - hh. Other Sealants: 420 g/L.
 - ii. Sealant Primers for Nonporous Substrates: 250 g/L.
 - jj. Sealant Primers for Porous Substrates: 775 g/L.
 - kk. Modified Bituminous Sealant Primers: 500 g/L.
 - ll. Other Sealant Primers: 750 g/L.
2. Paints & Coatings: Provide product data and MSDS for paints and coatings used inside the weatherproofing system indicating VOC content of each product used. Architectural paints, coatings and primers shall not exceed the VOC content limits established in Green Seal Standard GS-11, May 20, 1993. Anti-corrosive and anti-rust paints shall not exceed the VOC content limits established by Green Seal Standard GS-03, January 7, 1997. Clear

wood finishes, floor coatings, stains, sealers and shellacs shall not exceed the VOC limits of SCAQMD Rule 1113, January 1, 2004. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D (EPA Method 24). Comply with the following limits:

- a. Flat Paints and Coatings: VOC not more than 50 g/L.
 - b. Nonflat Paints and Coatings: VOC not more than 150 g/L.
 - c. Primers: VOC not more than 150 g/L.
 - d. Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
 - e. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
 - f. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
 - g. Floor Coatings: VOC not more than 100 g/L.
 - h. Shellacs, Clear: VOC not more than 730 g/L.
 - i. Shellacs, Pigmented: VOC not more than 550 g/L.
 - j. Stains: VOC not more than 250 g/L.
3. Flooring Systems: Provide product data for carpet products showing compliance with the Carpet and Rug Institute's Green Label Plus program. Carpet cushion shall meet the requirements of the Carpet and Rug Institute Green Label program. Provide product data for vinyl, linoleum, rubber and laminate flooring showing compliance with the FloorScore program requirements.
 4. Composite Wood and Agrifiber Products: Provide product data for products containing composite wood or agrifiber products or wood glues indicating that they do not contain urea-formaldehyde resin.
- I. Contractor shall provide a VOC budget if any adhesives, sealants, paints or coatings do not meet the requirements for EQ 4 listed in H. The VOC budget shall be a weighted average demonstrating that the overall low-VOC performance has been attained for paints, coatings, adhesives and sealants separately, not in combination. The calculation is a comparison between a baseline case and the design (actual) case. When the actual VOC content is less than the baseline, the credit requirement is satisfied. The values used in the comparison are the total VOCs contained in the products (e.g. paint) used on the project. The total VOCs is determined by multiplying the volume of the product used by the threshold VOC level for the baseline case and the actual product VOC level for the design case. The baseline application rate should not be greater than that used in the design case.

PART 3 - EXECUTION

3.1 MEASUREMENT AND VERIFICATION

- A. Credit EA 5: Support measurement and verification plan data collection by ensuring that all devices installed under the contract operate properly during the measurement and verification period.
- B. Measurement and verification period shall cover at least one year of post construction occupancy.

3.2 CONSTRUCTION WASTE MANAGEMENT

- A. Credit MR 2.: Comply with Division 1 Section "Construction Waste Management."

3.3 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT

- A. Credit EQ 3.1: Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under Construction, 1995, Chapter 3." At a minimum, plan must address HVAC protection, source control, pathway interruption, housekeeping and scheduling.

1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 1 Section "Temporary Facilities and Controls," install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.
2. Replace all air filters immediately prior to occupancy.
3. No smoking is allowed within the building and within 25 feet of building entrances.

- B. Credit EQ 3.2: **Comply with one of the following requirements:**

1. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14000 cu. ft. (4 300 000 L) of outdoor air per sq. ft. (sq. m) of floor area while maintaining an internal temperature of at least 60 deg F (16 deg C) and a relative humidity no higher than 60 percent.
 - a. Operating requirements to be created during construction based on weather conditions.
2. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. (1 070 000 L) of outdoor air per sq. ft. (sq. m) of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. (1.52 L/s per sq. m) of outside air or the design minimum outside air rate determined in EQ Prerequisite 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14000 cu. ft./sq. ft. (4 300 000 L/sq. m) of outside air has been delivered to the space.
 - a. Operating requirements to be created during construction based on weather conditions.
3. Air-Quality Testing:
 - a. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's "Compendium of Methods for the Determination of Air Pollutants in Indoor Air," and as additionally detailed in the USGBC's LEED-NC: Reference Guide." This EPA standard is available from NTIS by calling (800) 553-6847 with PB90200288 ordering number.
 - b. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:

- 1) Formaldehyde: 50 ppb.
 - 2) Particulates (PM10): 50 micrograms/cu. m.
 - 3) Total Volatile Organic Compounds (TVOC): 500 micrograms/cu. m.
 - 4) 4-Phenylcyclohexene (4-PH): 6.5 micrograms/cu. m.
 - 5) Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.
- c. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting noncomplying building areas, take samples from same locations as in the first test.
- d. Air-sample testing shall be conducted as follows:
- 1) All measurements shall be conducted prior to occupancy but during normal occupied hours, and with building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
 - 2) Building shall have all interior finishes installed including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Nonfixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.
 - 3) Number of sampling locations will vary depending on the size of building and number of ventilation systems. For each portion of building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq. ft. (2300 sq. m) or for each contiguous floor area, whichever is larger, and shall include areas with the least ventilation and greatest presumed source strength.
 - 4) Air samples shall be collected between 3 and 6 feet (0.9 and 1.8 m) from the floor to represent the breathing zone of occupants, and over a minimum four-hour period.

