

WORK DESCRIPTION

GENERAL CONSTRUCTION

Project Title: Warehouse Building
Location / Bldg: Cynthiana, KY / Building 009
Project ID #: 0083940
Disciplines Involved: Architectural, Structural, Civil, Mechanical and Electrical
Date of Revision: 01/22/2018
3M Project Engineer/Phone No.: Wayne Lindblad / (651) 737-2971
Consulting Firm Project Manager/Phone No.: Bob Kilgore
NV5, Inc.
651 634-7258
bob.kilgore@nv5.com

GENERAL PROVISIONS:

Furnish labor, equipment and materials necessary to complete the Work specified herein under the "Description of Work" portion of this document and also as shown on the drawings included in this package.

The word "Provide" shall mean "furnish and install".

Contractors shall prepare and maintain accurate redlined as-built drawings, including all the changes made during the progress of this project. At the completion of the work, the Contractor shall submit these redlined as-builts to the Owner's Designated Representative.

Asbestos removal shall be by 3M. No Work to start until reviewed and approved by (FAC) Facility Asbestos Coordinator.

Field modifications are not permitted without prior notification and approval of the Owner's Designated Representative.

Cutting, patching or core drilling incidental to this Work shall be done by each Contractor except as noted herein. The General Contractor shall cut any openings greater than 12 inches for the mechanical and electrical work. General Contractor shall review mechanical and electrical drawings for locations and sizes of penetrations. The General Contractor shall coordinate cutting all openings with the Mechanical and Electrical Contractors.

Construction/Equipment Staging Area for the project shall be agreed upon by the Owner's Designated Representative.

Each Contractor shall make a reasonable effort to prevent construction debris, noise, fumes, etc. from migrating to adjacent occupied work areas and leave work area clean. General Contractor shall provide exhaust fans for the work area.

Submittals

Submittals include, but are not limited to, such information as letters, selection samples, record samples, shop drawings, product data, diagrams, schedules, lists, illustrations, performance charts, brochures, test reports, and inspection reports which are prepared by CONTRACTOR, or for themselves by a subcontractor, illustrating or certifying some part of the Work.

CONTRACTOR shall order materials and equipment in sufficient time to allow the following submittal procedure to occur so as to cause no delay in the performance of the Work. At the time

of submittal CONTRACTOR shall inform the OWNER in writing of any deviation in the submittals from the Contract Documents.

CONTRACTOR shall determine and verify all field measurements, field construction criteria, materials, finishes, fastenings, clearances, sequencing, abutting Work, catalog numbers, availability, and the like. They shall check and coordinate each submittal with the requirements of the Contract Documents and the particular needs of the Work.

Shop Drawings

Prepare shop drawings for all specified materials under listed division headings i.e. Gypsum Partition Systems, Sealants, Doors and Finish Hardware, Painting etc. or as noted in description of work.

Prepare and submit shop drawings including product data for OWNER'S approval. Product data shall include manufacturer's recommended installation instructions. Provide where appropriate (DOORS) an itemized listing of all openings, elevations of all frame types and full size details of all frame sections. CONTRACTOR shall verify actual thickness of wall construction before submitting shop drawings. Prepare and submit type written finish door hardware schedules for OWNER'S approval. Provide schedule with catalog illustrations of all items listed, complete with descriptions and function. All required shop drawings shall be submitted for approval including, but not limited to the following:

- Metal Building System
 - Anchor Bolt Layout Plan
 - Building Shop Drawings
 - Signed and Sealed Building Calculations
- Concrete Mix Designs
- Rebar Shop Drawings
- Miscellaneous Steel Shop Drawings

Each Contractor shall be responsible for coordinating their Work with each other and with the Owner's Designated Representative.

ATTACHMENTS: (PART OF CONTRACT)

1. Drawings – See List of Drawings under listed division headings
2. Specifications
 - a. 00610 – Bid Form
 - b. 01110 – Alternates
 - c. 01900 – Contractor Safety Requirements
 - d. 02102 – Clearing and Grubbing
 - e. 02110 – Demolition
 - f. 02210 – Site Grading
 - g. 02220 – Foundation Excavating and Backfilling
 - h. 02221 – Trenching Backfilling and Compacting
 - i. 02227 – Waste Material Disposal
 - j. 02230 – Soil Compaction
 - k. 02374 – Erosion and Sedimentation Control
 - l. 02520 – Storm Sewer
 - m. 02560 – Sanitary Sewer
 - n. 02612 – Asphalt Concrete Paving
 - o. 02620 – Exterior Portland Cement Concrete
 - p. 02711 – Chain Link Fences
 - q. 03100 – Concrete Formwork
 - r. 03200 – Concrete Reinforcement
 - s. 03300 – Cast in Place Concrete

- t. 05500 – Metal Fabrications
 - u. 06100 – Rough Carpentry
 - v. 07210 – Building Insulation
 - w. 07920 – Sealants and Caulking
 - x. 08110 – Stock Hollow Metal Doors and Frames
 - y. 08360 – Overhead (Foam Insulated) Sectional Doors
 - z. 08710 – Finish Door Hardware
 - aa. 08800 – Glass and Glazing
 - bb. 09270 – Gypsum Wallboard Partition Systems
 - cc. 09310 – Ceramic Tile
 - dd. 09510 – Suspended Acoustical Lay-In Ceiling
 - ee. 09650 – Resilient Vinyl Composition Tile Flooring
 - ff. 09900 – Painting
 - gg. 11162 – Dock Levelers and Vehicle Restraint Devices
 - hh. 11164 – Dock Shelters
 - ii. 11165 – Dock Bumpers
 - jj. 11166 – Swing Arm Dock Light Fixtures
 - kk. 13602 – Pre-Engineered Prefabricated Metal Building
3. Electrical Procurement List
 4. FAPES Procurement List
 5. Geotechnical Report
 6. Mechanical Attachments (3)

ARCHITECTURAL: Robert Wasik, NV5, Inc. 651-634-7242; robert.wasik@nv5.com

Description of Work:

DEMOLITION WORK:

No demolition work is included in this scope.

NEW WORK:

1. Provide and install complete metal building as shown on the Drawings and in Specification Section 13602 – Pre-Engineered and Prefabricated Metal Buildings.
2. Provide an interior build-out of the metal building as shown on the Drawings.
 - a. Gypsum board on metal stud partition walls.
 - b. Sloped cold-formed metal ceiling support structure with metal deck.
 - c. Wall and ceiling insulation with vapor barrier.
3. Provide hollow metal doors and frames as designated on the Drawings and Door Schedule.
4. Provide finish door hardware as specified.
5. Provide borrowed lite windows in hollow metal frames in the Office as shown on the Drawings.
6. Provide insulated dock doors as shown on the Drawings.
7. Provide dock lifts as specified for all dock doors.
8. Provide dock shelters and vehicle restraint devices as specified for all dock doors.
9. Provide a vertical lift insulated sectional door as shown on the Drawings.
10. Provide a concrete sealer/densifier over the entire concrete slab in the Paper Storage area.
11. Provide vinyl composition tile and vinyl wall base in the Office and Vestibule areas.
12. Provide ceramic tile for the walls and floors as designated for the Toilet Room.
13. Paint the interior walls in the Office, Vestibule and Toilet Room as designated. Paint the walls exposed to the Paper Storage area for the same rooms and provide a vinyl wall base.
14. Provide suspended acoustical ceiling system in the Office, Vestibule and Toilet Room.
15. Provide unistrut supports with fire-treated plywood at locations to support electrical and communications panels. See Electrical and FAPES for panel sizes and locations.
16. Provide protective rail along perimeter of building as specified and shown on the Drawings.
17. Provide concrete filled pipe bollards as shown on the Drawings.

18. Provide guardrail at locations shown on the Drawings.
19. Provide toilet accessories as specified and shown on the Drawings.
20. Provide channel curb at perimeter rack locations as shown on the Drawings.

List of Architectural Drawings:

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Revision No.</u>	<u>Date</u>
CYNT-009-G-001	Title Sheet	1	01/22/2018
CYNT-009-A-002	Room Finish Schedule	1	01/22/2018
CYNT-009-A-010	Door Schedule	1	01/22/2018
CYNT-009-A-050	Door and Frame Types and Details	1	01/22/2018
CYNT-009-A-101	Overall Floor Plan	1	01/22/2018
CYNT-009-A-170	Egress Plan / Code Sheet	1	01/22/2018
CYNT-009-A-400	Roof Plan	1	01/22/2018
CYNT-009-A-450	Building Elevations	1	01/22/2018
CYNT-009-A-451	Building Elevations	1	01/22/2018
CYNT-009-A-500	Building Sections	1	01/22/2018
CYNT-009-A-750	Interior Details	1	01/22/2018
CYNT-009-A-950	Interior Buildout Plans and Details	1	01/22/2018

STRUCTURAL: William Zerfas, NV5, Inc. 651-634-7322; Bill.Zerfas@NV5.com

Description of Work:

GENERAL:

1. All work shall be done in accordance with the current Building Code and 3M Standards.
2. The CONTRACTOR shall use extreme caution when excavating near underground utilities. Existing utilities shall be exposed by hand methods. The CONTRACTOR shall notify the OWNER seven (7) days prior to any excavation near existing underground utilities.
3. See General Structural Notes (S-001) for additional information.

NEW WORK:

1. Provide and install complete metal building as shown on the Architectural drawings noted above and in specification section 13602. Work includes installation of roof hung mechanical / electrical equipment hangers as shown on the drawings.
2. Provide and install concrete foundation for metal building system as shown in the Structural drawings noted below. Step footings and provide wall openings for underground utilities as noted. Do not begin foundation work until building loads have been provided by the Metal Building Vendor in accordance to the project specifications.
3. Provide and install concrete retaining walls for truck ramp at loading docks as shown on the drawings. Work includes pipe openings through wall as noted and guardrail on top of wall.
4. Provide and install reinforced concrete slab-on-grade as shown on the Structural drawings. Work includes dock leveler pits and embedded steel, housekeeping pads, stoops, control/construction joints, isolation materials, caulking, etc. for a complete system in accordance to the project specifications.
 - a. Note that concrete slab-on-grade is to be placed on a minimum 12-inches compacted granular material. See project specifications and geotechnical report for additional information.
 - b. Seal concrete floor as noted on the architectural drawings and project specifications.
5. Provide and install concrete protective cover for select building columns as shown on the drawings.
6. Refer to architectural drawings for build-out of Office, Vestibule, and Toilet Room (Rooms 101,102, & 103) as shown on CYNT-009-A-101.

7. Refer to Architectural for bollards, guardrails, and other items embedded in or through the concrete slab-on-grade.
8. Provide and install exterior concrete slab on grade for mechanical equipment as shown on the drawings.
9. Arrange and coordinate Special Inspections & Testing in accordance to 2012 IBC Chapter 17.
10. Rack storage system by Owner.

List of Structural Drawings:

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Revision No.</u>	<u>Date</u>
CYNT-009-S-001	General Notes	1	01/22/2018
CYNT-009-S-100	Foundation and Slab Plan	1	01/22/2018
CYNT-009-S-200	Roof Plan	1	01/22/2018
CYNT-009-S-500	Sections and Details	1	01/22/2018
CYNT-009-S-501	Sections and Details	1	01/22/2018
CYNT-009-S-600	Pier and Footing Schedule	1	01/22/2018

CIVIL: John Ruff, Pierce Pini + Associates, 763-537-1311, john@piercepini.com

Description of Work:

GENERAL

1. The CONTRACTOR shall use extreme caution when excavating near underground utilities. Existing utilities shall be exposed by hand methods. The CONTRACTOR shall notify 3M seven (7) days prior to any excavation near existing underground utilities. The CONTRACTOR shall relocate any underground utility lines as required.
2. Submit shop drawings and product data as required.

DEMOLITION

1. Subcut existing soil below areas of proposed paving and proposed building per soil correction exhibit and geotechnical report.
2. Remove existing fence, post and gates as required per Horizontal & Vertical Control Site Demolition Plan.
3. Remove existing hydrant and gate valve north of Building 1, verify the hydrant is in good working condition. Salvage for reinstallation in proposed hydrant location per Sewer Plan, C-403.
4. Sawcut and remove existing bituminous pavement as required for new pavement and building.

NEW WORK

1. Grade to provide drainage away from building and direct towards existing swale per Grading and Drainage plan.
2. Provide concrete pavement for new loading dock and loading ramp to building per Horizontal and Vertical Control plan.
3. Provide bituminous pavement adjacent to south side of building for fire lane access Horizontal and Vertical Control plan.
4. Provide gravel drive on east and west sides of building for fire late access per Horizontal and Vertical Control plan.
5. Provide sanitary sewer from proposed building to existing MH east of existing building per Sewer plan.
6. Provide potable water service from existing building to proposed building per Sewer plan.
7. Provide fire water service from existing fire main stub to proposed building per Sewer plan.
8. Install hydrant per Sewer plan.
9. Provide conduits for electrical and communication lines to be coordinated with Electrical.
10. Provide gas service routed per Sewer plan, coordinate with owner and utility company.

11. Provide storm sewer to collect and direct drainage to existing 42" RCP per Grading and Drainage plan and Sewer plan.

List of Civil Drawings:

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Revision No.</u>	<u>Date</u>
CYNT-888-C-223	GRADING AND DRAINAGE PLAN	1	01/22/18
CYNT-888-C-223A	ESTIMATED SOIL QUANTITIES EXHIBIT	1	01/22/18
CYNT-888-C-223B	PRICING ALTERNATES EXHIBIT	1	01/22/18
CYNT-888-C-303R	SITE DEMOLITION PLAN	1	01/22/18
CYNT-888-C-303	HORIZONTAL & VERTICAL CONTROL	1	01/22/18
CYNT-888-C-403	SEWER PLAN	1	01/22/18
CYNT-888-C-403A	SUBGRADE DRAINAGE PLAN	1	01/22/18
CYNT-888-C-638	MISCELANEOUS DETAILS	1	01/22/18

MECHANICAL: Jennifer Guenther, NV5, 651-634-7262, Jennifer.Guenther@nv5.com

3M Mechanical Specifications for Standing Contracts dated April 21, 2007, previously issued to you shall apply to all Work specified herein.

Certain articles in the above mentioned Mechanical Specifications are herein amended and/or highlighted to clarify specific requirements of this project. The highlighting or amending of specific articles of the Mechanical Specifications does not limit the Contractor's responsibility to just these articles. The Contractor is responsible for performing the work of this project in accordance with the entire Mechanical Specifications.

Description of Work:

PIPING:

1. Furnish and install gas piping from main connection shown on civil drawings to gas entrance. Provide gas train for entrance. Refer to detail 2/M-260.
2. Furnish and install gas piping from gas entrance to (2) non-process gas trains inside the warehouse. Refer to detail 1/M-260.
3. Furnish and install dock heaters above dock doors. Follow manufacturer's recommendations for mounting heights.
4. Furnish and install gas piping from dock heater gas train to dock heaters.
5. Furnish and install gas piping from AHU gas train to air handling units AHU-2-5.
6. Furnish and install water closet, lavatory and urinal as shown on 1/M-260.
7. Furnish and install sanitary pipe from main connection shown on civil drawings to toilet room fixtures as shown on M-240.
8. Furnish and install vent pipe from toilet room fixtures as shown on M-240.
9. Furnish and install hose bib on south exterior wall. Mount at 3'-0" above grade.
10. Furnish and install cold water piping from existing valve shown on CYNT-001-M-214 to wall and down. Refer to civil drawings for connection outside of building.
11. Furnish and install domestic cold water pipe from main connection shown on civil drawings to toilet room fixtures and tankless water heater as shown on M-240.
12. Furnish and install (2) tankless water heaters in series.
13. Furnish and install domestic hot water piping from tankless water heaters to lavatory and eyewash mixing valve.
14. Furnish and install eyewash with mixing valve. Refer to detail 5/M-240.
15. Furnish and install condensing unit CU-1 on concrete pad as shown on M-200. Refer to structural drawings for pad.
16. Furnish and install refrigeration piping (suction and liquid) from condensing unit CU-1 to air handling unit AHU-1.
17. Furnish and install pipe supports per 3M specifications.