3.4 MATERIAL AND CONSTRUCTION PROTECTION

- A. Deliver, store and handle products and materials using methods that will prevent damage and deterioration and in accordance with manufacturer's recommendations. Deliver to minimize long term storage in undamaged condition in manufacturer's original unopened, undamaged containers complete with labels and instructions. Store products and materials subject to damage by the elements under cover in a weather tight enclosure above ground with ventilation adequate to prevent condensation. Protect from freezing and moisture intrusion.
- B. Inspect materials and products promptly upon arrival at the site for damage, soiling, contaminates and dampness and reject as appropriate.
- C. Provide protection during the construction process to prevent moisture intrusion, freezing, dirt and debris within assemblies and extremes in temperature not common to the in-place use environment of the element. Do not allow food and drink or food and drink containers or material protective wrapping to be incorporated into the Work.
- D. Install Work in sequence with sufficient time for curing and drying of each element before subsequent work upon which such work depends.

- E. Promptly take measures to dry or remove and replace materials products and portions of the project that evidence absorption of moisture or are wet before incorporation proceeding with the work and incorporation or of such materials or products into the project.

END OF SECTION 01352

(Insert Attachment A - Materials Credits Documentation Sheet)

(Insert Attachment B – Low-Emitting Materials Credits Documentation Sheet)

(Insert Attachment B (alternate) – Low-Emitting Materials Credits Documentation Sheet)

(Insert Attachment C – LEED Checklist)

(Insert Attachment D - LEED Materials Table in Excel Spreadsheet Format)

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 Boards 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 Boards 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 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 Boards 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. Backfill: 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, or 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 OR 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 will 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.
 14. 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 the 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 the Board Authorized Representative. Provide temporary services during interruptions to existing utilities, as acceptable to the Chicago Public Schools, and the 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 O R 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 the Board Authorized Representative and the MEC advance written notice (minimum 48-hours) of the anticipated removal date. The Contractor must coordinate all UST removal activities with the Board Authorized Representative, and the MEC.
- D. The Contractor shall cooperate with and coordinate work progress with the Board Authorized Representative, and the 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 will be backfilled with excavated soil and/or gravel the same day after removal and sampling activities unless directed by the 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 the MEC.
3. The UST Contractor(s), Subcontractor(s) and their employees shall be thoroughly trained in the 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 will 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

1. 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.
2. The Contractor shall, in writing, bring to the attention of the Board Authorized Representative and the MEC any obstacles, impairments or other items that may prohibit the performance of work at least 72-hours prior to the start of work,
3. 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 permitted Subtitle D Landfill Site

- B. 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 of the requirement 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.

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. Using 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 the 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 the 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. Temporary plug all other openings so that all vapors will 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 operate 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 the 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 the MEC.

F. Disposal of storage tanks:

1. All tanks will be taken to an appropriate disposal facility (e.g. scrap steel reclaimed or landfill). Tanks will 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 the 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 the 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 will be collected and disposed of at the Contractor's own expense. or as determined by the Board Authorized Representative and the 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 the MEC. If the Contractor backfills the excavation area without obtaining approval from the Board Authorized Representative and the 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 the 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 SECTION

SECTION 02550

PERMEABLE PAVERS

PART 1 – MATERIALS

1.1 SUMMARY

- A. This section includes all ungrouted and mortarless exterior permeable unit paving for the extent of unit paving indicated on the drawings.

1.2 RELATED WORK

- A. Section 02300 – Earthwork
- B. Section 02700 – Sewerage Drainage

1.3 REFERENCES

- A. The American Society of Testing and Materials (ASTM):
 - 1. ASTM D698 - Tests for Moisture-Density Relationship of Soils and Soil-Aggregate Mixtures, Using 5 Lb. Rammer and 12 in. Drop.
- B. Illinois Department of Transportation:
 - 1. Standard Specifications for Road and Bridge Construction, January 2007, including all addenda.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract.
- B. Product data for the following products:
 - 1. Permeable unit pavers
 - 2. **Edge Restraints**
 - 3. **Joint Material**
 - 4. **Bedding Layer**
 - 5. **Drainage Course**
 - 6. **Base Course**
- C. Samples for initial selection purposes in form of actual units or sections of units showing full range of colors, textures, and patterns available for each type of unit paver indicated. Include similar samples of material for joints and accessories involving color selection.
- D. Qualification data for firms and persons specified in "Quality Assurance" Article 1.05 to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, plus other information specified.
- E. Shop Drawings: showing detailed paving patterns and proposed cuts within concrete banding modules.
- F. LEED
 - 1. LEED Credit MR 4.1 and Credit MR 4.2: Submit product data for products having recycled content, documentation indicating percentages by weight of post-consumer and pre-consumer recycled content.

- a. Include statement indicating costs for each product having recycled content.
2. LEED Credit MR 5.1 and Credit MR 5.2: Submit product data for products that have extracted, harvested, or recovered, as well as manufactured within 500 miles of the Project site.
 - a. Include a statement indicating the percentage by weight which is extracted, harvested, or recovered within 500 miles of the Project site.
3. LEED Credit SS Credit 7.1: Product Data stating the solar reflectance index (SRI) is 29 or greater.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has successfully completed permeable unit paver installations similar in material, design and extent to that indicated for Project.
- B. Single-Source Responsibility: Obtain each color, type and variety of unit pavers, from a single source with resources to provide products and materials of consistent quality in appearance and physical properties without delaying progress of the work.
- C. Field-Constructed Mock-Up: Prior to installation of unit pavers, erect mock-ups for each form and pattern of unit pavers required to verify selections made under sample submittals. Build mock-ups to comply with the following requirements, using materials and same base construction including special features for expansion joints and contiguous work as indicated for final unit of work.
 1. Locate mock-ups on site in location and size indicated or, if not indicated, as directed by Owner's Representative and/or Architect/Engineer.
 2. Notify Owner's Representative and Architect/Engineer one week in advance of the dates and times when mock-ups will be erected.
 3. Demonstrate quality of workmanship that will be produced in final unit of work.
 4. Retain and maintain mock-ups during construction in undisturbed condition as a standard for judging completed unit of work. Accepted mock-ups in undisturbed condition at time of Substantial Completion may become part of completed unit of work.
 5. Paving is to show the proposed color, crevice fill material, surface finish and workmanship. Consult Architect for paver color.
 6. Panel size shall be a minimum of 10' -0" wide x 10' -0" long in the presence of the Architect/Engineer prior to the installation of these materials on the site.
 7. Do not start paving site work until the Architect has given written approval of all components of the sample panel.
 8. This sample panel will be used as a standard of comparison for all site concrete constructed of same materials.
- D. Visual Inspection
 1. All units shall be sound and free of defects that would interfere with proper placing of the unit or impair the strength or permanence of the construction. Minor cracks incidental to the usual methods of manufacture, or minor chipping resulting from customary methods of handling in shipment and delivery, shall not be deemed grounds for rejection.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Protect unit pavers and aggregate during storage and construction against wetting by rain, snow, or ground water and against soil or contamination from earth and other materials.

1.7 PROJECT CONDITIONS

- A. Cold Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.
- B. Weather Limitations: Protect unit paver work against freezing when atmospheric temperature is 40 deg F (4 deg C) and falling. Heat materials and provide temporary protection of completed portions of unit paver work. Comply with International Masonry All-Weather Council's "Guide Specification for Cold-Weather Masonry Construction."

1.8 LEED REQUIREMENTS:

- 1. Maximize the use of recycled concrete aggregate for aggregate in the design mixes.
- 2. Obtain recycled concrete aggregate within 500 miles of the project.
- 3. Obtain non-recycled concrete aggregate within 500 miles of the project.
- 4. Obtain ready-mix concrete within 500 miles of the project.

PART 2 - PRODUCTS

2.1 PERMEABLE PAVING UNITS

- A. All permeable pavers shall comply with the quality specifications for solid concrete interlocking paving units as set out in ASTM Specifications C 936-01.
- B. Manufacturer
 - 1. Unilock Chicago (or approved equal)
301 Sullivan Rd.
Aurora, IL 60505
Contact: Brad Swanson
- C. Permeable Paver: Unilock Eco-Priora
 - 1. Color: Natural (SRI >29) **and Autumn Red.**
 - 2. Finish: **Premium Face Mix Finish**
 - 3. Size: Manufacture the sizes indicated with a maximum tolerance of plus or minus 1/16 in all directions.
 - a. 120 mm (5 in) x 240 mm (10 in) x 80 mm (3-1/8 in) thick

Note: Imperial dimensions are nominal equivalents to the metric dimensions

- D. Physical Requirements
 - 1. Compressive Strength
 - a. At the time of delivery to the work site, the average compressive strength shall not be less than 8,000 psi, with no individual strength less than 7,200 psi as per ASTM Specifications C 936-01.
 - b. Testing procedures shall be in accordance with ASTM Specifications C 140.
 - 2. Absorption
 - a. The average absorption shall not be greater than five percent (5%) with no individual unit absorption greater than seven percent (7%) as required by ASTM Specification C 936-01.
 - 3. Resistance to Freezing and Thawing
 - a. The manufacturer shall satisfy the purchaser either by proven field performance or laboratory freezing and thawing test that the paving units have adequate resistance to

freezing and thawing. If a laboratory test is used, when testing in accordance with ASTM Specification C 67-02, Section 8, specimens shall have no breakage and not greater than 1 % loss in dry weight of any individual unit when subjected to 50 cycles of freezing and thawing.

2.2 AGGREGATE MATERIALS

- A. Aggregates shall conform to ASTM Specifications C 33 for normal weight concrete aggregate (no expanded shale or lightweight aggregates) except that grading requirements shall not necessarily apply.
- B. Joint Material:
 - 1. Color to be selected by architect to match paver selected.
 - 2. The grading requirements for the material shall be in compliance with the grain size distribution envelope presented in the following chart.

Eco-Priora Pedestrian Use Paver (ASTM #8)

1/4"	97-100
No. 4	50-60
No. 8	0-3
No. 16	0-2

- C. Bedding Layer:
 - 1. The Bedding Layer shall consist of crushed stone (CA-16) meeting the grading requirements specified in IDOT Section 1004.
 - 2. The grading requirements for the material shall be in compliance with the grain size distribution envelope presented in the following chart.