Piping Systems Materials (Spec 15050.4.1) Which Shall Comply:

<u>Symbol</u>	<u>Service</u>	<u>Spec Sheet</u>	<u>Material</u>
CW-2	Water - Cold	A-1	Copper
HW-2	Water - Hot	A-1	Copper
TW-2	Water – Tempered	A-1	Copper
V	Vent - Plumbing - Aboveground	W-1	Cast Iron Soil (No Hub)
SAN-6	Waste - Sanitary - Aboveground	W-4	Cast Iron Soil (No Hub)
USAN-6	Waste - Sanitary - Aboveground	UW-4	Cast Iron Soil (No Hub)(HUB)
F-410S/L	Refrigerant 410 Suction/Liquid	C-5	Copper/Carbon Steel
FG	Gas – Firm Natural	C-1	Carbon Steel

Piping Insulation Material Specifications 15260:

<u>Symbol</u>	<u>Service</u>	<u>Insul. / Jacket / Pipe Size / Insul. Thick. / Notes</u>
CW-2	Water - Cold	FPM / ASJ / all pipe sizes / 1” thick / ---
HW-2	Water - Hot	FPM / ASJ / all pipe sizes / 1” thick / ---
TW-2	Water - Tempered	FPM / ASJ / all pipe sizes / 1” thick / ---
F-410S/L	Refrigerant 410 Suction/Liquid	PVC/ AL / all pipe sizes / 2” thick / --

NOTE 1: Provide PVC jacket cover over ASJ on all new pipe insulation located below 6’-0” AFF.

Amendments to 3M Mechanical Specifications for Standing Contracts dated April 21, 2007:

Section 15010 – General Provisions - Mechanical

1. Mechanical Contractor shall provide painting of all UN-INSULATED carbon steel piping. (Stainless steel, Fiberglass, Copper, Cast Iron and Insulated Carbon Steel piping does not require painting.)
2. Mechanical Contractor shall provide painting of all carbon steel pipe hangers and threaded hanger rod. (Galvanized hangers and galvanized threaded hanger rod does not require painting. Stainless steel hangers and stainless steel threaded hanger rod located does not require painting.)
3. Mechanical Contractor shall provide painting of all fabricated structural steel pipe supports and stands.
4. Items located indoors being painted shall undergo wired brush surface preparation. Apply a zinc-rich type primer coat and an epoxy type finish coat of paint. Submit painting procedure and color selections to 3M Designated Representative for approval.

SHEET METAL:

1. Furnish and install AHU-1, AHU-2, AHU-3, AHU-4 and AHU-5.
2. For AHU-2-5, provide ducting as shown on detail 2/M-340.
3. Furnish and install drum louvers (S-2) as scheduled on M-390.
4. For AHU-1, provide supply and return duct work as shown on 1/M-340.
5. Furnish and install supply diffusers and return grilles for toilet room, vestibule and office as shown on M-300. Refer to M-390 for schedule.
6. Furnish and install outdoor air intake hood for AHU-2,3,4,5.
7. Furnish and install toilet exhaust fan EF-1.
8. Furnish and install duct work from exhaust fan EF-1 to south wall louver (L-2).
9. Furnish and install outdoor exhaust louver L-2. Mount at minimum of 15 feet above grade.
10. Furnish and install cross flow exhaust fans EF-2, 3, 4,5,6,7 with outdoor hood. Refer to schedule on M390 for accessories. Mount as high as possible on wall.
11. Furnish and install cross flow louvers (qty 2) L-1 on face of building. Refer to architectural drawings for elevations.
12. Ductwork shall comply with SMACNA duct construction standards for the following duct:

<u>Duct</u>	<u>Air System</u>	<u>Operating Pressure</u>	<u>Classification</u>	<u>Material</u>
Supply/ Return	AHU-1	+/-2.0" w.c.	Commercial	Galvanized Steel
Supply/ Return	AHU-2,3,4,5	+/-2.0 " w.c.	Commercial	Galvanized Steel
Exhaust	EF-1	+/-2.0 " w.c.	Commercial	Galvanized Steel

13. As specified in the 3M Standing Contract Specification, Section 15890, all duct connections for "industrial class" shall be welded or companion angle flanges bolted together.
14. Upon completion of the project a formal test and balance report will be required. Test and Balance report shall include: fan rpms, motor amp draw airflow and static readings.

General Sheet Metal Notes:

1. Ductwork shall comply with SMACNA duct construction standards.
2. Coordinate all work with other trades.
3. Contractor will be responsible to properly dispose of all equipment, ductwork and piping removed during the demolition and construction phase of this project.
4. Where insulation is applied in multiple layers, the joints shall be staggered. Insulation greater than 2 inches thick shall be applied in two or more layers.
5. All ductwork that penetrates the roof to be externally insulated the last 2'-0" before exiting the building.
6. All ductwork located in non-conditioned spaces to be externally insulated.
7. All outdoor ductwork shall be equipped with aluminum jacket over base jacketing.

Ductwork Insulation Schedule 15290, 4.1:

All ductwork to be externally insulated as specified below:

<u>Description</u>	<u>Insulation / Thickness / Jacket / Notes</u>
AHU-2,3,4,5	Code C / 1-1/2" / AL / -

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Rev No.</u>	<u>Date</u>
CYNT-000-M-001	Symbols & Abbreviations	1	01/22/18
CYNT-001-M-214	Building Plumbing Plan	6	01/22/18
CYNT-009-M-200	Piping Plan – First Floor	1	01/22/18
CYNT-009-M-240	Enlarged Piping Plan	1	01/22/18
CYNT-009-M-260	Piping Details	1	01/22/18
CYNT-009-M-290	Piping Schedules	1	01/22/18
CYNT-009-M-300	HVAC Plan – First Floor	1	01/22/18
CYNT-009-M-340	HVAC Enlarged Plans and Details	1	01/22/18
CYNT-009-M-390	HVAC Schedules	1	01/22/18
CYNT-009-M-400	Fire Protection Floor Plan	1	01/22/18

ATTACHMENTS: (PART OF CONTRACT)

1. Drawings – See List of Drawings under listed division headings
2. Mech Attachment 1 – AbsolutAir AHU
3. Mech Attachment 2 – Toilet Room Fan Coil Unit
4. Mech Attachment 3 – Crossflow Exhaust Fans

FIRE PROTECTION: Mallory Holmen, 3M, 651-736-8313, mholmen@mmm.com

Contractor to design the layout and complete the hydraulic calculation for the warehouse per NFPA standards. Furnish and install complete fire protection system. Refer to drawing CYNT-009-M-400.

ELECTRICAL: Adnan Adam, NV5, 651-634-7334, Adnan.Adam@NV5.com

All work shall be done in accordance with the “3M Electrical Standing Specifications” dated **April 30, 2014** and the work as described below:

SUPPLEMENT TO 3M ELECTRICAL SPECIFICATIONS

This document shall be made part of the Contract Documents. Items are included that **emphasize** the 3M Electrical Standing Specifications dated **April 30, 2014**, and hereafter called the “Electrical Standing Specifications”. Where there is a conflict between this document and the Electrical Standing Specifications, this document shall take precedence. It also includes construction administrative requirements that are **not included** in the Electrical Standing Specifications.

1. If needed, the Electrical Contractor shall apply for an electrical permit before work begins. The Electrical Contractor is responsible for all aspects of the electrical permit. When an electrical permit is needed, the inspector’s final sign-off document shall be given to the Plant engineer or 3M Representative. 3M approval of this document is required before final payment is made to the contractor.
2. Contractor Lockout/Tagout procedures shall be used. Reference Specification Section 01900.1.7. If 3M plant personnel are involved, 3M procedures shall be followed.
3. Contractor shall include temporary lighting if new or existing light fixtures are not available or operating any time during the project construction. Reference Specification Section 01812.1.6.G.
4. 3M Company considers work on energized circuits to be hazardous and requires safe work procedures meeting the requirements of NFPA 70E whenever there is justification to work energized. Energized work on electrical bus, electrical bus plugs, step down transformers, pad mount transformers and unit substation transformers is typically not allowed.
5. Follow Specification Section 16500.3.3 for light fixture disposal. Fluorescent lamps shall be taken out of fixtures and placed in cardboard barrels / containers furnished by 3M. Fixtures must be palletized. Ballasts shall be checked for PCB’s by the Contractor. Ballasts containing PCB’s shall be removed from the light fixture and placed in cardboard barrels / containers furnished by 3M.
6. Contact 3M Plant engineer or 3M Designated rep before removing speakers. Disconnecting one speaker could disable an entire speaker zone covering occupied areas.
7. Inform Plant engineer or 3M Designated rep of new equipment being installed. Include Plant Maintenance representative during checkout of systems and deliver O&M manuals along with scheduled maintenance information to Plant Maintenance.
8. Provide separate equipment grounding conductor between all plug-mold receptacles and the first junction box serving the plug-mold.
9. Identify all conduit seal-off “fill plugs” as being poured according to the plant site’s standard way of identification: orange or yellow paint, after system checkout.
10. Storage of materials, fixtures, etc. shall be coordinated with Plant engineer through the 3M Representative.
11. Verify phase rotation of any existing or new equipment. Reference 16120.3.10.

12. No cords shall pass through walls, ceiling tile, etc. Power drops through ceiling tile shall be done by installing a short conduit stub from the ceiling box through the ceiling space, and pulling cord through the conduit. Provide strain relief at the end device/receptacle and at the junction box. Stamped steel boxes are not allowed with cords.
13. Coordinate installation of light fixtures with sprinkler drops and diffuser locations.
14. All exhaust fans installed in penthouses shall be required to have lockable non-fused disconnect switches installed on power feed to fan motor for Lockout/Tagout procedures.
15. Metal-Clad Cable shall not be permitted except as follows:
 - a. Lighting circuits within lab or office areas (limited to between fixtures in suspended ceilings).
 - b. Power circuits under a raised floor area.
 - c. Where approved in writing by Plant Engineering.

Description of Work: (Removal thru New Work)

REMOVAL WORK DESCRIPTION:

1. None

INSTALLATION WORK DESCRIPTION:

1. Provide 400amp/3p circuit breaker in the existing panelboard PD-114 for the new warehouse power connection.
2. Provide panelboard 9P-101, 400amp, 480Y/277V, 3-phase, 4-wire panelboard with 400amp main for warehouse power distribution. Provide panelboard with feed-thru lugs to feed the second panelboard, 9P-101A.
3. Provide panelboard 9P-101A, 400amp, 480Y/277V, 3-phase, 4-wire panelboard, main lug only to be an extension of panelboard 9P-101. Provide wiring, conduit and fitting between panelboard 9P101 and 9P-101A for feed thru connection.
4. Provide 400amp, 3-phase feeder wiring and conduit between panelboard PD-114 in the main building and the new warehouse. Provide RMC conduit inside the building and PVC conduit encased in concrete in underground utility trench.
5. Provide 45kVA, 480V – 208Y/120V, 3-phase transformer in new the warehouse.
6. Provide 125amp main, 208Y/120V, 3-phase, 4-wire panelboard in the new warehouse.
7. Provide 20amp/1P circuit breaker in panelboard ELM01 spare space for warehouse emergency circuit power connection.
8. Provide 20amp, 277V wiring and conduit from emergency panelboard ELM01 in building 01 to the warehouse for the warehouse emergency circuit. Provide RMC conduit inside the building and PVC conduit encased in concrete in underground ground utility trench.
9. Provide 30amp, 3-phase disconnect switch in the warehouse for emergency power circuit.
10. Provide 480V, 3-phase wiring and conduit for power connection to battery charger 1. Provide 30A, 600V disconnect switch for each battery charger.
11. Provide 480V, 3-phase wiring and conduit for power connection to battery charger 2. Provide 30A, 600V disconnect switch for each battery charger.
12. Provide 480V, 3-phase wiring and conduit for power connection to battery charger 3. Provide 30A, 600V disconnect switch for each battery charger.
13. Provide 208V, 1-phase wiring and conduit for power connection to AHU-1 (M251) from panelboard 9LP-101. Provide 30amp, 240V disconnect switch DS251. Provide 208V, 1-phase wiring and conduit including control wiring between DS251 and M251.

14. Provide 480V, 3-phase wiring and conduit for power connection to AHU-2 (M252) from panelboard 9P-101. Provide disconnect switch DS252. Provide 480V wiring and conduit between DS252 and M252.
15. Provide 480V, 3-phase wiring and conduit for power connection to AHU-3 (M253) from panelboard 9P-101. Provide disconnect switch DS253. Provide 480V wiring and conduit between DS253 and M253.
16. Provide 480V, 3-phase wiring and conduit for power connection to AHU-4 (M254) from panelboard 9P-101. Provide disconnect switch DS254. Provide 480V wiring and conduit between DS254 and M254.
17. Provide 480V, 3-phase wiring and conduit for power connection to AHU-5 (M255) from panelboard 9P-101. Provide disconnect switch DS255. Provide 480V wiring and conduit between DS255 and M255.
18. Provide 480V, 3-phase wiring and conduit for power connection to CU-1 (M256) from panelboard 9P-101. Provide disconnect switch DS256. Provide wiring and conduit between DS256 and M256.
19. Provide 120V wiring and conduit for power connection to EF-1 (M257) from panelboard 9LP-101. Provide motor starter switch with overload and disconnect MS257 for motor protection. Provide wiring and conduit between MS257 and M257.
20. Provide 480V wiring and conduit for power connection to EF-2 (M258) from panelboard 9P-101. Provide combination motor starter CMS258. Provide wiring and conduit between CMS258 and M258.
21. Provide 480V wiring and conduit for power connection to overhead door (M259) at door 100F from panelboard 9P-101. Provide disconnect switch DS259. Provide wiring and conduit between DS259 and M259.
22. Provide 480V wiring and conduit for power connection to overhead door (M260) and dock leveler control panel, Dok-Commander (M264), at door 100G from panelboard 9P-101. Provide disconnect switch DS260. Provide wiring and conduit between DS260 and M260.
23. Provide 480V wiring and conduit for power connection to overhead door (M261) and dock leveler control panel, Dok-Commander (M265), at door 100H from panelboard 9P-101. Provide disconnect switch DS261. Provide wiring and conduit between DS261 and M261.
24. Provide 480V wiring and conduit for power connection to overhead door (M262) and dock leveler control panel, Dok-Commander (M266), at door 100J from panelboard 9P-101A. Provide disconnect switch DS262. Provide wiring and conduit between DS262 and M262.
25. Provide 480V wiring and conduit for power connection to overhead door (M263) and dock leveler control panel, Dok-Commander (M267), at door 100K from panelboard 9P-101A. Provide disconnect switch DS263. Provide wiring and conduit between DS263 and M263.
26. Provide 480V wiring and conduit for power connection to EF-3 (M268) from panelboard 9P-101. Provide combination motor starter CMS268. Provide wiring and conduit between CMS268 and M268.
27. Provide 480V wiring and conduit for power connection to EF-4 (M269) from panelboard 9P-101. Provide combination motor starter CMS269. Provide wiring and conduit between CMS269 and M269.
28. Provide 480V wiring and conduit for power connection to EF-5 (M270) from panelboard 9P-101. Provide combination motor starter CMS270. Provide wiring and conduit between CMS270 and M270.
29. Provide 480V wiring and conduit for power connection to EF-6 (M271) from panelboard 9P-101. Provide combination motor starter CMS271. Provide wiring and conduit between CMS271 and M271.
30. Provide 480V wiring and conduit for power connection to EF-7 (M272) from panelboard 9P-101. Provide combination motor starter CMS272. Provide wiring and conduit between CMS272 and M272.