Sieve Size	Percentages Passing Weight Specified
1/2"	100
3/8"	94-100
No. 4	15-45
No. 16	0-4

- D. Drainage Course:
 - 1. The Drainage Course shall consist of crushed stone (CA-7) meeting the grading requirements specified in IDOT Section 1004.
 - 2. The grading requirements for the material shall be in compliance with the grain size distribution envelope presented in the following chart.

Sieve Size	Percentages Passing Weight Specified
1-1/2"	100
1"	90-100
1/2"	30-60
No. 4	0 - 10

- 3. The percentage of Voids in Dry Bulk shall be 38.0.

- E. Base Course

1. The Base Course shall consist of crushed stone (CA-1) meeting the grading requirements specified in IDOT Section 1004.
2. The grading requirements for the material shall be in compliance with the grain size distribution envelope presented in the following chart:

Sieve Size	Percentages Passing Weight Specified
3"	100
2 - 1/2"	90-100
2"	45-75
1 - 1/2"	0-30
1"	0-6

3. The percentage of Voids in Dry Bulk shall be 38.0.

2.3 EDGE RESTRAINTS

- A. Steel Edge Restraints: ~~Per contract documents~~ Commercial steel edging with loops pressed from or welded to face of sections at 2' 6" on center to receive stakes, and steel stakes 16" long for each loop. Size of edging as follows:
 1. ~~3/16" thick by 4" high by 16 ft. long.~~
 2. ~~Manufacturer: Subject to compliance with requirements, provide products of J.T. Ryerson & Son, Inc. or equal.~~

PART 3 - EXECUTION

3.1 SUBGRADE

- A. Under this section the Contractor shall perform the final shaping and compaction of earth to provide for the construction of the permeable pavement structure, to conform to the lines, grades and cross-sections shown on the plans.
- B. Site grades can be elevated to the design sub grade elevation using clean native earth fill (free of deleterious material). This fill should be placed in lifts not exceeding 6 inches and compacted to a minimum of 90 percent Standard Proctor Density per ASTM D 698. The final sub grade profile should be (1) uniformly compacted to a minimum of 90 percent Standard Proctor Density and (2) proof-rolled using a heavy rubber tired vehicle (such as a loaded tandem) to delineate soft (wet and "spongy") areas. These areas should be repaired by removing the unstable soil and replacing with clean dry compacted earth fill.

3.2 PLACEMENT OF BASE COURSE

- A. The base course of CA-1 shall consist of a thickness as indicated in drawings and shall be compacted to a minimum of 95 percent Standard Proctor Density.

3.3 PLACEMENT OF DRAINAGE COURSE

- A. The base course of CA-7 shall consist of a thickness as indicated in drawings and shall be compacted to a minimum of 95 percent Standard Proctor Density.

3.4 BEDDING LAYER

- A. Spreading

1. The bedding aggregate shall be spread loosely in a uniform layer to provide a finished layer of 1.5 inches after compaction of the paving units.

B. Screeding

1. The spread aggregate shall be carefully maintained in a loose condition and protected against precompaction by traffic or rain both prior to and following screeding. Under no circumstances shall the bedding aggregates be screeded in advance of the laying face to an extent to which paving will not be completed on that day. Any screeded bedding aggregate which is precompacted prior to laying of paving units shall be brought back to profile in a loose condition. Neither pedestrian nor vehicular traffic shall be permitted on the screeded bedding aggregates.
2. The contractor shall screed the bedding aggregates using either an approved mechanical spreader (e.g. an asphalt paver) or by the use of screed guides and boards.

3.5 INSTALLATION OF PERMEABLE PAVERS

A. General

1. Pavers with excessive chips, cracks, voids, discoloration's or other defects shall not be installed. Permeable pavers should be produced with spacer lugs which maintain consistent joint spacing.

B. Initial Compaction of permeable pavers

1. After placement, the pavement surface shall be compacted to achieve consolidation of the bedding aggregates and brought to design levels and profiles by not less than three passes of a suitable plate compactor.
2. Compaction shall be accomplished by the use of a plate compactor capable of a minimum of a 4500-pound compaction force.
3. Initial compaction should proceed as closely as possible following installation of the paving units and prior to acceptance of any traffic or application of additional Joint and bedding aggregate.
4. Compaction should not be attempted within 3 feet of an unrestrained laying edge.

C. Inspection of Paver Surface

1. Any units, which are structurally damaged during compaction, shall be immediately removed and replaced.

D. Infilling of Joints and Surface Voids with Additional Bedding Aggregates

1. The joint and bedding aggregates shall be spread over the pavement after initial compaction has been completed. This aggregate material shall be spread as soon as is practical after initial compaction and prior to the termination of work on that day.
2. The joint and bedding aggregates shall be broomed or shoveled to fill the surface voids. Excess aggregate material shall then be removed from the pavement surface and the pavers shall be compacted again to settle the aggregates. A second application of the aggregates may be required to completely fill the surface voids.

E. Final Compaction of permeable pavers

1. After the joint and bedding aggregates has been installed, the pavement surface shall be swept clean and final compaction shall be accomplished by not less than two passes of the plate compactor.

2. Final compaction shall proceed as closely as possible following installation of the joint and bedding aggregates and prior to the acceptance of any traffic.
3. Inspection by the owner or consultant shall determine whether and additional aggregate application is required.

3.6 PROTECTION

- A. Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit paver work being without damage or deterioration at time of Substantial Completion.

3.7 CLEAN-UP

1. Sweep clean all paved areas of excess aggregate and dirt.
2. Pick up and removed from the site all surplus materials, equipment and debris resulting from this section of the work.

END OF SECTION

SECTION 09270
DRYWALL SHAFT SYSTEMS

PART 1 - GENERAL

SUMMARY

- A. Section Includes: All shaftwall shown and as specified.

1.2 SUBMITTALS

- A. Submit manufacturer's product specifications and installation instructions for each component of drywall shaft systems, including certified test data as may be required to show compliance with these Specifications.
- B. LEED Documentation Submittals:
1. Credit MR 4.1 and Credit MR 4.2: Submit product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
 2. Credit MR 5.1 and Credit MR 5.2: Submit product data for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 3. Credit EQ 4: Submit certification stating all adhesives and sealants installed in the building interior (defined as inside of the weatherproofing system and applied on-site) shall meet 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.
 4. Credit EQ 4: Submit certification stating all gypsum board and insulation 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.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's unopened containers, packages or bundles identified with manufacturer's name, brand, type and grade. Store inside in a dry area and protect from dampness and deterioration. Protect ready-mixed components (if any) from freezing.

1.4 PROJECT CONDITIONS

- A. Environmental Requirements: Maintain interior ambient temperatures at not less than 55 degrees F. for a period of at least 24 hours prior to joint treatment application, during application, and subsequently until joint treatment materials are dry.

1.5 SYSTEM PERFORMANCES

A. Fire-Resistance Ratings:

1. Where drywall shaft systems with fire resistance ratings are indicated, provide materials and assemblies, which comply with such ratings.
2. Provide assemblies to comply with requirements of fire-response-tested assemblies indicated by GA File Numbers in GA-600,"Fire Resistance Design Manual"; or design designations in UL's "Fire Resistance Directory" or certification listings of Warnock Hersey or another testing and inspecting agency acceptable to authorities having jurisdiction.
3. Fire-resistance ratings were determined by testing assemblies for fire response per ASTM E 119.

B. Structural performance requirements:

1. Provide gypsum board shaft wall assemblies capable of withstanding the full air Air-pressure indicated for the maximum height of the partition indicated without failing and while maintaining an air tight and smoke tight seal.
 - a. Air pressure: 7.5 lbs/sq ft. and deflection limit of L/360.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide assemblies of one of the following:
 1. Georgia.
 2. LaFarge
 3. National Gypsum.
 4. United States Gypsum.

2.2 BASIC SYSTEM MATERIALS

A. LEED Requirements:

1. Maximize the percentage of recycled steel in metal components, but not less 50%
2. Maximize the percentage of recycled components of gypsum board products.
3. Maximize materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.

- B. Metal Framing: Provide manufacturer's standard shapes for shaftwall construction; of profile, size and base metal thickness designed to comply with ASTM C645, hot-dip galvanized in accordance with ASTM AG53, G40 (ASTM A653M, 290) coating.

- C. Gypsum Shaftwall Board: Provide manufacturer's standard gypsum backing board or coreboard designed for shaftwall construction and hour rating required, in maximum lengths available to eliminate or minimize end-to-end butt joints, and thickness as indicated.
- D. Gypsum Wallboard: ASTM C 36, Type X, of edge configuration indicated below, in maximum lengths available to minimize end-to-end butt joints.
- E. Gypsum Backing Board for Multi-Layer Applications: ASTM C 442, or, where backing board is not available from manufacturer, gypsum wall board, ASTM C 36; Type X where required for fire-resistance ratings, edge configuration as standard with manufacturer; thickness as indicated.
- F. Gypsum Base for Gypsum Veneer Plaster: ASTM C 588, core type as required by fire-resistance-rated assembly indicated, with square or tapered edges as standard with manufacturer.
- G. Drywall Trim Accessories: Provide manufacturer's standard trim accessories of types indicated for drywall work, formed of galvanized steel, with either knurled and perforated or expanded flanges for nailing or stapling, and beaded for concealment of flanges in joint compound. Provide corner beads, L-type edge trim-beads, U-type edge trim-beads, special L-kerf-type edge trim-beads, and one-piece control joint beads.
- H. Joint Treatment Materials: ASTM C 475; type recommended by the manufacturer.
- I. Trim: Paper faced metal for tapping in unless required to be otherwise.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation of Basic System Components:
 - 1. General: Comply with manufacturer's installation instructions and with applicable requirements of the industry standards listed below:
 - a. Metal Support Installation Standard: ASTM C 754.
 - b. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA 216.
 - 2. Anchor and fasten materials and components to comply with ratings and performance requirements, and to comply with governing regulations.
 - 3. Do not bridge building expansion joints with drywall shaft system, frame both sides of joints with furring and other support as indicated.
 - 4. Isolate shaft system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading. Comply with details shown and with manufacturer's instructions.
 - 5. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.
 - a. At elevator hoistway doorframes, provide jamb struts on each side of doorframe. Provide other shaft-wall framing at opening according to assembly manufacturer's written recommendations.
 - b. Where handrails are indicated for direct attachment to gypsum board shaft-wall

assemblies, provide galvanized steel reinforcing strip with 0/0329-inch (0.84-mm) minimum thickness of base (uncoated) metal in size indicated, accurately positioned and secured behind at least 1 face-layer panel as indicated.