31. Provide convenient receptacles in the warehouse as shown on the drawings.
32. Provide receptacles in the office.
33. Provide convenience receptacles in vestibule/sitting area.
34. Provide GFI receptacle in the toiler room.
35. Provide grounding system for the new warehouse. Provide new grounding bus bar and grounding electrode connections as shown on grounding drawing.
36. Provide grounding ring around the new warehouse as shown on grounding drawings.
37. Provide new LED industrial high-bay lighting fixture in the warehouse. Provide each light fixture with integral occupancy sensor.
38. Provide new LED 2 x 4 light fixture in the office.
39. Provide LED 2 x 4 light fixture in vestibule as shown on the drawings.
40. Provide new 1 x 4 light fixture in the toilet as shown on the drawings.
41. Provide LED exit lighting fixture as shown on the drawings.
42. Provide outdoor LED light fixtures as shown on the drawings.
43. Provide ceiling mounted occupancy sensor for room lighting control.
44. Provide wall mounted occupancy sensor switch in the toilet for lighting control.
45. Provide two over-ride switches for the warehouse lighting to override and manually control the warehouse lighting. One switch will be controlling the lighting near the dock door area and the other switch to control the rest of the warehouse. Switches shall be field wired to override occupancy sensor integral with each fixture.
46. Provide 120V wiring and conduit for power connection to fire alarm control panel from panelboard 9LP-101.
47. Provide 120V wiring and conduit for power connection to card access system control panel from panelboard 9LP-101.
48. Provide 120V wiring and conduit for power connection to paging system control panel from panelboard 9LP-101.
49. Provide 120V wiring and conduit for power connection to CCTV system control panel from panelboard 9LP-101.
50. Provide 30amp 208 volt, 1-phase power connection for heat trace. Provide wiring and conduit between panelboard 9LP-101 and heat trace power connection kit. Provide j-box at the heat trace for power connection.
51. Provide 120V wiring and conduit between water heater and panelboard 9LP-101 for power connection. Provide manual motor switch at the water heater for power disconnect.
52. Provide 120V wiring and conduit between dock heater 1 and panelboard 9LP-101 for power connection. Provide motor starter switch enclosed in NEMA 12 enclosure.
53. Provide 120v wiring and conduit between dock heater 2 and panelboard 9LP-101 for power connection. Provide motor starter switch enclosed in NEMA 12 enclosure.

Special Job Requirements:

All building interior conduits shall be IMC or rigid galvanized steel. All outdoor conduits shall be rigid galvanized steel.

Termination of conduits into panelboard, motor control centers, control panels, disconnect switches, etc. shall be done with Meyer hubs.

All local disconnect switches, convenience receptacles, electrical panels, etc. shall have nameplates identifying where the device is being fed, panelboard/bus duct number and circuit number.

Electrical Contractor shall provide 24 journeyman man-hours for engineering checkout assistance to engineering personnel, monitored via Daily Time Sheets.

The bid amount shall not include any premium labor cost. If premium time is required, these costs shall be covered per the Standing Contract.

Equipment & Material Procurement List:

(See Attached)

List of Drawings:

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Rev No.</u>	<u>Date</u>
CYNT-001-E-014A	Panelboard Index	34	01/22/18
CYNT-001-E-028B	Panel Schedule	19	01/22/18
CYNT-001-E-036	Panel Schedule - Emerg Power	28	01/22/18
CYNT-001-E-091	One Line Diagram 1-US-11	22	01/22/18
CYNT-001-E-323	Col L1-M2, 11-9A Mezz Pwr Plan	17	01/22/18
CYNT-001-E-327	Power Plan 2 nd Floor Col. M2-R, 20-23	30	01/22/18
CYNT-009-E-010	Fixture Schedule	1	01/22/18
CYNT-009-E-015	Panelboard Schedule Bldg 009 Warehouse	1	01/22/18
CYNT-009-E-180	Grounding Plan	1	01/22/18
CYNT-009-E-200	Lighting Plan - Warehouse	1	01/22/18
CYNT-009-E-300	Power Plan - Warehouse	1	01/22/18
CYNT-009-E-400	Equipment Schedule	1	01/22/18
CYNT-888-E-120	Electrical Site Plan - Warehouse	1	01/22/18

FIRE ALARM, PAGING, EVACUATION & SECURITY SYSTEMS (FAPE&SS):

David Youngquist / 651-210-7656 / dbyoungquist@mmm.com

All work shall be done in accordance with the “3M Electrical Specifications for Standing Contracts” dated August 19, 2002. “3M Access Control Specifications” dated May 22, 1999 and the work as described below:

Work Description:

Paging System:

1. It is the responsibility of the Electrical Contractor (E.C.) and to call to the attention of 3M site representative any conflicts or ambiguities that may exist between the drawings, specifications, contract, applicable code or any site condition and resolve with 3M representative prior to completion of work.
2. E.C. shall provide a new paging system that shall connect into the existing paging system in the main plant VIA fiber optic cable provided by 3M IT. The new paging system shall be installed in a wall mounted lockable cabinet with all required paging components, programming and testing for a complete working system. This shall include all new paging speakers all cabling, 120V circuit and all required conduit including all field terminations.
3. E.C. shall provide connections to and from the new Supervisory system for alarm input and trouble output. This shall include prerecorded messages to match the existing supervisory evacuation at the main plant.

4. E.C. shall field verify all speaker locations and adjust as necessary to avoid obstructions, lighting and ventilation.
5. E.C. shall set all paging speakers and speaker horns at 70V and wattage tap settings as shown for each speaker on drawings.
6. At each general purpose speaker location where conduit has been installed, the E.C. shall install a type "fs" box within 1' of the speaker. Provide cord and fitting at box.
7. E.C. shall measure all speaker line loads with an impedance bridge and record results in the as-builts package.
8. E.C. shall provide a tone over the paging system during testing. Each speaker shall be evaluated and any speaker needing adjustment shall have its transformer re-tapped by the E.C.
9. All paging cabling installed below the ceiling bar joists shall be installed in rigid conduit from device back box/j-box up to ceiling deck with proper fitting to receive incoming cables. All paging horns shall be mounted to a j-box affixed to walls or beams, all splices shall be in the j-box no open splices are acceptable. All cable runs shall be bundled together, run at right angles and fastened to deck every 5'. No paging cabling shall be permitted in any existing low voltage or high voltage cable trays but j-hooks every 3' can be attached to the side or below of the existing low voltage cable trays for paging cabling. All conduit in explosion proof areas shall be rigid.
10. E.C. shall permanently label each cable at the head-end and at each field device.
11. E.C. shall provide conduit sleeves and fire stopping at all wall penetrations.
12. E.C. shall provide to the 3M Engineer complete as-builts upon project completion.

Approved Paging Contractors:

Electronic Design Co.
Joe Kankovsky
612-355-2301 | Direct
612-940-4320 | Mobile
jkankovsky@edcsolutions.com

Supervisory System:

1. It is the responsibility of the Electrical Contractor (E.C.) and to call to the attention of 3M site representative any conflicts or ambiguities that may exist between the drawings, specifications, contract, applicable code or any site condition and resolve with 3M representative prior to completion of work.
2. E.C. shall provide all supervisory conduit, cabling and 120VAC 20A dedicated circuit.
3. Supervisory system Panel and field devices provided and under a different contract.
4. E.C. shall provide conduit sleeves and fire stopping at all wall penetrations.
5. E.C. shall provide to the 3M Engineer complete as-builts upon project completion.

Card Access / Security System:

1. It is the responsibility of the E.C. to call the attention of the 3M site Representative any conflicts or ambiguities that may exist between the drawings, specifications, contract, applicable code or any site condition and resolve with 3M site Representative prior to completion of work.
2. The E.C. shall provide all conduit a new UTC Micro/5 card access system including all required card access components, back boxes, J-Boxes, 120 VAC power, sleeves for wall penetrations, low voltage plenum cabling low voltage terminations, local programming, testing and training for a complete and operational system. All low voltage security plenum cabling shall be installed in rigid conduit from device back box to ceiling deck with proper fitting to receive incoming cables. All cable runs shall be bundled together, run at right angles and fastened to the deck every 5 feet. Conduit installation shall follow 3M standing specifications section "16110 Raceways and Supports".
3. G.C. shall provide all new 24VDC electric strikes,
4. The E.C. shall provide permanent labels on each cable in the Micro/5 panel and at each field device using 3M approved label marking.
5. The E.C. shall provide to the 3M Engineer a complete set of as builds indicating all changes to conduit, wire, device addressing, etc. upon job completion.

Approved Card Access / Security Contractors:

Mike Borths
 Senior Account Manager VT
 401 W Travelers Trail
 Burnsville, MN 55337
 +1 952-707-9509 Direct
 +1 952-894-5343 Main
 +1 888-334-7244 National Service
Mike.Borths@vtisecurity.com

Kevin Grice
 Sr. National Account Manager
 STANLEY Convergent Security Solutions
 8030 Kensington Ct.
 Brighton, MI 48116
 C: 513-316-3123
Kevin.Grice@sbdinc.com | www.stanleysecurity.com

CCTV Security System:

1. It is the responsibility of the Electrical Contractor (E.C.) to call the attention of the 3M site representative of any conflicts or ambiguities that may exist between the drawings, specifications, contract, applicable code or any site condition and resolve with 3M rep prior to completion of work.
2. The E.C. shall provide all CCTV head-end components, conduit, j-boxes, Middle Atlantic wall cabinet, CCTV cabling and 120V wiring. All CCTV cabling shall be installed in conduit from j-box up to ceiling deck with proper fitting to receive incoming cables. E.C. shall provide and install all connectors on all RJ45 ends on all CAT6 cables and certify per 3M standards. All cable runs shall be bundled together, run at right angles and fastened to deck every 5'. All conduit shall be

ridged in the warehouse areas, production areas, underground and comply with all State codes and 3M standards.

3. The E.C. shall provide all penetrations, conduit sleeves and fire caulking as required for all new cable and conduit runs.
4. The E.C. shall provide and install all cameras, camera back boxes and camera mounts.
5. The E.C. shall provide all programming, testing and training.
6. The E.C. shall provide to the 3M Engineer a riser diagram showing all CCTV components and cabling prior to the start of any work for approval.
7. The E.C. shall provide to the 3M Engineer complete red-lined as-builts upon job completion.

Approved CCTV Contractors:

Mike Borths
Senior Account Manager VT1
401 W Travelers Trail
Burnsville, MN 55337
+1 952-707-9509 Direct
+1 952-894-5343 Main
+1 888-334-7244 National Service
Mike.Borths@vtisecurity.com

Kevin Grice
Sr. National Account Manager
STANLEY Convergent Security Solutions
8030 Kensington Ct.
Brighton, MI 48116
C: 513-316-3123
Kevin.Grice@sbdinc.com | www.stanleysecurity.com

Special Job Requirements:

All conduit will be as per 3M Standing Electrical Specifications.

The bid amount shall not include any premium labor cost. If premium time is required, this cost shall be covered per the Standing Contract.

Equipment & Material Procurement List: (See Attached Tabulation)

List of Drawings:

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Revision No.</u>	<u>Date</u>
CYNT-009 E-580	Paging System	1	01/22/18
CYNT-009-E-750	Supervisory System	1	01/22/18
CYNT-009-E-800	Card Access Security System	1	01/22/18
CYNT-009-E-801	Card Access Security System ¼” Scale Details	1	01/22/18
CYNT-009-E-810	Card Access Security System Micro/5 #0879	1	01/22/18
CYNT-009-E-815	Card Access Security System Door Elevation Details	1	01/22/18
CYNT-009-E-820	CCTV System	1	01/22/18
CYNT-009-E-825	CCTV System Camera Mounting Details	1	01/22/18

UTILITIES: (NOT PART OF THIS CONTRACT)

END OF WORK DESCRIPTION

SECTION 00610

3M

BID FORM

PROJECT I.D. 0083940 BID FORM

1.0 IDENTIFICATION:

- A. Category of Work: Civil, Architectural, Structural, Mechanical, Fire Protection, Electrical and FAPSE.
- B. Project: Building 009 Warehouse
- C. Location: Cynthiana, KY- Building No. 009
- D. To: Wayne Lindblad, Facilities Engineering

1.1 BID PROPOSAL:

A. BASE BID:

The undersigned hereby offers to perform the Work and things provided in and according to the provisions of the attached Contract Documents for a consideration of _____ Dollars (\$_____).

The successful bidder will be requested to provide a bid breakdown in CSI format.

B. BID ALTERNATES:

ALTERNATE NO. 1: «Expand building one additional bay on east end

Add the sum of _____ Dollars (\$_____).

ALTERNATE NO. 2: «Include roof skylights

Add the sum of _____ Dollars (\$_____).

ALTERNATE NO. 3: «Include wall interior liner panel

Add the sum of _____ Dollars (\$_____).

ALTERNATE NO. 4: «Extend fire loop road on north side of building

Add the sum of _____ Dollars (\$_____).

- C. This proposal shall continue for 60 days, and a contract shall be consummated between us if you on or before that date accept our proposal. In the event that you accept our proposal, we agree to execute a copy of the Construction Contract submitted as a part of the bid package, it being understood and agreed that the consideration herein before contained in this proposal shall be inserted in the appropriate places in the said contract.

- D. We agree to commence the said Work within 7 days after receiving notice from you and to proceed with the Work expeditiously and in such manner as will promote harmony of Work with other CONTRACTORS on the Worksite and such as will not interfere with the progress of the entire job.
- E. It is understood that OWNER is not in any way obligated to accept this bid, the lowest bid, or any other bid.
- F. CONTRACTOR acknowledges receipt of and includes Work of Bulletin numbers with dates _____, _____, and _____.

Officer's Signature, Title

Firm Name

Date

Street

State of Incorporation

City and State

SECTION 01110

ALTERNATES

PROJECT I.D. 0083940

PART 1 - GENERAL

1.0 DESCRIPTION:

- A. The terms and conditions of the Construction Contract shall apply to the Work specified in this section.
 - 1. If the information in this Section conflicts with the terms and conditions of the Construction Contract, the Contract language takes precedence.
- B. This Section describes the limits of the requested alternates to the Work.
- C. Each proposal under an alternate shall include all incidental Work and all adjustments necessary to accommodate the changes. All Work shall meet the requirements of the Contract Documents.
- D. Each alternate proposal shall be submitted as an individual cost for the particular alternate (not cumulative) and shall be proposed under the premise that no other alternates have been accepted. Should the Work of an alternate called for by the Bid Form not affect the cost of the Work, "No Change" shall be stated.
- E. Any of the alternates may be accepted by OWNER and will be considered in award of contract.
- F. OWNER may, at their option, vary the scope of the Work by authorizing alternates which will add to the Work, deduct from the Work or substitute materials, equipment or methods. If alternates are authorized subsequent to execution of the Contract they shall be authorized in accordance with Article 20 of the Construction Contract.

1.1 ALTERNATE(S):

- A. ALTERNATE NO. 1: «Expand building one additional bay on east end»
 - 1. Under this alternate, CONTRACTOR shall construct one additional 30' wide bay on the east end of the proposed building. This includes an added OH door, AHU, lighting and minor changes to the site grading. This also changes the location of electrical disconnects.
- B. ALTERNATE NO. 2: «Include roof skylights»
 - 1. Under this alternate, CONTRACTOR shall construct roof skylights as indicated on the plans.
- C. ALTERNATE NO. 3: «Include wall interior liner panel»
 - 1. Under this alternate, CONTRACTOR shall construct a 10' tall steel interior liner panel around the perimeter walls.
- D. ALTERNATE NO. 4: «Extend fire loop road on north side of building»
 - 1. Under this alternate, CONTRACTOR shall extend the fire loop road around the north side of the building. This includes lowering footing elevations in the NW corner of the building as well as minor grading changes.