6. Coordinate gypsum board shaft-wall construction with sprayed-on fireproofing applied to structural elements so both elements of Work remain complete and undamaged. Patch or replace sprayed-on fireproofing removed or damaged during the installation of shaft-wall assemblies to comply with requirements specified in Division 7 Section "Sprayed-on Fireproofing."
7. Integrate stair hanger rods with gypsum board shaft-wall assemblies by locating cavity of assemblies where required to enclose rods.
8. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
9. Seal gypsum board shaft-walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with manufacturer's written instructions or ASTM C 919, whichever is more stringent.
10. In elevator shafts where gypsum board shaft-wall assemblies cannot be positioned within 2 inches (50.8 mm) of the shaft face of structural beams, floor edges, and similar projections into shaft, install 1/2- or 5/8- inch- (12.7- or 15.9-mm-) thick, gypsum board cants covering tops of projections as follows:
 - a. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches (610 mm) o.c. with screws fastened to shaft-wall framing.
 - b. Where required to support gypsum board cants, install steel framing spaced at 24 inches (610 mm) o.c. maximum; extend studs from top of projection to shaft-wall framing behind cant.

B. Installation of Drywall Trim Accessories:

1. Nail or staple the flanges of accessories in accordance with manufacturer's instructions, and fasten integrally with gypsum board where possible. Apply trim wherever edge of gypsum board would otherwise be exposed or semi-exposed, including terminations of the work, openings in the work, external corners, expansion and control joints and similar edges, both exposed and abutting other work. Miter-cut corners of exposed trim accessories, and spine-reinforce from behind to eliminate offsets and misalignments.
 - a. Install L-type trim where board edges abut other Work without space or reveal.
 - b. Install U-type trim where board edges are indicated for sealant or gasket application, or would otherwise be exposed (special kerf-type where kerf is provided to receive trim).
 - c. Install semi-finishing where shown.
 - d. Install control-joint trim (beaded type) where indicated.

3.2 FINISHING

- A. Comply with manufacturer's instructions for the mixing, handling and application of materials. Machine or hand application is Installer's option. Apply treatment at joints both directions, flanges of trim accessories, penetrations of the gypsum board (electrical boxes, piping and similar work),

fastener heads, surface defects and elsewhere as indicated; and apply in the manner which will result in each of these being concealed when applied decoration has been completed.

- B. Where open joints of more than 1/16" occur, including edges of boards with rounded or beveled corners, prefill joint with special chemical-hardening-type bedding compound, prior to bedding of joint tape.
- C. Comply with the requirements for a level 4 finish except where otherwise specified. Embed tape in joint compound in all joints and interior angles and apply two (2) additional separate coats of joint compound over all flat joints and one separate coat of joint compound overall interior angles. Cover fastener heads and accessories with three separate coats of joint compound. Provide compound free of tool marks and ridges and the Gypsum board surface free of joint compound. Smooth compound by wiping with a damp sponge.
- D. Where water resistant gypsum board is indicated as a base for ceramic tile and similar rigid applied finishes, finish joints with tape and setting. Tape joint compound to comply with gypsum board manufacturer's recommendations.
- E. Where tile backer board is indicated as a base for ceramic tile tape and finish joints in accordance with recommendations of the manufacturer of the selected backer board.
- F. Where gypsum board is indicated as a base for the adhesive-application of wall coverings, comply with manufacturer's instructions for applying joint compound and joint tape in minimum thicknesses over end-joints and cut-joints, so as to avoid a build-up of tape and compound which would telegraph through. Select topping coat for maximum strength and bond with gypsum board.
- G. Partial Finishing: Omit third coat and sanding on concealed drywall construction which is indicated for drywall finishing or which requires finishing to achieve fire-resistance rating, sound rating or to act as air or smoke barrier.

END OF SECTION

SECTION 15250

SOUND PRESSURE LEVEL/SOUND POWER LEVEL LIMITS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Sound power Level and Sound Pressure Level limits for air handling units, fans, chillers, cooling towers, and other noise-generating equipment.

1.2 SUMMARY

- A. Provide equipment that meets the sound pressure and power limits established in this section. These levels are the basis for design of noise and vibration systems designed for this project to comply with the requirements of Section 01015 – General Acoustic Requirements.

1.3 RELATED WORK

- A. Perform vibration isolation work in this Contract, including work described in other Divisions, to meet the product and execution requirements of this Section. Related work includes:
 - 1. Division 15 – Mechanical
 - 2. Division 16 – Electrical
 - 3. Section 01015 – General Acoustic Requirements
 - 4. Section 15240 – Vibration Isolation
 - 5. Section 16240 – Noise and Vibration Control in Electrical Systems

1.4 STANDARDS

- A. Base submitted sound power levels upon laboratory test data taken in compliance with AMCA Standard 300; Reverberant Room Method for Sound Testing of Fans, 1985.
- B. Inlet and Discharge sound pressure levels for ducted fans may be taken in accordance with ASHRAE Standard 68 (AMCA 300); Laboratory Method of Testing In-Duct Sound Power Measurement Procedure for Fans, 1986.
- C. Conduct tests in an AMCA-certified acoustics testing laboratory.
- D. For sound power level data development, comply with AMCA Standard 301; Methods for Calculating Fan Sound Ratings from Laboratory Test Data, 1990.
- E. Values based on ASHRAE Handbook estimation method, the Wells plenum calculation, or other estimation methods are not acceptable.

1.5 SUBMITTALS

- A. Submit the following information in compliance with Division 1:
 - 1. Sound Power Level data for unit discharge and inlet openings and for casing-radiated noise. Provide values in decibels on the linear (unweighted) scale for octave bands of center frequency from 63 Hertz to 8,000 Hertz. Submit test data for the units to be used on this project or test data for the configurations used to develop the submitted levels when values are interpolated from those taken from tests of similar equipment.
 - 2. Description of the test facility, the test setup, and the number of fans tested to establish the sound power database.
 - 3. Certification that the data were developed in compliance with accepted standards. Describe the standards used for the tests and the method of data interpolation (Specific Sound Power Level Method or Generalized Sound Power Spectrum; AMCA 301-90).
 - 4. Certification of the laboratory by AMCA.
 - 5. Fan curve and design point of operation for each fan.
- B. Submittals failing to comply with the requirements of this section will be rejected.

1.6 DEFINITIONS

- A. 'Unit' is defined as the entire fan-powered device, including casing, plena, integral silencers, and other appurtenances.
- B. 'Bare Fan' is defined as a fan that is not integrated into a larger assembly.

1.7 MEASUREMENT REQUIREMENTS

- A. Measure inlet and discharge sound power levels at the cabinet inlet and discharge openings based upon the design performance of the supply and return fans to be used in this project. Report levels that include the effects of plena, housings, acoustic linings, and location of opening in the cabinet that corresponds to that of the equipment for this project. Adjust for end reflection effects for tests measurements taken in ducted inlet and discharge openings.
- B. Where mechanical air volume control elements such as inlet vanes and disks are provided as part of the unit cabinet, provide data for volume control device at maximum, minimum, and intermediate point on the system curve.
- C. Cabinet-radiated sound power levels must describe total-unit casing-radiated levels.

1.8 GUARANTEE

- A. Certify that the submitted units will operate within the specified sound pressure and sound power levels when operated within design parameters. If the units are determined to be operating in excess of the specified levels upon commissioning,

correct the condition at no cost to the Owner. Pay related time and materials expenses incurred by the Architect, Design Engineer, and Acoustics Consultant during the evaluation and remedy of non-compliant conditions.

PART 2 - PRODUCTS

2.1 SCHEDULES

A. Do not exceed the following Sound Power Level Limits:

Equipment Tag		Octave Band Center Frequency (Hz)							
		63H z	125 Hz	250H z	500 Hz	1kHz	2kH z	4kHz	8kH z
AHU-1	Discharge	99	93	94	90	87	82	78	74
	Inlet	91	84	84	82	82	76	73	68
	Casing Radiated	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
AHU-2	Discharge	94	89	89	84	82	76	72	67
	Inlet	87	90	89	82	75	75	66	56
	Casing Radiated	94	93	84	75	68	61	58	57
AHU-3	Discharge	81	80	90	81	82	85	72	69
	Inlet	80	75	80	70	71	77	60	60
	Casing Radiated	82	83	84	70	65	66	63	60
AHU-4	Discharge	86	80	89	80	75	68	66	61
	Inlet	80	69	72	60	64	67	61	57
	Casing Radiated	82	79	76	70	59	58	55	52
AHU-5	Discharge	82	80	80	79	72	70	63	59
	Inlet	75	68	64	61	61	65	60	56
	Casing Radiated	78	78	69	71	59	61	57	53
AHU-6	Discharge	84	79	86	78	72	66	63	59
	Inlet	78	66	70	57	61	64	59	55
	Casing Radiated	81	78	73	68	56	56	53	51

AHU-7	Discharge	82	83	87	77	77	71	67	59
	Inlet	85	75	71	68	69	67	60	57
	Casing Radiated	85	82	79	71	67	67	66	61
1350 CFM VAV	Discharge	70	70	64	61	58	54	48	48
	Radiated	60	60	53	49	43	39	33	33
425 CFM VAV	Discharge	66	66	59	53	50	47	41	41
	Radiated	57	57	48	42	37	37	31	31
2800 CFM VAV	Discharge	68	68	63	61	57	55	48	48
	Radiated	59	59	53	46	44	42	34	34
125 CFM VAV	Discharge	64	64	58	51	47	46	39	39
	Radiated	54	54	51	40	37	35	30	30
175 CFM VAV	Discharge	67	67	64	56	51	48	41	41
	Radiated	59	59	56	44	40	37	32	32
1450 CFM VAV	Discharge	69	69	64	61	57	54	47	47
	Radiated	60	60	52	49	42	39	32	32
500 CFM VAV	Discharge	66	66	60	55	51	48	41	41
	Radiated	59	59	50	44	39	38	33	33
2600 CFM VAV	Discharge	68	68	62	60	56	54	47	47
	Radiated	58	58	52	46	44	42	34	34
100 CFM VAV	Discharge	62	62	55	48	44	44	38	38
	Radiated	50	50	47	38	35	33	29	29
150 CFM VAV	Discharge	66	66	61	54	49	47	40	40