2.0 PARTS 2 THROUGH 4 - NOT APPLICABLE

SECTION 01900

CONTRACTOR SAFETY REQUIREMENTS

PROJECT I.D. 0083940

TABLE OF CONTENTS:

- 1.0 Part 1 - General
- 1.1 Purpose, Scope and Philosophy
- 1.2 Referenced Standards
- 1.3 Owner's Facility Safety Indoctrination
- 1.4 Permits
- 1.5 Fire Protection and Prevention
- 1.6 Welding, Cutting and Spark Production
- 1.7 Electrical Work and Lockout (Tagging) Procedures
- 1.8 Motor Vehicles and Equipment
- 1.9 Cranes and Hoists
- 1.10 Contractor's Safety Training and Education
- 1.11 Recording and Reporting of Injuries
- 1.12 First Aid and Medical Attention
- 1.13 Personal Protective Equipment
- 1.14 Respirators
- 1.15 Personal Conduct
- 1.16 Safety Inspection and Housekeeping
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- 1.18 Vertical and Horizontal Work Safety Access Control
- 1.19 Miscellaneous Provisions
- 1.20 Signs, Signals and Barricades
- 1.21 Excavations and Trenching
- 1.22 Concrete, Concrete Forms and Shoring
- 1.23 Steel Erection
- 1.24 Confined Space Entry
- 1.25 Environmental Requirements
- 2.0 Part 2 - Not Applicable
- 3.0 Part 3 - Not Applicable
- 4.0 Part 4 - Related Documents
- 4.1 Attachments

1.0 PART 1 – GENERAL

1.1 PURPOSE, SCOPE AND PHILOSOPHY:

- A. This Section defines safety requirements, which CONTRACTOR shall comply with and enforce on all 3M Company's Worksites. This section also addresses conditions of work and the manner in which OWNER expects work on their premises to proceed.
- B. Failure of this Section to reference specific laws, ordinances, codes, rules, regulations or orders does NOT excuse CONTRACTOR or CONTRACTOR employees from following those regulations that may be applicable to the scope of work being performed by CONTRACTOR.
- C. The safety requirements may be exceeded by the specific safety rules and procedures of individual operating plants or facilities.
- D. CONTRACTOR shall not permit any person to enter upon the premises of OWNER at the Worksite or elsewhere, except in accordance with the safety and security requirements of

OWNER, or such governmental authority having an interest in the work. Should any unforeseen considerations or problems arise, they shall be resolved by mutual agreement, recognizing that personnel safety is of paramount importance.

1.2 REFERENCED STANDARDS:

- A. The publications listed below and its supplements, including but not limited to, form a part of these requirements:
 - 1. U.S. Department of Labor - Occupational Safety and Health Administration (OSHA).
 - 2. National Fire Protection Association (NFPA).
 - 3. National Electrical Code (NEC) - Refer to NFPA 70.
 - 4. American National Standards Institute, Inc. (ANSI).
 - 5. The Material Handling Institute, Inc. (MHI) - Refer to Crane Operators Manual.
 - 6. Environmental Protection Agency (EPA)
 - 7. Uniform Fire Code or applicable fire code
 - 8. Uniform Building Code or applicable building code
- B. Where a standard is referenced in this document, the subject referenced (equipment, material or work) shall be in compliance with the most recent edition of that standard.
- C. The referenced standards are minimum requirements. Where the requirements of this document are in excess of, but not contrary to, the referenced standards, CONTRACTOR shall comply with the more stringent requirements.

1.3 OWNER'S FACILITY SAFETY INDOCTRINATION:

- A. CONTRACTOR shall obtain from OWNER any safety rules and regulations in effect at OWNER'S Worksite. CONTRACTOR will be responsible for requiring all of CONTRACTOR'S employees to receive and ensure comprehension of this information prior to beginning work.
 - 1. These rules will include an explanation of OWNER'S emergency alarm system and emergency response procedures, if such is present.
- B. CONTRACTOR shall keep records showing to whom this information has been given. In the event there is a change in personnel on CONTRACTOR'S work force, CONTRACTOR is responsible for providing any new employees with this information and maintaining all necessary records.

1.4 PERMITS:

- A. The OWNER requires a daily work permit system to keep track of all work at the Worksite. All contract work on the Worksite will require a "3M Daily Work Permit" for each job. This must be initiated by CONTRACTOR'S Designated Representative at least the day before the work starts.
 - 1. CONTRACTOR will not be allowed to enter the facility unless a "3M Daily Work Permit" is at the proper facility entrance. On an emergency basis a telephone call can be made to allow a CONTRACTOR to enter, however, a "3M Daily Work Permit" must be completed before work begins.
 - a. Refer to Part 4 for a copy of the "3M Daily Work Permit".
 - 2. Failure to comply with the daily work permit requirement shall be cause for immediate dismissal from the Worksite.
 - 3. CONTRACTOR shall provide the next days work schedule to OWNER'S Designated Representative at the conclusion of each day's operation.
- B. Additional permits may be required for certain work activities on OWNER Worksites. Examples include, but are not limited to the following:
 - 1. Entry into confined space shall require a "Confined Space Entry Permit" by CONTRACTOR to be completed before work begins. This entry permit shall require standby personnel outside the confined or enclosed space at all times while work activity

- is being performed in the confined space. Refer to Article 1.24 for confined space requirements. Refer also to Articles 1.13 and 1.14 for equipment requirements.
- a. Refer to Part 4 for a copy of the "Confined Space Entry Permit".
 2. Any work such as drilling, chipping, caulking, soldering, welding, lead-burning or other work which may burn or produce a flame, including the use of an open flame or any other heat-generating or spark-producing device shall require an "Open-Flame and Spark Hazard Permit" by CONTRACTOR to be completed before work begins. Refer to Article 1.6 for welding, cutting and spark production requirements.
 - a. Refer to Part 4 for a copy of the "Open Flame and Spark Hazard Permit".
 3. To perform any excavation or digging in accordance with Article 1.21.
 4. To use a "linebreaking permit" for processes which may be hazardous.
- C. It is imperative that the conditions noted on the permit(s) are identical to the actual job conditions. When the nature or conditions of a job change in any way, or when new tools are required or different methods are employed to do the job, other than those originally covered in the initial permit, WORK SHALL STOP IMMEDIATELY because the permit is invalid. The permit is only good for what it describes - no more. Work cannot progress until the situation can be carefully analyzed and a new permit issued for the new conditions.
- D. Communication is the key to enhancing the effectiveness of the work permits system. CONTRACTOR'S employees, agents, delegates, invitees and subcontractors and OWNER'S Designated Representative, including operators and facility supervisors, must all be aware of the permit process and the specific requirements of each permit. This then allows each to review the ongoing work and look for possible changing conditions or deviations during their daily work routine. Permits may only be requested and obtained by CONTRACTOR'S Designated Representative. After the permit has been issued, but before any work has been performed, the CONTRACTOR'S copy of the permit shall be read and initialed by OWNER'S Designated Representative. This assures both CONTRACTOR and OWNER Designated Representative's knowledge and involvement. After the permits have been initialed by OWNER'S Designated Representative, the CONTRACTOR'S Designated Representative shall distribute the permit to CONTRACTOR employees performing that work. CONTRACTOR'S Designated Representative shall make sure CONTRACTOR employees read the permit requirements. These permits must be posted in the work area. If the permit cannot be posted, it must be carried by one of CONTRACTOR supervisors in that area. OWNER'S Designated Representative will, as a routine, periodically question CONTRACTOR employees as to the location of the permit and its requirements. Permits are valid for only one day. Permits shall not remain in CONTRACTOR'S trailer. Permits shall be returned to the OWNER'S Designated Representative at the end of the day.

1.5 FIRE PROTECTION AND PREVENTION:

- A. CONTRACTOR'S personnel shall observe OWNER'S fire safety rules and regulations and evacuation procedures.
- B. CONTRACTOR shall provide the number of fire extinguishers and fire protection devices required by law and any additional protection devices required by OWNER. CONTRACTOR shall also maintain the equipment in good operating condition (i.e., fully charged). All fires and types of extinguishing equipment used shall be promptly reported to OWNER'S Designated Representative.
 1. A fire extinguisher, rated not less than 2A, must be provided for each 1,500 square feet of the protected building area with travel distance from any point to the nearest extinguisher not to exceed 75 feet.
- C. CONTRACTOR shall be responsible for the development of a fire protection program to be followed throughout all phases of the construction work and shall provide for the fire fighting equipment in accordance with OSHA regulations, these guidelines, and the requirements appropriate to the type of construction being performed. This shall include, but not be limited to:

1. All fire fighting equipment provided by CONTRACTOR shall be conspicuously located, free for access, periodically inspected, and maintained in good operating condition. Defective equipment shall be replaced immediately. CONTRACTOR shall give particular attention to training CONTRACTOR'S personnel in the use of fire extinguishers and their limitations.
 2. Installation of an automatic sprinkler protection system(s) must follow the construction work sequence as soon as possible and be placed in service as soon as applicable laws permit.
 3. The telephone number(s) of the nearest appropriate fire department(s) and OWNER'S security/emergency number(s) shall be conspicuously posted.
 4. "Strike anywhere" matches or disposable butane lighters are not allowed on the Worksite.
 5. All smoking areas shall be designated by OWNER'S Designated Representative. Smoking shall be prohibited on all roofs and in areas where flammable or combustible liquids and materials are used and stored.
- D. Fire prevention program shall also include analysis of potentially hazardous materials, identifying hazardous area classifications, developing guidelines for storage and handling and using items such as fuel oils, flammable gases, solvents, plastics and paints.
- E. Refer to Article 1.4 for "Open-Flame and Spark Hazard Permit" requirements.

1.6 WELDING, CUTTING AND SPARK PRODUCTION:

- A. CONTRACTOR'S personnel shall observe OWNER'S safety regulations regarding welding, cutting and spark production.
- B. Proper precautions (isolating welding and cutting, removing fire hazards from the vicinity, providing a fire watch, etc.) for fire prevention shall be taken in areas where welding or other "hot work" is being done. The "Open-Flame and Spark Hazard Permit" must be issued by the facility designated person at the request of the OWNER'S Designated Representative prior to any welding, cutting or other "hot work" being performed. No welding, cutting or heating shall be done where the application of flammable paints or the presence of other flammable compounds or ignitable dust concentration creates a fire hazard. Refer to Article 1.4 for details on permits.
1. Refer to Part 4 for a copy of the "Open-Flame and Spark Hazard Permit".
- C. CONTRACTOR shall exercise extreme care in the use of all open flame equipment. OWNER'S Designated Representative shall be informed daily of all such activities. The following items are of particular importance and shall be strictly enforced by CONTRACTOR:
1. CONTRACTOR shall enforce strict compliance with the above "Open-Flame and Spark Hazard Permit".
 2. CONTRACTOR'S welding, cutting or spark production shall be permitted in flammable liquid areas only if vapor checks are made and automatic sprinklers are in service.
 3. CONTRACTOR shall use fire-resistant tarpaulins to contain sparks and hot metals.
 4. CONTRACTOR shall confine flammable liquids in approved safety containers.
- D. CONTRACTOR shall perform welding and cutting in accordance with OSHA regulations. These shall include, but not be limited to:
1. All exposed combustible materials located below the welding and cutting area shall be removed to a safe location, covered with a fire-resistant material or protected by an approved spark catcher to contain all sparks and slag.
 2. A fire extinguisher suitable for the hazards must be within the immediate area of any welding, cutting, or open flame work. A welder's helper or fire watcher shall be required whenever cutting or welding is performed in locations where a fire might develop.
 3. The user shall inspect all leads, grounds, clamps, welding machines, hoses, gages, torches and cylinders before they are put into operation. Leads must not be placed in traffic areas.
 4. All fittings, couplings and connections are to be "leak-free".

5. Provide adequate ventilation while cutting, welding, soldering or working on galvanized material and while working within enclosed shelters.
 6. All work shall have a separate and adequate ground, pulled from the welding machine to the item being welded.
 7. At the end of each shift (or when not in use for extended periods or unattended), the welding machine shall be turned off.
 8. An approved welding helmet shall be worn.
 9. Electric welding is prohibited from any metal ladder. (Metal ladders are not permitted on site.)
 10. Compressed gas cylinders shall be secured vertically to an adequate support while in storage or transit. The protective cap must be on during storage and transit. All oxygen cylinders shall be separated while in storage from any flammable gas such as LP or acetylene cylinders by a 5 foot high fire barrier having a 1/2 hour fire rating or separated by a minimum distance of 20 feet. Under no circumstances shall acetylene cylinders be laid down.
 11. Keep oil and grease away from oxygen regulators, hoses and fittings. Do not store wrenches, dies, cutters or other grease covered tools in the same compartment with oxygen equipment.
 12. Approved cutting goggles shall be worn.
 13. Gloves shall be worn to protect hands and wrists. Flying chips and weld slag travel a considerable distance and may be dangerous to other personnel in the area and, therefore, shall require screening or shielding. Heavy leather work gloves, long sleeve shirts or jackets and goggles or a full face shield shall be worn when welding, cleaning, grinding and brushing surfaces. The same precautions shall be taken for wirebrushing and power brushing. Flame-resistant aprons of leather or other suitable material shall be worn as protection against radiating heat and sparks. Clothing should be free of oil and grease.
 14. Torches shall never be left in a vessel due to potential leaks.
 15. Oxygen shall not be used to operate pneumatic tools, pressurize a container, blow out lines or as a substitute for compressed air or other gases.
 16. Cylinders and hoses shall be placed where they are not exposed to sparks and slag from a welding or cutting operation.
 17. Cylinders shall be raised to upper levels with approved rigging gear. Do not lift them with slings or by the protective cap.
 18. Do not strike an arc on cylinders or use them as rollers.
 19. Cutting/burning units must have hoses bled and gages zeroed when not in use.
- E. Welding and cutting on barrels or other containers shall be in accordance with all prevailing codes, ordinances and regulations, including all procedures directed by OWNER'S Designated Representative.

1.7 ELECTRICAL WORK AND LOCKOUT (TAGGING) PROCEDURES:

- A. General Requirements:
1. All electrical work shall be performed by qualified personnel. Work shall be performed on locked out de-energized circuits whenever possible. Exceptions include: testing of circuits, working on a portion of a continuous industrial process where shutdown of the entire process is not feasible, etc. Work on energized parts shall follow requirements of OSHA.
 2. All electrical work, installation, and wire capacities shall be in accordance with the pertinent provisions of NFPA 70 (latest revision) and area classifications.
 3. The construction and installation of permanent and temporary electrical power shall comply with OSHA standards.
 4. CONTRACTOR shall be in compliance with Lockout/Tagout (1910.147) prior to starting electrical work, which involves cutting, splicing or tapping existing cables. CONTRACTOR will request OWNER to tag and identify all cables present in the area.

CONTRACTOR shall check to make sure that the circuit to be worked on has been de-energized and the source locked out. CONTRACTOR shall use its own padlock on the disconnect device. Review one line diagram to be sure there are no alternate power sources.

- a. CONTRACTOR will check for energized cable with a device intended for the purpose before cutting into the cable or opening a splice or termination. Solidly ground the cable to a KNOWN low resistance ground point while working on the cable.
- b. Electrical lines shall be de-energized while work is performed with the energy control source locked out. When it is necessary to work with energized lines, only qualified personnel and effective means of personal protection shall be utilized such as, but not limited to, rubber gloves and blankets which have been tested regularly in accordance with ANSI.
- c. At least two people shall be assigned to work on any energized lines or in substations.
- d. When it becomes necessary to transport equipment or machinery under overhead lines in a mover that encroaches on specified clearances, the job shall be scheduled so the lines can be de-energized.
- e. Operations conducted adjacent to overhead lines shall not be initiated until coordinated with the local utility officials.
- f. Materials and supplies shall not be stored under overhead transmission and distribution lines due to CONTRACTOR'S potential exposure to overhead contact with electrical energy during storage and removal.
- g. Operations adjacent to overhead lines shall be prohibited unless one of the following conditions is satisfied:
 - 1) Power has been shut off and positive means taken to prevent the lines being energized.
 - 2) Equipment, or any part, does not have the capability of coming within the following minimum clearance from energized overhead lines or the equipment has been positioned and blocked to assure no part, including cables, can come within the following minimum clearances:

Power Lines Nominal <u>System</u> <u>kv</u>	Minimum Required <u>Clearance</u>
50 or under	10 feet (3.04m)
51 – 75	12 feet (3.66m)
115; 161	15 feet (4.57m)
230; 285	20 feet (6.10m)
345	25 feet (7.62m)
500	35 feet (10.67m)

B. Grounding Requirements:

- 1. All electrical circuits shall be grounded in accordance with the NEC, unless otherwise noted in this Specification.
- 2. A ground shall be provided for non-current-carrying metallic parts of equipment such as: generators (if not exempted by NEC 250-6), electrically powered welders, switches, motor-controller cases, fuseboxes, distribution cabinets, frames, non-current-carrying rails used for travel, motors of electrically operated cranes, electric elevators, metal frames of non-electric elevators to which electric conductors are attached, other electric equipment and metal enclosures around electric equipment.
- 3. Portable and semi-portable electrical tools and equipment shall be grounded by a multiconductor cord having an identified grounding conductor and a multicontact polarized plug-in receptacle.

4. Semi-portable equipment, flood lights and work lights shall be grounded. The protective ground of such equipment shall be maintained during moving unless supply circuits are de-energized.
5. Tools protected by a system of double insulation, or its equivalent, need not be grounded. Double-insulated tools shall be distinctly marked and listed by UL or FM.
6. Grounding circuits shall be checked to ensure that the circuit between the ground and a grounded power conductor has a resistance, which is low enough to permit current flow sufficient to cause the fuse or circuit breaker to interrupt the current.
7. Conductors used for bonding and grounding stationary and movable equipment shall be of ample size to carry the anticipated current. When attaching bonding and grounding clamps or clips, a secure and positive metal-to-metal contact shall be made. The ground end shall be attached first and the other end shall be attached and removed by insulated tools or other suitable devices. When removing grounds, the grounding device shall first be removed from the line or equipment using insulated tools or other suitable devices. Such bonding and grounding attachments shall be made before closures are opened and material movements are started and should not be broken until after material movements are stopped and closures are made.
8. All 120-volt single-phase 15 and 20 ampere receptacle outlets which are not a part of the permanent wiring of the building or structure shall have ground-fault circuit interrupters (GFCI) for personnel protection or an assured equipment-grounding conductor program. Permanent wiring of electrical circuits shall be grounded in accordance with NEC. GFCI's may be sensitive to some equipment such as concrete vibrators. In these instances, other precautions shall be taken to protect the equipment.

C. Temporary Wiring:

1. Temporary wiring shall be guarded, buried or isolated by elevation to prevent accidental contact by workers or equipment.
2. Outdoor lighting strings shall consist of lamp sockets and connection plugs permanently molded to the conductor insulation.
3. Flexible/extension cord sets shall be of a type listed by the UL. Flexible/extension cord sets used on construction Worksites shall contain the number of conductors required for the service, plus an equipment ground wire. The cords shall be hard usage or extra-hard usage as specified in the NEC. Approved cords may be identified by the word "outdoor" or letters "WA" on the jacket. All portable receptacle boxes must be approved for outside use (free of knock out plugs).
4. Bulbs attached to festoon lighting strings and extension cords shall be protected by wire guards or equivalent unless deeply recessed in a reflector.
5. When temporary wiring is used in tanks or other confined spaces, an approved switch suitable for the hazards present e.g., explosion proof, identified and marked, shall be provided at or near the entrance to such spaces for cutting off the current in emergencies.
6. Exposed empty light sockets and broken bulbs shall not be permitted.
7. Temporary lights shall be equipped with heavy-duty electric cords with connections and insulation maintained in safe condition. Temporary lights shall not be suspended by their electric cords unless cords and lights are designed for this suspension. Splices shall have insulation equal to that of the cable.
8. Portable electric lighting used in moist and/or hazardous locations such as drums, tanks, vessels and confined spaces shall be operated at a maximum of 12 volts.
9. Temporary lights shall be equipped with guards to prevent accidental contact with the bulb.
10. Attachment plugs for use in work areas shall be constructed so that they will endure rough use. They shall be equipped with a cord grip to prevent strain on the terminal screws.
11. Additional requirements for temporary wiring are as listed in the Section of this Specification entitled "Temporary Facilities and Controls".

1.8 MOTOR VEHICLES AND EQUIPMENT:

- A. CONTRACTOR'S personnel shall observe OWNER'S roadway vehicle safety rules and prevailing OSHA regulations when operating vehicles and moving equipment at OWNER'S facilities.
- B. The driver of each vehicle is responsible for the safety of all passengers and the stability of materials being hauled or handled by the equipment.
- C. All vehicles, which are not necessary for work, shall park in areas designated by OWNER'S Designated Representative.
- D. All CONTRACTOR vehicles must be covered by CONTRACTOR'S insurance requirements as indicated in OWNER'S Contract.
- E. Blocking of OWNER'S roadways is prohibited except where specifically authorized by OWNER'S Designated Representative.
- F. Speed limits shall be strictly followed on OWNER'S Worksite.
- G. All CONTRACTOR'S equipment (i.e., backhoes, cranes, front end loaders, dozers, earth movers, etc.) shall have functioning backup warning devices.
- H. All stationary equipment shall be grounded or isolated, when working near, above or below grade energized lines or equipment.

1.9 CRANES AND HOISTS:

- A. CONTRACTOR shall comply with the manufacturer's specifications and limitations applicable to the operation of any and all cranes and hoists. Attachments used with cranes shall not exceed the capacity, rating or scope recommended by the manufacturer. A copy of the crane manufacturer's operating manual shall be available in the cab of each crane at all times. Manufacturer's load rating plates (in view of the operator) shall be attached to all load hoisting equipment.
- B. All equipment used for hoisting shall be inspected daily by CONTRACTOR before operations are begun. Cranes or equipment that have been idle shall be inspected by CONTRACTOR before being put into operation. Maintenance and inspection of cranes or equipment shall be in accordance with ANSI standards.
 - 1. Inspection records shall be made available to OWNER'S Designated Representative if requested by OWNER.
- C. Operating cranes or equipment in the vicinity of overhead power lines must include an action plan developed by the CONTRACTOR and implemented to insure safe operation. This plan must include building barricades, warning signs, a limited device for boom extension, grounding of equipment, use of nylon slings, wearing insulated gloves and boots, and/or limited access. These are preventive measures. First consideration shall be given to alternative methods and routes that will keep equipment away from these areas.
- D. The riding of crane hooks and/or "headache balls" is prohibited. Doing so may result in immediate dismissal from the Worksite.
- E. Rigging equipment shall be certified and inspected by qualified state or manufacturer representatives prior to use and as necessary during its use to ensure that it is safe. Inspection documentation shall be submitted to OWNER'S Designated Representative upon request.
- F. Only personnel qualified by training and experience shall operate cranes or hoists. Upon request, CONTRACTOR shall provide qualification and experience resumes for all operators.
- G. One person shall be designated to perform signaling.
- H. During assembly and disassembly of crane booms and hoist sections, all components shall be adequately supported so that these components will not shift or fall.

- I. When making a lift with a crane, CONTRACTOR shall have the area cleared, roped or barricaded off, and shall have someone supervising the lift. No one shall stand or pass under suspended loads. Tag lines shall be used for controlling loads.
- J. Cranes and hoists shall not be refueled while in operation.
- K. When working near energized lines and equipment, the cranes shall be grounded or isolated.
- L. All cranes and hoists not in use shall be properly secured.
- M. Outriggers shall be fully extended for any lift. Where cribbing is used under the outrigger, it must only be used under the pedestal.
- N. The use of a crane or hoist to hoist employees on a personnel platform is prohibited, except when the erection use and dismantling of conventional means of reaching the Worksite; such as a personnel hoist, ladder, stairway, aerial lift, elevating work platform or scaffold would be more hazardous, or is not possible because of structural design or Worksite conditions.

1.10 CONTRACTOR'S SAFETY TRAINING AND EDUCATION:

- A. CONTRACTOR shall instruct each employee in the recognition and correction of unsafe acts, behavior and conditions and the regulations applicable to CONTRACTOR'S work environment. The employee shall use these instructions to control or eliminate any hazards or other exposure to illness or injury.
- B. CONTRACTOR shall acquaint each CONTRACTOR employee with the safety and emergency equipment available and the procedures to be followed in each type of emergency.
- C. At a minimum, each Contractor shall be required to conduct weekly safety meetings with CONTRACTOR personnel and subcontractors. Minutes must be kept and submitted to the OWNER'S Designated Representative, if requested.
- D. CONTRACTOR shall provide a qualified employee who is responsible for maintaining Worksite safety during all phases on Worksite. The qualified employee shall conduct safety meetings with all personnel weekly, monitor site safety continuously, and thoroughly investigate all accidents and near misses. Depending on the size and type of project, the qualified employee may have other Worksite responsibilities.
- E. All CONTRACTOR personnel shall receive an initial indoctrination by CONTRACTOR'S safety supervisor into CONTRACTOR'S safety procedures and the requirements of this Section.
- F. Before work begins, CONTRACTOR shall provide to OWNER a hazardous chemical inventory for contractor-supplied hazardous materials and corresponding MSDS'S. Contractors are required to inform OWNER'S Designated Representative of hazardous substances brought on Worksite and to update the hazardous chemical inventory.
 - 1. The hazardous chemical inventory, along with all update information shall be made available to OWNER'S Designated Representative on a regular scheduled basis with copies of MSDS'S as requested by OWNER.
- G. Contractors are required to strictly enforce container labeling. Labels are to include the identity of the substance and the appropriate hazard warning on all containers of hazardous substances.
 - 1. In the event that containers suspected of containing hazardous substances are received without the manufacturer's label, the shipment shall be rejected. All containers of hazardous substances shall be appropriately labeled and identified.
 - 2. If a shipment of properly labeled containers is received by CONTRACTOR without a MSDS, CONTRACTOR shall immediately request the MSDS from the manufacturer, a copy of the written request shall be submitted to OWNER'S Designated Representative.
 - a. The MSDS is not required for subsequent deliveries of the same product.

- H. Contractors are responsible for educating their personnel on the requirements of the Federal Hazard Communication Standard regarding hazardous chemical inventories, MSDS's, container labeling and evacuation procedures.
- I. Documentation of employee training is of paramount importance to ensure Federal Hazard Communication Standard compliance. CONTRACTOR shall keep complete and accurate records of CONTRACTOR personnel training and attendance. This documentation, as well as the hazardous chemical inventory and MSDS file, shall be ready for audit at any time by either OWNER'S Designated Representative or an OSHA inspector.

1.11 RECORDING AND REPORTING OF INJURIES:

- A. Every CONTRACTOR and subcontractor shall keep occupational injury and illness records for employees which shall include the following forms:
 - 1. Supplementary Record of Occupational Injuries and Illnesses or a "First Report of Injury/Illness" as required by the state.
 - 2. Log and Summary of Occupational Injuries and Illnesses.
 - 3. Any state safety and health records required.
- B. CONTRACTOR shall notify OWNER of the name of CONTRACTOR'S employee who will be knowledgeable in the prevention of accidents at the Worksite, and whose duty will be to report immediately in writing to OWNER all accidents and injuries occurring at the Worksite. If CONTRACTOR is required to file an accident report with a public authority, CONTRACTOR shall provide a copy of the report to OWNER.
- C. CONTRACTOR shall investigate each OSHA recordable accident to determine the cause and implement future corrective measures. CONTRACTOR shall present a written copy of its investigation report and corrective action measures to OWNER'S Designated Representative.
- D. Every CONTRACTOR and subcontractor shall provide the total employee hours worked each day on the Worksite to the OWNER'S Designated Representative or according to the local facility procedures.

1.12 FIRST AID AND MEDICAL ATTENTION:

- A. All first aid and medical attention for CONTRACTOR'S workers shall be handled by CONTRACTOR in accordance with OSHA regulations.
- B. CONTRACTOR shall set up a first aid station in compliance with OSHA and state regulations.

1.13 PERSONAL PROTECTIVE EQUIPMENT:

- A. CONTRACTOR is responsible for providing and requiring employees to wear appropriate personal protective equipment for all operations where there is an exposure to hazardous conditions, where there is the need for using such equipment to reduce the hazards to employees, where required by the specifications or where required by plant operating procedures. The most stringent requirements shall take precedence and shall include, but not be limited to:
 - 1. Hard hats (metal hard hats shall not be worn), safety glasses and full-length trousers are required personal protective equipment and must be worn at all times when on the Worksite. Flexible slip-on side shields are acceptable. Additional personal protective equipment such as ear plugs, goggles, conductive shoes, grounding straps, safety harness and energy-absorbing lanyard, gloves, safety nets, respirators and similar safety items may be required depending on the nature of the work area and the work involved. Safety belts are not to be used on any 3M Worksite.
 - 2. When the possibility of loose particles or flying projectiles exists, the proper safety wearing apparel and safety protection devices shall be worn. A full face shield may be allowed at the discretion of OWNER'S Designated Representative.

3. Safety shoes are recommended.
 4. Contact lens may not be worn in operating areas.
- B. CONTRACTOR shall have extra safety glasses and hard hats available on the Worksite. Safety glass cleaner shall also be made readily available to all CONTRACTOR employees on the Worksite.
- C. Before entering any area or confined space where toxic airborne contaminants (vapor) or oxygen-depleted atmospheres are possible or suspected to exist, the CONTRACTOR must ensure proper safety equipment is used, including a recovery line and backup person. Refer to Article 1.24 for confined space entry requirements.

1.14 RESPIRATORS:

- A. If required, respirators shall be provided by the CONTRACTOR for their workers and any of their subcontractors.
- B. The respirator shall be applicable and suitable for the purpose intended.
- C. CONTRACTOR shall be responsible for the establishment and maintenance of the respirator protective program and shall include the requirements as outlined below:
1. Respirators shall be selected on the basis of hazards to which the worker is exposed.
 2. The user shall be instructed and trained in the proper use of respirators and their limitations.
 3. Where practical, the respirators should be assigned to individual workers.
 4. Respirators shall be cleaned, disinfected and filters replaced as per manufacturer's recommendations.
 5. Persons should not be assigned to tasks requiring use of respirators, unless it has been determined that they are physically able to perform the work and use the equipment. CONTRACTOR'S physician shall determine what health and physical conditions are pertinent.
 6. CONTRACTOR shall contact and meet regularly with the OWNER'S Designated Representative to establish the type of respirator required, vapors, gases, dust, mists or fumes which are present and areas where respirators are required.
- D. CONTRACTOR shall pay particular attention to and comply with OSHA Code of Federal Regulations 1926.103 regarding respiratory protection for the Construction Industry.

1.15 PERSONAL CONDUCT:

- A. Horseplay, fighting, gambling, explosives, possession of firearms, drinking alcoholic beverages, use of regulated drugs, being under the influence of drugs or alcohol, theft, vandalism, sabotage and distribution of unauthorized literature shall be cause to bar those involved from the Worksite.
- B. Cameras are prohibited to protect proprietary processes. No photographs may be taken without following the local procedure.

1.16 SAFETY INSPECTION AND HOUSEKEEPING:

- A. At a minimum, CONTRACTOR shall check the work area daily at the beginning and at the end of each work shift to ensure safe working conditions are maintained and all safety procedures are followed.
- B. During the course of the work, CONTRACTOR shall be responsible for properly organizing all activities on the Worksite to the extent that good housekeeping shall be practiced at all times. This shall include, but not be limited to:
1. As the job progresses, work areas shall be kept clean at all times.