	Radiated	57	57	54	43	39	36	31	31
600 CFM VAV	Discharge	67	67	62	56	53	49	42	42
	Radiated	60	60	52	45	41	39	34	34
1874 CFM VAV	Discharge	67	67	59	59	55	52	46	46
	Radiated	59	59	54	48	46	43	38	38
540 CFM VAV	Discharge	67	67	61	55	52	48	42	42
	Radiated	59	59	51	44	40	39	33	33
3000 CFM VAV	Discharge	69	69	63	62	57	55	49	49
	Radiated	60	60	54	47	45	43	35	35
575 CFM VAV	Discharge	67	67	62	56	52	49	42	42
	Radiated	60	60	51	45	40	39	33	33
1600 CFM VAV	Discharge	67	67	59	58	55	53	47	47
	Radiated	58	58	53	47	45	42	38	38
250 CFM VAV	Discharge	60	60	57	53	50	46	40	40
	Radiated	56	56	49	41	34	33	29	29
300 CFM VAV	Discharge	62	62	59	55	52	48	42	42
	Radiated	57	57	52	43	37	34	30	30
450 CFM VAV	Discharge	66	66	59	54	50	47	41	41
	Radiated	58	58	49	43	38	37	32	32
750 CFM VAV	Discharge	68	68	60	57	55	50	45	45
	Radiated	59	59	51	49	46	42	30	30

1400 CFM VAV	Discharge	70	70	64	61	57	54	48	48
	Radiated	60	60	53	49	43	39	33	33
800 CFM VAV	Discharge	68	68	60	57	55	51	45	45
	Radiated	60	60	51	49	46	42	30	30
1200 CFM VAV	Discharge	69	69	63	60	56	54	48	48
	Radiated	59	59	52	48	42	38	32	32
400 CFM VAV	Discharge	65	65	58	53	49	46	41	41
	Radiated	57	57	47	42	37	36	31	31
350 CFM VAV	Discharge	65	65	57	52	48	45	40	40
	Radiated	56	56	46	40	35	35	30	30
1100 CFM VAV	Discharge	69	69	63	59	56	54	47	47
	Radiated	59	59	51	48	42	37	31	31
1500 CFM VAV	Discharge	70	70	64	61	57	54	48	48
	Radiated	60	60	53	49	43	39	33	33
RF-2	Fan Inlet	86	91	94	88	84	82	76	69

PART 3 - EXECUTION

3.1 REMEDIES

- A. For units with noise levels in excess of the limits specified in this section, provide attenuators, plenum, lining, and other accessories as required to comply with the limits. Submit for review and acceptance by the Architect, Engineer, and Acoustics Consultant prior to implementation.

END OF SECTION 15250

1. Do not use nuts, bolts, or sheet metal screws for unit assemblies.
2. Lock form and seal or continuously weld joints.
3. Suspended Units: Factory-installed suspension hooks or lugs attached to frame in quantities and spaced to prevent deflection or distortion.
4. Reinforcement: Cross or trapeze angles for rigid suspension.

H. Source Quality Control:

1. Acoustic Performance: Test according to ASTM E 477.
2. Record acoustic ratings, including dynamic insertion loss and self-noise power levels with an airflow of at least 2000-fpm face velocity.
3. Leak Test: Test units for airtightness at 200 percent of associated fan static pressure or 6-inch wg static pressure, whichever is greater.

I. Duct Silencer Schedule:

Tag		<u>63 Hz</u>	<u>125 Hz</u>	<u>250 Hz</u>	<u>500 Hz</u>	<u>1000 Hz</u>	<u>2000 Hz</u>	<u>4000 Hz</u>	<u>8000 Hz</u>
SA1	Insertion Loss (dB)	5	5	11	22	34	31	21	9
	Regenerated Noise (dB)	63	54	51	52	52	46	39	39
SA2	Insertion Loss (dB)	9	11	12	20	21	20	15	14
	Regenerated Noise (dB)	69	62	56	54	56	57	49	49
SA3	Insertion Loss (dB)	9	4	5	8	15	14	9	7
	Regenerated Noise (dB)	63	55	53	53	56	61	61	61
SA4	Insertion Loss (dB)	8	7	13	22	25	13	12	11
	Regenerated Noise (dB)	56	55	51	48	55	49	54	49
SA5	Insertion Loss (dB)	6	1	5	11	17	7	5	3
	Regenerated Noise (dB)	61	52	49	50	53	59	57	59
SA6	Insertion Loss (dB)	3	3	7	17	29	37	21	8
	Regenerated Noise (dB)	51	42	41	39	41	37	26	37
SA7	Insertion Loss (dB)	3	3	7	17	29	37	21	8
	Regenerated Noise (dB)	51	42	41	39	41	37	26	26
SA8	Insertion Loss (dB)	3	3	8	13	20	11	8	7
	Regenerated Noise (dB)	59	49	45	44	49	53	54	56
SA9	Insertion Loss (dB)	1	6	11	21	20	11	11	9
	Regenerated Noise (dB)	58	50	46	44	48	55	55	56
SA10	Insertion Loss (dB)	6	5	12	15	10	9	7	6
	Regenerated Noise (dB)	61	60	57	56	62	65	62	53