2. All materials, tools and equipment shall be stored in a stable position to prevent rolling or falling. Materials and supplies shall be kept away from edges of floors, hoistways, stairways and floor openings. When exterior walls are being built, materials and supplies shall be kept away from the perimeter of the building.
3. A safe access way to all work areas and storage areas shall be maintained. All stairways, corridors, ladders, catwalks, ramps, passageways and work platforms shall be kept clear of loose material and trash.
4. Forms and scrap lumber with protruding nails and all other debris shall be cleared from work areas, passageways, stairs and in and around buildings or other structures.
5. Combustible scrap and debris shall be removed at regular intervals. Safe means shall be provided to facilitate such removal.
6. CONTRACTOR shall supply an adequate number of dumpsters to insure a clean working area at all times. CONTRACTOR shall load and transport all refuse and debris to a suitable disposal area away from the Worksite and make disposition in a lawful manner. CONTRACTOR shall be responsible for weekly cleanup of common areas, such as parking lots and roadways.
 - a. CONTRACTOR'S parking and staging areas shall also be maintained clean and free of all debris at all times.
7. The eating areas shall be maintained in a clean and orderly condition. Garbage containers shall be placed in these areas and frequently emptied. Eating and drinking shall not be permitted in the construction work areas.
8. Contractor shall restrict the use of flammable liquids and gases to a minimum. Store all flammables not actually needed for immediate use outside building, in a secure shelter. Store flammables outside building during non-work hours. Store rags or wiping waste with oily or flammable residue away from flammable liquids in approved metal containers.
 - a. CONTRACTOR shall collect and dispose of flammable debris and dust as it is accumulated.
 - b. Storage locations for gasoline or other flammable materials used for vehicles or equipment shall be in areas agreed to by OWNER'S Designated Representative. These areas shall be diked to retain spilled material and have an appropriately placed fire extinguisher.
 - 1) Refer to Section entitled "Temporary Facilities and Controls" of this Specification regarding construction pollution control facilities.
 - c. All items must be properly labeled.
9. Cords and hoses shall be kept a minimum of 7 feet overhead or laid flat outside of walkways.
10. Tools and equipment shall not be strewn about where they might cause tripping or falling hazards and shall, at the end of each workday, be collected and stored in the toolroom or craft gang boxes.
11. Each employee shall be instructed to practice required housekeeping as part of assigned duties.

C. Housekeeping and care of the Worksite shall be in accordance with the Contract.

1.17 MATERIAL HANDLING AND STORAGE:

A. General:

1. CONTRACTOR shall be responsible for using safe methods of handling, storage and disposal of materials on the Worksite.
2. CONTRACTOR'S personnel shall observe OWNER'S safety rules and regulations for receiving, handling, storage and disposal of all materials. See Article 1.25 for proper environmental disposal procedures.

- B. Material Handling:
 - 1. Rigging equipment for material handling shall be of the proper size and rating. All rigging equipment shall be inspected by CONTRACTOR prior to use on each shift and as necessary during its use to ensure that it is safe. Defective rigging equipment shall be removed from service. All rigging equipment not in use shall be properly secured.
 - 2. Tagline shall be used for controlling loads.
 - 3. Special custom design grabs, hooks, clamps or other lifting accessories (for such units as modular panels, prefabricated structures and similar materials) shall be marked to indicate safe working loads and shall be proof tested prior to use to 125 percent of their rated load.
- C. Material Storage:
 - 1. All materials stored shall be stacked, braced, racked, blocked, interlocked or otherwise secured to prevent sliding, rolling, falling or collapse.
 - 2. Flammable material storage shall be as previously described under Article 1.16 of this Section.
 - 3. Materials stored inside buildings under construction shall not be placed within 6 feet of any hoistway or inside floor opening, nor within 10 feet of an exterior wall, which does not extend above the top of the material stored.
 - 4. Materials stored on existing structurally supported floors and roofs shall not exceed the uniform design load capacity of floor or roof.
 - 5. Materials shall be stored in a manner to provide unobstructed access to all exits.
 - 6. Storage location shall be approved by OWNER'S Designated Representative.

1.18 VERTICAL AND HORIZONTAL WORK SAFETY ACCESS CONTROL:

- A. Ladders:
 - 1. The use and erection of ladders shall comply with OSHA regulations and shall include, but not be limited to:
 - a. Each user must visually inspect each ladder for defects before using.
 - b. While ascending or descending a ladder, carry nothing which will prevent holding onto the ladder with both hands. Use a handline if necessary to raise or lower materials.
 - c. Metal ladders shall not be used.
 - d. Ladders shall be securely tied off.
 - e. When working from ladders, work facing the ladder with both feet on the rungs.
 - f. All ladders shall have appropriate shoes or footings.
 - g. Workers shall not stand on the top or second step of step ladders.
- B. Scaffolds:
 - 1. The use and erection of scaffolds shall comply with OSHA regulations and shall include, but not be limited to:
 - a. All scaffolds shall be erected on a firm base.
 - b. Never exceed safe working loads on scaffolds.
 - c. Never rig from scaffold handrails or braces.
 - d. Scaffold handrails, midrails or brace members shall not be climbed. Use ladders for access.
 - e. Appropriate hand and toe rails and cleats are required.
 - f. Since federal standards are quite detailed in their specifications for the dozens of types of scaffolds, OSHA 29 CFR Part 1926.451 must be referred to for each particular job's scaffolding requirements.
- C. Safety Harnesses:
 - 1. The use of safety harnesses shall comply with OSHA regulations and shall be used on Worksites. Safety harnesses with energy-absorbing lanyards are required to be worn and tied off when working on:
 - a. Sloping roofs.

- b. Flat roofs without handrails within 10 feet of the edge of the roof or an opening.
 - c. Open-sided floors or platforms.
 - d. Any suspended scaffolds, platforms or stages.
 - e. Any scaffold with incomplete handrails
 - f. All steel erection (first connection shall be made as defined by OSHA).
 - g. Confined spaces, such as manholes, tanks, pressure vessels and tunnels.
 - h. Generally any elevated work area that is without protection to prevent workers from falling.
2. Safety belts are not allowed on the Worksite.
- D. Openings in Floors, Walls and Stairwells:
1. The protection of unguarded openings in floors, walls and stairwells shall be in compliance with OSHA regulations.
 2. All holes or openings through floors, decking or walls at all elevations shall have properly identified hole covers or be barricaded immediately. Floor openings shall be guarded by a standard railing and toeboards or a cover. All open-sided floors or platforms, 4 feet or more above adjacent floor or ground level, shall be guarded by standard railings or the equivalent on all open sides, except where there is an entrance to a ramp, stairway or fixed ladder.
 3. Equipment or material shall not be stored on a hole cover.
 4. Covers for holes in floors, roofs and other walking/working surfaces shall meet the following requirements:
 - a. Covers located in roadways and vehicular aisles shall be capable of supporting, without failure, at least twice the maximum axle load of the largest vehicle expected to cross over the cover.
 - b. All covers shall be capable of supporting, without failure, at least twice the weight of employees, equipment and materials that may be imposed on the cover at any one time.
 - c. All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment or employees.
 - d. All covers shall be color coded or they shall be marked with the word "HOLE" or "COVER" to provide warning of the hazard.

Note: This provision does not apply to cast iron manhole covers or steel grates used on streets or roadways.

- E. Stairways, Platforms, Runways, Walkways and Ramps:
1. The fabrication and use of temporary stairways, walkways and ramps shall be in compliance with OSHA and ANSI regulations.
 2. On all structures of two or more floors, stairways, platforms, runways, walkways and ramps shall be provided for employees during the construction period.
 - a. Handrails and guardrails shall be as required by OSHA capable of withstanding a minimum force of 200 pounds in any direction.

1.19 MISCELLANEOUS PROVISIONS:

- A. General:
1. CONTRACTOR is solely responsible for CONTRACTOR equipment and goods. OWNER is not responsible for any losses by theft (or by whatever nature) of CONTRACTOR'S property.
 2. Loose clothing, rings and other jewelry shall not be worn around operating tools or machines. Keep sleeves buttoned.
- B. Illumination:
1. CONTRACTOR shall ensure that construction areas, aisles, stairs, ramps, runways, corridors, offices, shops and storage areas where work is in progress shall be adequately

lighted with either natural or artificial illumination. Refer to OSHA Standards for illuminated light levels in all work areas.

- C. Hand and Power Tools:
 - 1. All hand and power tools and similar equipment, whether furnished by CONTRACTOR or CONTRACTOR employees, shall be maintained in a safe operating condition. Damaged tools shall be immediately repaired or replaced. Tools shall be used only for the purpose for which they were designed.
 - 2. Any tools that are designed to have guards must have those guards in place at all times. Any worker removing a guard or using an unguarded tool shall be subject to dismissal from the Worksite.
 - 3. Grinders are particularly hazardous. Workers shall be trained in their use. While the grinders are rotating, the operator shall assure that he/she is in a balanced position and that the momentum of the disc will carry the tool away from the operator if it becomes stuck.

- D. Sanitation:
 - 1. CONTRACTOR shall furnish an adequate supply of potable water, waste containers and disposable cups to CONTRACTOR employees for drinking water.
 - 2. CONTRACTOR shall furnish adequate toilet facilities for CONTRACTOR employees. All portable toilets shall be kept clean, sanitary and located in an easily accessible area. If they are to be used at night, the area shall be well lighted.
 - 3. Refer to Section entitled "Temporary Facilities and Controls" of this Specification for additional requirements regarding water and toilet availability.
 - 4. State and federal requirements shall be met.

1.20 SIGNS, SIGNALS AND BARRICADES:

- A. The fabrication and use of barricades and handrails shall be in compliance with OWNER'S safety rules and with OSHA and ANSI regulations. Special attention shall be given by CONTRACTOR to the following items:
 - 1. To protect workers from injury, CONTRACTOR shall construct removable replaceable handrails, temporary barricades or secured covers for all openings in the roof and floors, open trenches in the roof and floor, open trenches crossing roads and pedestrian walkways and open manholes in accordance with all applicable safety regulations. Such handrails, barricades and covers may be removed only when removal is necessary for the performance of work near the opening, trench or manhole. They shall be replaced when any of the following occur:
 - a. The workers take a break and leave the area; or
 - b. The work is not completed by the end of the working day; or
 - c. As soon as their absence is no longer necessary for the performance of the work.
 - 2. When such handrails, barricades or covers are removed by CONTRACTOR or any subcontractor, they shall be replaced or rebuilt as necessary by CONTRACTOR or subcontractor who removed them.
 - 3. CONTRACTOR shall post areas where it is necessary to do overhead work.

- B. CONTRACTOR shall be responsible for posting, installing and maintaining signs, signals and barricades to detour the passage of persons or vehicles at all locations where potential hazards exist.

- C. CONTRACTOR'S employees shall obey all signs, signals and barricades, which are posted to warn of potential or existing hazards.

- D. Barricades shall be 42 inches high, square and level. Barricade shall be kept 4 feet back from the edge excavations, trenches, holes, platforms and roofs.

- E. The selection and use of signs and tags shall be in conformance with the appropriate ANSI standard.

1. CONTRACTOR shall be responsible for attaching danger tags to a piece of equipment (or part of a structure) to warn of potential or immediate hazards.
- F. Flag persons must wear red or blaze orange vests. Flags must be of color and size meeting OSHA standards. Refer to Article 1.9 for crane and hoist signals.

1.21 EXCAVATIONS AND TRENCHING:

- A. The sides of all excavations and trenches must be properly sloped, shored or sheeted before entering according to OSHA regulations and shall be capable of withstanding all soil pressures, including stresses which can be exerted by water, heavy loads or vibrations.
1. Shoring and sheeting procedures shall be reviewed by CONTRACTOR'S Designated Representative before work begins.
 2. Shoring and sheeting shall be removed after trenching installation work has been fully completed.
 3. CONTRACTOR may use OSHA approved movable steel plate trench boxes or shields during trenching work.
- B. Location of all underground structures or utilities shall be verified before digging begins and CONTRACTOR shall take all necessary precautions to prevent any hazard from developing. In the event any underground structure is encountered, CONTRACTOR shall provide proper support to the structure as required to maintain its integrity and stability.
1. Refer to Section entitled "Summary of the Work" of this Specification for additional requirements regarding underground structures.
- C. All excavations and trenches must have safe accessways and be properly barricaded. Barricades with flashing lights are required at night. Excavated material may be used to barricade one side of the excavation or trench. The edge of the excavated material shall be at least 2 feet from the edge of the excavation or trench. Excavated material must be piled at least 3 feet high when used as a barricade.
- D. Check for soil erosion and stability of all excavation walls before entering and after a heavy rain or thaw. Check shoring and sheeting daily or more often in extremely wet weather for stability and for accumulation of water. Checking shall be done by a person who is competent and knowledgeable for this type of work.
1. Workers will not be permitted in trenches or excavations until accumulated water has been totally removed.
- E. The area shall be cleared and approved by CONTRACTOR'S Designated Representative prior to the start of excavation. Refer to Article 1.4 for work within an existing building or operating area.
- F. Workers will not be permitted in trenches or excavations while equipment is being used next to the edge.
- G. The use of explosives will not be allowed at any time, unless written approval from OWNER'S Designated Representative is first obtained.

1.22 CONCRETE, CONCRETE FORMS AND SHORING:

- A. All equipment and materials used in concrete construction and masonry work shall be as required by OSHA and also the applicable ANSI standard. Wall shoring shall also be designed to meet applicable federal and state codes.
- B. Form work and shoring shall be designed, erected, supported, braced and maintained so that it will safely support all vertical and lateral loads that may be imposed upon it during placement of concrete.
- C. Structural calculations regarding strength and stability of form work and shoring shall be made available to OWNER'S Designated Representative upon request.

- D. Forms shall not be removed until the concrete can support its own weight and any superimposed load.

1.23 STEEL ERECTION:

- A. The erection of new structural steel and removal of structural steel from existing structures shall comply with OSHA regulations. CONTRACTOR shall also comply with OWNER'S safety regulations regarding welding, cutting and spark production when work encompasses any existing facility equipment or structures, including the posting of area(s) where it is necessary to do overhead work.
- B. During the placing of solid structural members, the load shall not be released from the hoisting line or lifting equipment until the members are secured with not less than two bolts (or the equivalent) at each connection and drawn up wrench tight.
 - 1. Taglines shall be used for controlling loads.
- C. CONTRACTOR shall provide and maintain all necessary temporary guying, bracing, falsework, cribbing or other elements required of steel frame to resist safely all wind or seismic forces and construction loads during erection.
- D. All partially erected structural steel shall be braced or secured in an approved manner during interruptions of work or at the end of the working day.
- E. Loads shall not be placed on structural supports until members are positively secured from movement or accidental displacement.

1.24 CONFINED SPACE ENTRY:

- A. Definition:
 - 1. A confined or enclosed space is defined as a special configuration that could result in any of the following:
 - a. Atmospheric condition - a condition in which a dangerous air contamination, oxygen deficiency <19.5 percent or oxygen enrichment >23.5 percent may exist or develop, except where state law requires otherwise.
 - b. Entry/Exit access - a condition where the emergency removal of a suddenly disabled person is difficult due to the location or size of the access opening.
 - c. Engulfment condition - a condition where the risk of engulfment exists or could develop.
 - 2. Entry into a confined space such as, but not limited to, tanks, silos, storage bins, hoppers, vaults, pits, diked areas, sewers, manholes or any other confined space with limited openings for entry or exit, unfavorable natural ventilation or not designed for continuous work occupancy.
 - 3. Confined or enclosed space entry means any action resulting in any part of the worker's face breaking the plane of any opening of the confined space, and includes any ensuing work activities inside the confined space.
- B. General:
 - 1. Entry into a confined space shall require a "Confined Space Entry Permit" issued by the facility designated person at the request of the OWNER'S Designated Representative before work begins. Refer to Article 1.4 for permit requirements. Refer also to Articles 1.13 and 1.14 for personal protective equipment requirements.
 - 2. CONTRACTOR shall provide proper barriers with appropriate warning signs and lighting for night-time visibility must be provided around uncovered manholes. Stacked up equipment or poorly braced rails are not adequate.
 - 3. No underground space shall be entered until tested and found free of dangerous atmospheres, such as flammable or explosive mixtures, toxic/hazardous vapors or oxygen deficiency. Manholes shall be tested through a hole in their cover. If there is no hole, the

cover should be raised only far enough to clear the test probe. Potentially hazardous mixtures are usually heavier than air, so additional testing at the bottom of the space should be done once the cover is raised.

4. All water must be pumped out. Where seepage is unavoidable, a pump must be kept running rather than waiting for a build-up. Rubber footwear shall be worn in damp or wet locations.
5. An adequate supply of oxygen (minimum 19.5 percent) shall be maintained using positive pressure. One person shall remain outside the confined space.
6. A safety harness with retrieval line attached shall be worn by the person or persons working in the confined space. Provide and have in place equipment for retrieval.
7. Access ladders shall be free of defects and shall not be made of metal.
8. Access ladders must extend three feet above the top step-off surface.

C. Electrical:

1. Refer to Article 1.7 for required safety precautions during any work activity in a confined space where energized electrical cable and grounding cable is present.

1.25 ENVIRONMENTAL REQUIREMENTS:

A. Contractor Supplied Materials:

1. CONTRACTOR shall provide the OWNER'S Designated Representative with a MSDS for all hazardous and/or toxic material before they are brought on site. All hazardous and/or toxic material brought on site must be approved by OWNER'S facility management or an appointed alternate.
2. All containers must be properly labeled and kept sealed when not in use.
3. Chemicals that are environmentally safe and compatible are to be used whenever possible.
4. Portable tanks (if capacity exceeds 110 gallons each) brought on site must have secondary containment.

B. Ozone Depleting Chemicals:

1. The following ozone depleting chemicals shall not be used at 3M facilities, including use in cleaning equipment parts:

CFC-11

(CAS #75-69-4)

Fluorocarbon 11

Fluorotrichloromethane

Trichlorofluoromethane

Freon 11

Trichloromonfluoromethane

CFC-12

(CAS #75-71-8)

Dichlorodifluoromethane

F-12

FC-12

Fluorocarbon 12

Freon 12

CFC-113

(CAS #76-13-1)

FC-113

Freon 113

1, 1, 2-Trichloro-1, 2, 2-tetrafluoroethane

1, 2, 2-Trichlorotrifluoroethane

CFC-114

(CAS #76-14-2)

1, 2-Dichloro-1, 1,2-tetrafluoroethane

FC-114
Freon 114
Sym-Dichlorotetrafluoroethane
CFC-115
(CAS #76-15-3)
Chloropentafluoroethane
Fluorocarbon 115
Freon 115
Carbon tetrachloride
(CAS #56-23-5)
Tetrachloromethane
Perchloromethane
Methyl Chloroform
(CAS #71-55-6)
1, 1, 1-Trichloroethane
Chloroethene

2. Refrigeration and air conditioning equipment containing CFCs may continue to be used until feasible substitutes exist. However, when such equipment is disposed of or replaced, the CFCs should be collected for reclamation or proper disposal.
 3. CONTRACTOR shall notify OWNER'S Designated Representative for packaging and disposal requirements.
 4. CONTRACTOR is responsible for ensuring employees handling CFCs are trained and certified.
- C. Permits and Notifications:
1. All required environmental permits and notifications must be in hand before installation, modification, or operation of equipment or process begins.
- D. Polychlorinated Biphenyls (PCBs):
1. Polychlorinated Biphenyls (PCBs) and PCB-containing equipment shall not be used at or installed in 3M facilities and equipment.
 2. All PCB light ballasts and capacitors removed from equipment at a 3M facility remain the property of 3M.
- E. Spills:
1. CONTRACTOR shall notify the OWNER'S Designated Representative for instructions on all waste management issues, including packaging and disposal.
 2. CONTRACTOR shall take steps necessary to minimize the risk of releases of any fuel, oils, solvents, paints and other liquids. This includes releases to the ground, surface waters, sewers and/or atmosphere.
 3. CONTRACTOR must report spills immediately to the OWNER'S Designated Representative or site security.
- F. Waste Management:
1. CONTRACTOR is responsible for ensuring their employees are trained and certified.
 2. CONTRACTOR shall maintain good housekeeping procedures.
 3. CONTRACTOR shall notify OWNER'S Designated Representative for instructions on all waste management issues including packaging and disposal. CONTRACTOR shall comply with applicable federal, state and local regulatory requirements, laws and ordinances.
 4. Waste may not be discharged to the sewer without prior approval from OWNER.
 5. No materials used on site may be left on site without prior approval from OWNER.
 6. Refer to the "3M Compactor/Dumpster Procedure" in Part 4 for additional waste management requirements.
- G. Asbestos:

1. Asbestos-containing material (ACM) will not be installed in any 3M facility or equipment.
2. Only CONTRACTORS trained and licensed in asbestos removal techniques may remove or otherwise disturb ACM.
3. CONTRACTOR must contact the OWNER'S Designated Representative prior to beginning work in an area to identify the presence or absence of ACM. No work may be conducted that may potentially disturb ACM. If work in an area has already begun, the CONTRACTOR is to stop work and contact the OWNER'S Designated Representative to verify any question as to the presence of asbestos in any material to be disturbed.

H. Lead:

1. CONTRACTOR must contact the OWNER'S Designated Representative prior to beginning work in an area to identify the presence or absence of lead in painted, coated or other suspected materials that may be disturbed during the course of work.
2. CONTRACTOR must comply with the federal, state and local regulations related to construction activities involving lead-containing materials.

2.0 PART 2 - NOT APPLICABLE

3.0 PART 3 - NOT APPLICABLE

4.0 PART 4 - RELATED DOCUMENTS

4.1 ATTACHMENTS:

- A. Refer to Appendices (Table of Contents) for sample copies and are hereby incorporated and made part of this Section:
- 3M Daily Work Permit (Form 38194)
 - Open-Flame and Spark Hazard Permit (Form 4345)
 - Confined Space Entry Permit (Form 5669)
 - 3M Compactor/Dumpster Procedure
 - Contractor Representative Safety Walk-Through Checklist (Form 37832)

SECTION 02102

CLEARING AND GRUBBING

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Perform all clearing and grubbing Work as shown on Drawings and herein specified.
- C. Work shall include the removal and disposal of all trees, shrubs, brush, stumps, roots, windfalls and other plant life, including dead and decayed matter that exist within the construction areas and which are not specifically designated to remain.
 - 1. Pruning, shearing and trimming of trees, shrubs and bushes are not a part of Work of this Section.
- D. Related Work Specified Elsewhere:
 - 1. Site Grading: Section 02210
 - 2. Waste Material Disposal: Section 02227
 - 3. Erosion and Sedimentation Controls: Section 02374

2.0 PART 2 - PRODUCTS - NOT APPLICABLE

3.0 PART 3 - EXECUTION

3.1 PROTECTIVE REQUIREMENTS:

- A. General:
 - 1. Mark and protect that which is to remain as indicated on Drawings and as indicated by OWNER'S Designated Representative. Conduct all clearing and grubbing operations in a manner that will not damage or jeopardize the surrounding plant life and property.
 - 2. Protection shall consist of binding guard timbers to the trunks of trees and fencing to protect the branches and root systems.
- B. Penalty:
 - 1. Plant life designated to remain and which has been damaged, as a result of Work under this Contract shall be replaced by CONTRACTOR at their expense. Replaced plant life shall be OWNER approved and guaranteed for at least one (1) full growing season.
 - 2. Large trees designated to remain that have been damaged by CONTRACTOR that cannot be replaced in equal size shall result in a credit to OWNER. This Contract shall be reduced by an amount equal to two hundred fifty dollars (\$250.00) per inch of circumference measured 24 inches above the ground surface.

3.2 CLEARING:

- A. Cut and remove the trees, shrubs, brush, bushes, windfalls and other vegetation within the construction area. All brush shall be cut-off within 6 inches of the ground surface.

3.3 GRUBBING:

- A. Remove stumps, roots and all other plant life remains within the construction area. Unless otherwise noted, stumps shall be removed completely. If any stumps are noted on Drawings to remain, they shall be cut off not more than 6 inches above the ground, and flush with or below ground surface if so directed.
- B. Except in areas to be excavated, all depressions resulting from the grubbing operations shall be backfilled with suitable material and compacted to the requirements of the area involved.

3.4 DISPOSAL:

- A. Disposal of all waste material herein specified shall be in accordance with Section 02227 of this Specification.
- B. Unless otherwise permitted, timber, stumps, roots and other debris or by-products resulting from the clearing and grubbing operations shall be removed from Work Site. Burning and/or burying will only be permitted when local regulations allow this method and written permission is obtained from OWNER.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 02110

DEMOLITION

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Perform all demolition Work as shown on Drawings and herein specified.
 - 1. Work herein shall include, but may not be necessarily limited to the following:
 - a. Remove existing sidewalks, exterior concrete slabs, curb and gutter, or portions thereof where indicated or required.
 - b. Remove storm sewer piping, catch basins and other miscellaneous drain line items where indicated or required.
 - c. Remove existing bituminous pavement and other roadway materials where indicated or required.
 - d. Remove existing fencing and boundary markers.
 - e. All shrubbery and trees, including grubbing of roots, where indicated or required shall be removed, salvaged and relocated as directed by OWNER.
- C. OWNER assumes no responsibility for the conditions of any existing Work on Worksite. CONTRACTOR shall accept the premises as they find them and do all demolition Work to complete the Work.
- D. Related Work Specified Elsewhere:
 - 1. Shrub and Tree Removal: Section 02102

1.2 QUALITY ASSURANCE:

- A. Requirements of Regulatory Agencies:
 - 1. It is CONTRACTOR'S responsibility to comply with the requirements of all federal, state and local regulatory agencies, including OSHA, for the removal and disposal of all existing hazardous materials, such as asbestos fireproofing, required under this Specification. CONTRACTOR shall have complete knowledge in the art of removal, storage and disposal of hazardous (asbestos) materials as required by state or local authorities and shall also obtain and pay for all required permits.
 - a. CONTRACTOR bidding on the above Work shall have been accepted and approved by OWNER before any Work has been started.
 - 2. CONTRACTOR shall refer to Section 01900 of this Specification for safety requirements regarding the handling, storage and disposal of all materials.
- B. Permits:
 - 1. CONTRACTOR shall obtain and pay for all permits.

1.3 SUBMITTALS:

- A. CONTRACTOR'S Demolition Schedule:
 - 1. CONTRACTOR shall submit proposed methods and operations of demolition to OWNER'S Designated Representative for review prior to start of Work. Include in

schedule coordination for shut-off, capping and continuation of utility services as required.

2. Schedule shall also indicate a detailed sequence of demolition and removal Work to ensure uninterrupted progress of OWNER'S on-site operations.
3. Provide a detailed proposal or outline for protecting OWNER'S operations with a system of temporary partitions or enclosures.

2.0 PART 2 - NOT APPLICABLE

3.0 PART 3 - EXECUTION

3.1 PROTECTIVE REQUIREMENTS:

- A. CONTRACTOR shall take precaution to protect OWNER'S property from damage during demolition Work, moving of debris and from damage by the elements. Any damages to OWNER'S property due to the aforesaid Work shall be restored or replaced by CONTRACTOR at their expense and in a manner satisfactory to OWNER.
- B. CONTRACTOR shall provide and maintain suitable barricades, shelters, lights and danger signals during the progress of the Work. They shall meet the requirements of state and/or local building codes. CONTRACTOR shall assume full responsibility of barriers to completion of contract and shall remove same.
- C. During remodeling Work, special precautions must be taken not to disrupt operations or interrupt services in other occupied portions of the building any more than absolutely necessary and then only with the full knowledge and consent of OWNER. Any unavoidable service interruption shall be scheduled with OWNER so as to occur at a time which will least interfere with their operations. All junctures between occupied areas and areas undergoing remodeling shall be properly and adequately sealed off to prevent dirt infiltration into occupied area. Where Work must necessarily be done in occupied spaces, it shall be accomplished as quickly as possible and all tools and debris shall be removed immediately thereafter.

3.2 CONDUCT OF THE WORK:

- A. All Work shall be conducted with a minimum of noise, dust and dirt. CONTRACTOR shall exercise extreme care in demolition. Work in existing building must be scheduled with OWNER and shall not commence without OWNER'S consent. Materials and equipment noted or specified to be reused or salvaged shall not be damaged or defaced in any way. Any damages resulting thereto shall be the sole responsibility of CONTRACTOR and all repairs will be made at their expense.
 1. Remove all Work carefully and only to the extent required for the final Work. Remove all loose or damaged material, caused by demolition and as noted or specified to be removed.
 2. Structural steel removal and reworking shall be accomplished in a manner that will not
 3. The use of pneumatic hammers for demolition and cutting purposes within the existing building will not be permitted unless written permission is first obtained from OWNER.
- B. Existing Work shall be cut, altered, removed or temporarily removed and replaced, as necessary for the performance of the Contract. If removal of existing Work exposes Work out of alignment, such surfaces shall be refinished or the materials shall be replaced as necessary to make contiguous Work uniform and harmonious. In areas disturbed by the new construction Work and in areas noted on Drawings to be remodeled, all damaged building materials and finishes shall be removed and be replaced with new Work. All damaged masonry, plaster, gypsum (drywall) wallboard and similar finishes or surfaces shall be repaired or removed and replaced as necessary

to provide a workmanlike completed project (refer to the various specification sections for specific remodeling instructions). Work remaining in place that is damaged or defaced by reason of Work done under this Contract shall be restored equal to its condition at time of award of Contract. New Work, which is an extension of existing Work, shall correspond in all respects with that to which it connects or to similar existing Work, unless otherwise indicated or specified.

1. Existing structure to remain shall be supported with shoring, braces and devices or system as approved by OWNER, to prevent collapse, settling or other damage. Supports shall be adequate for load carried and shall bear on sound surfaces with load properly distributed to lower levels, if necessary. Supports shall be removed in a manner that will insure the complete safety of the structure.
- C. All furnishings and built-in equipment, which are removed during demolition, and are not noted to be reused, shall remain the property of OWNER and shall be carefully removed and stored where directed on Worksite by OWNER. All materials noted to be reused shall be carefully removed and stored on Worksite until reinstalled.
1. OWNER will remove and reset all items of furniture and movable equipment occurring in remodeled area. CONTRACTOR shall remove and reset, or shall properly protect, all items of fixed or built-in equipment in these same areas. CONTRACTOR shall confer with OWNER sufficiently in advance before any demolition or remodeling Work so that adequate time (minimum of 48 hours) is available in which to remove existing equipment.

3.3 DISPOSITION OF MATERIALS:

- A. All materials and equipment to be reused in the Work shall be stored on Worksite in locations as directed by OWNER.
- B. All materials and equipment salvaged for OWNER shall be stored in locations designated by OWNER.
- C. All shrubbery and trees designated to be relocated shall be removed and replaced in one operation.
- D. All other materials or debris resulting from demolition operations shall become the property of CONTRACTOR and shall be removed from the Work area daily. No accumulation of debris will be permitted. Wood and flammable debris resulting from demolition operations shall not be burned on Worksite.
- E. In areas where OWNER may restrict the use of corridors, elevators, exits and the like, debris shall be removed from the building by loading debris in wheeled containers, wheel barrows or similar equipment and/or lowering debris in container, through enclosed chutes or by CONTRACTOR'S hoist. Debris shall not drop free of restraining devices for a distance greater than 10 feet.
 1. Debris transported through finished spaces of existing building shall be on rubber-tired trucks or dollies and shall be properly covered to minimize spread of dust.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 02210
SITE GRADING
PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Perform all site grading as shown on Drawings and as herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Quality Control: Section 01710
 - 2. Trenching, Backfilling and Compacting: Section 02221
 - 3. Waste Material Disposal: Section 02227
 - 4. Soil Compaction Control: Section 02230
 - 5. Turf Establishment: Section 02820
- D. CONTRACTOR shall refer to Bid Form and Section 01220- Unit Prices, for description of unit prices required under this Section.

1.2 QUALITY ASSURANCE:

- A. Grade and Alignment Tolerances:
 - 1. CONTRACTOR shall check the Work during the grading progress with devices satisfactory to OWNER. The completed subgrade shall conform to Drawings with the following tolerances:

	<u>HORIZONTAL MEASURE+</u>	<u>VERTICAL MEASURE</u>
		±
Cut and fill slopes(general grading):	1.0'	0.10'
Ditch bottom:	0.5'	0.10'
Cut and fill areas in roadbeds and railroad beds:	0.2'	0.05'
Cut and fill areas in buildings:	---	0.05'
Cut and fill areas in aprons, yards, etc.:	0.2'	0.05'

- 2. Where appropriate, the above tolerances, with OWNER'S express written approval, may be exceeded if drainage is maintained and the grade is relatively uniform. In all cases the areas shall drain.

- B. Soil Selection and Inspection:
 - 1. Soil selection and inspection by OWNER'S Designated Representative and/or a Soils Technician, hired and paid for by OWNER, will be conducted as required during the earthwork operations, to assure compliance with this Specification. Pocketed and stratified soils are to be excavated by soil classification and placed as designated by OWNER.

- C. Testing by CONTRACTOR:
1. CONTRACTOR shall submit to OWNER results of testing by OWNER approved laboratory of all materials furnished by CONTRACTOR from other than OWNER'S properties. CONTRACTOR shall pay for these tests.
 - a. Refer to Section 01710 of this Specification for quality control and basis of payment.
 2. Before delivery of top soil material, furnish a soil analysis made by and approved soil testing laboratory, stating the percentages of silt, sand and organic matter, the pH and the mineral and plant nutrient content of the soil for OWNER'S approval.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Topsoil Material:
1. The top layer of variable depth of soil that has been modified by weathering which is designated as either "A" or "B" horizons. The "A" horizon is identified as the original top layer of soil having the same color and texture throughout its depth containing organic and vegetable matter. The "B" horizon is identified as the transition between the "A" and "C" horizons containing colloidal material and may be the top layer if erosion of the "A" horizon has occurred.

- B. Topsoil Borrow Material:
1. Topsoil shall be obtained from "A" or "B" soil horizons or from alluvial deposits. Texture of topsoil shall be according to the engineering definition of particle size, and its final composition shall be within the following limitations: Not less than 90 percent passing the Number 10 sieve, one inch maximum particle size.

	<u>MINIMUM PERCENT</u>	<u>MAXIMUM PERCENT</u>
Clay	10	40
Silt	14	64
Sand	12	60

2. Texture shall be determined by method prescribed in AASHTO T88.
3. The topsoil shall meet the nutrient values set forth below:

<u>TEST</u>	<u>MINIMUM PERCENT</u>	<u>MAXIMUM PERCENT</u>
Organic Matter:	3.3	15.0
Extractable Phosphorus:	13 lb./Ac.	
Exchangeable Potassium:	110 lb./Ac.	
PH:	6.0	7.5

- C. Unsuitable Material:
1. All saturated and unsaturated mixtures of soil which include organic and/or inorganic matter, such as humus, spongy matter, roots, stumps, muck and peat or rubbish and other objectionable materials designated by OWNER as not suitable for foundation material, regardless of moisture content.

- D. Suitable Material:
1. All earth materials except topsoil, rock, boulders and unsuitable materials.

- E. Borrow Material:
1. Suitable material approved by OWNER having a plasticity index of 8 or less.

- F. Granular Fill Material:
1. Granular fill material using either onsite material or material from offsite borrow pits shall be pit-run or crusher-run material conforming to the following requirements:

- a. Maximum dry density (ASTM D1557) of the material passing the Number 4 sieve shall be not less than 105 pounds per cubic foot.
- b. Material to be within the following gradation limits:

<u>SIEVE SIZE</u>	<u>TOTAL PERCENT PASSING</u>
3 inches	100
2 inches	80 - 100
1 inch	75 - 100
No. 10	25 - 75
No. 40	15 - 50
No. 100	5 - 15
- c. Deviations from the density or gradation requirement may be granted, by OWNER, if requested in writing, and if the qualities of the construction are not reduced. Deviations from the requirements for the borrow granular fill shall only be allowed upon receipt of written permission from OWNER.

G. Definition of Rock:

- 1. All boulders and rocks measuring 1 cubic yard or more.
- 2. Dolomite, granite, trap, quartzite, limestone, hard sandstone, slate, or other hard material, in natural ledges 6 inches or more in thickness or displaced masses which, in the opinion of OWNER, are not practical to excavate and remove by use of:
 - a. Dozer or dozer ripper shall be equipped with at least 200 engine horsepower.
 - b. Backhoe or shovel with bucket capacity of not less than 1-1/2 cubic yard.
 - c. Non-power operated hand tools; (but does require line drilling, blasting, presplitting, rock wedging, jack hammering and/or the use of other power tools).
- 3. A rock ledge shall be considered to be a continuous deposit of any one of the above materials which may or may not include interbedded seams of soft material that can be measured for thickness either horizontally or vertically. If the vertical thickness of soft material between layers is less than 12 inches, then this material shall be included and measured as rock excavation. If the horizontal thickness of soft material between rock pinnacles measures less than 30 inches, then this material shall be included and measured as rock excavation.

H. Surface Removal:

- 1. All surfacing in areas of construction as shown on Drawings shall be removed. Waste, concrete, bituminous, wood and similar items shall be removed from Worksite. All suitable materials, such as crushed rock and topsoil, shall be stockpiled on Worksite where directed by OWNER'S Designated Representative.

3.0 PART 3 - EXECUTION

3.1 PREPARATION:

A. Topsoil Stripping:

- 1. All topsoil in the areas of construction as shown on Drawings shall be stripped. OWNER'S Designated Representative will determine the actual depth of topsoil to be stripped; however, in no case shall the depth of stripping be less than 6 inches. The topsoil shall be stockpiled for later use where shown on Drawings or where designated by OWNER'S Designated Representative.
 - a. Disposal of excess topsoil shall be as specified in Section 02227 of this Specification.

B. Scarifying Filled Areas:

- 1. After topsoil and unsatisfactory materials have been removed from the surface upon which the fill is to be placed, and if OWNER'S Designated Representative deems it necessary, the surface shall then be plowed or scarified to a depth of at least 4 inches or

until the surface is free from ruts, hummocks, or other uneven features which would tend to prevent uniform compaction by the equipment to be used.

2. Where the embankment is made on a hillside or slope, the ground upon which the fill is to be placed, shall be plowed or scarified deeply. Where the slope ratio of the ground is steeper than five to one (5:1) horizontal to vertical, the bank shall be stepped or benched.

C. Compacting Filled Areas:

1. After the area for the embankment has been cleared and plowed or scarified, it shall be disced or bladed until it is uniform and free from large clods, brought to the proper moisture content, and compacted to a density equal to or greater than the density requirements for the proposed embankment as specified in Section 02230 of this Specification.

3.2 EXCAVATION:

A. General Excavation:

1. General excavation shall include all materials of every nature and description, encountered in obtaining lines and grades shown on Drawings.
2. All excavations shall be made to the proper depth with the proper allowance made for under slab base, pavement, topsoil and similar items.
3. All suitable materials removed from the excavation, if any, shall be used as far as practicable in the formation of the embankment, shoulders, slopes and other areas stockpiled for reuse as designated by OWNER.
4. CONTRACTOR shall, at their own expense, form all dams, construct temporary ditches, provide pumps or do whatever other Work is necessary during the progress of the Work to keep the excavation area clear of or to remove all surface and perched water which accumulates in the excavation areas.
5. All unsuitable material encountered in excavation or embankment areas where some type of loading will be superimposed, either under this Contract or in the future, as shown on Drawings shall be removed.
6. In the prosecution of the Work, when it is necessary to interrupt existing surface drainage, sewers, or underdrainage, CONTRACTOR shall provide and maintain temporary drainage facilities until permanent facilities are completed.
7. The subgrade in cuts within areas where some type of loading will be superimposed, whether under this Contract or in the future, as shown on Drawings shall be proof rolled so that the top 8 inches shall have a density as specified in Section 02230 of this Specification.
8. Disposal of unsuitable materials and excess materials shall be as directed by OWNER'S Designated Representative.
 - a. Refer to Section 02227 of this Specification for additional requirements.

B. Rock Excavation:

1. Rock occurring in excavation shall be uncovered by CONTRACTOR and measured by OWNER before its removal by CONTRACTOR. Any rock removed before OWNER'S inspection and measurements shall be construed as general excavation and CONTRACTOR cannot obtain additional compensation for its removal. The bottom of the rock excavation shall be as shown on Drawings or as specified in other sections. The volume in cubic yards will be computed by the method of average end areas.
2. All Work with explosives shall have prior OWNER approval in writing and shall be done by competent personnel in such a manner as not to endanger life or property. All storage places for explosives and inflammable materials shall be clearly marked DANGEROUS. The method of storing and handling explosives, including inflammable materials, shall conform to all federal, state and local laws, by-laws and regulations.

3.3 EMBANKMENT:

A. Fill Materials:

1. The fill materials shall consist of suitable and/or granular onsite or borrow materials free from organic matter and other deleterious substances. When more than one soil type is available on Worksite, the type and types exhibiting the better structural characteristics shall be used in embankment areas where some type of loading will be superimposed, whether under this Contract or in the future, as shown on Drawings. Fill shall not contain stones or fragmentary rock measured in their greatest dimension larger than the following sizes:

<u>FILL LOCATION</u>	UPPER 36 INCHES OF <u>FILL(INCHES)</u>	BELOW THE UPPER 36 INCHES OF <u>FILL(INCHES)</u>
Under building areas:		
	2	6
Under roads, pavements, parking lots, railroads, walks and storage yards:	2	*12
Under grassed areas:	6	*12

(*May be exceeded if approved in writing by OWNER.)

B. Construction:

1. The selected fill material shall be placed in horizontal layers which, when loose, shall not exceed 8 inches. Each layer shall be spread evenly and shall be thoroughly blade mixed during the spreading to obtain uniformity of material in each layer. Each layer shall be compacted to a density not less than the percentage of maximum dry density as specified in Section 02230 of this Specification.
2. Embankment construction shall start at the lowest plane and progress upward.
3. When the fill material includes stones, no large stones shall be allowed to nest and all voids must be carefully filled with small stones or earth and properly compacted.
4. If necessary, the material shall be brought to the proper moisture content as determined by the Soils Technician by either aerating the material if it is too wet and if weather conditions permit or spraying or sprinkling with water if it is too dry. Each lift shall be mixed thoroughly if drying or wetting is required to insure uniform distribution of the moisture.

C. Seasonal Limits:

1. No frozen fill material shall be placed, spread or rolled in the embankment nor shall any fill material be placed on frozen ground or during unfavorable weather conditions. When Work is interrupted by unfavorable weather conditions, fill operations shall not be resumed until the Soils Technician indicates that the moisture content and density of the previously placed fill are as specified.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 02220

FOUNDATION EXCAVATING AND BACKFILLING

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Perform all foundation excavating and backfilling as shown on Drawings and as herein specified.
- C. Refer to Geotechnical Engineering Report (No. N3175057) titled "3M Warehouse Building" by Terracon Consultants, Inc., dated 11/03/2017, for subsurface exploration and geotechnical recommendations. Follow recommendations contained in this report.
- D. Related Work Specified Elsewhere:
 - 1. Quality Control: Section 01710
 - 2. Site Grading: Section 02210
 - 3. Trenching, Backfilling and Compacting: Section 02221
 - 4. Waste Material Disposal: Section 02227
 - 5. Soil Compaction Control: Section 02230
 - 6. Erosion and Sedimentation Controls: Section 02374
- E. CONTRACTOR shall refer to Bid Form and Section 01220 - Unit Prices, for description of unit prices required under this Section.

1.2 QUALITY ASSURANCE:

- A. Inspection and Testing:
 - 1. Inspection and testing by OWNER'S Designated Representative and/or a Soils Technician, hired and paid for by OWNER, will be conducted as required during the excavation and backfill operations, to assure compliance with this Specification.
 - a. Refer to Section 01710 of this Specification for basis of payment for retesting.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. General:
 - 1. Unless otherwise indicated, the following materials, including the definition of rock, shall conform to the minimum requirements of Section 02210 of this Specification:
 - a. Topsoil material.
 - b. Unsuitable material.
 - c. Suitable material.
 - d. Granular fill material.
 - e. Rock material.
- B. Under Slab Material:
 - 1. Under slab base shall consist of pit-run or crushed granular material conforming to the following gradation:

<u>SIEVE SIZE</u>	<u>TOTAL PERCENT PASSING</u>
2 inches	100
No. 10	40 - 100
No. 200	2 - 10

3.0 PART 3 - EXECUTION

3.1 EXCAVATION:

A. General Excavation:

1. CONTRACTOR shall excavate all materials of every nature and description encountered in obtaining lines and grades shown on Drawings, except rock as defined in Section 02210 of this Specification.
2. If satisfactory load bearing soil is not reached at the depths indicated, the excavation shall be carried deeper to satisfactory soil as determined by OWNER. CONTRACTOR shall backfill same to plan elevation with granular fill compacted to a density as specified in Section 02230 of this Specification. Any OWNER approved depth greater than indicated on Drawings will be paid for by OWNER on a unit price basis (refer to Section 01220 of this Specification) or, if no unit price has been requested, extra compensation shall be allowed as described in the Construction Contract. If the excavation in satisfactory soil is carried beyond the elevation shown or beyond OWNER approved depth, CONTRACTOR shall backfill same as noted above at no cost to OWNER.
3. All excavations shall be cleaned, leveled and trimmed as required for the installation of concrete and in general, this Work shall be done just before the concrete is placed. Bottoms shall be free from debris and water when concrete is placed.

B. Rock Excavation:

1. Rock occurring in excavation shall be uncovered by CONTRACTOR and measured by OWNER before its removal by CONTRACTOR. Any rock removed before OWNER'S inspection and measurements shall be construed as general excavation and CONTRACTOR cannot obtain additional compensation for its removal.
2. Rock occurring in excavation for footings, columns, piers, foundation walls of structure and any other miscellaneous foundation found either inside or outside of building shall be measured at a width to permit a clearance of 12 inches for installation and removal of forms. If no forms are used, the rock excavation width shall be measured at the face of concrete structure. If greater widths are required to construct the structure, CONTRACTOR shall obtain OWNER approval in writing prior to the Work being done. The volume in cubic yards will be computed by the method of average end areas.

C. Dewatering:

1. CONTRACTOR shall form all dams or perform other Work necessary for keeping the excavation clear of water during the progress of the Work and, at their own expense, shall pump or otherwise remove all surface and perched water which accumulates in the trenches. Perched water that cannot be dewatered in 48 hours of continuous pumping at a minimum rate of 60 gpm in dry weather shall be considered ground water. Water weeping out of permeable soil lenses after the initial removal of water from the excavation in 48 hours or less is considered to be perched water.

3.2 BACKFILL:

- A. After concrete has properly cured and forms, lumber and construction debris have been removed from around the foundations, and dampproofing, insulation or other preparatory Work has been performed, CONTRACTOR shall backfill in 6 inch layers to the designated subgrade with suitable or granular fill as applicable material free from clods and lumps. Each layer shall be

mechanically compacted to a density as specified in Section 02230 of this Specification and in such a manner as to prevent wedging action or eccentric loading against foundations.

- B. CONTRACTOR shall exercise extreme care with foundation insulation (Refer to Section 07210 of this Specification) so that insulation is not gouged, punctured or displaced during backfilling operations. Any insulation damaged as result of Work under this Section will be replaced by this CONTRACTOR without cost to OWNER.

3.3 UNDER SLAB FILL:

- A. The under slab fill for concrete slabs/floors on grade shall consist of under slab base material at least 12 inches in depth and compacted to a density as specified in Section 02230 of this Specification.
- B. When the natural soil is granular and meets the requirements of under slab base and when the bottom elevation of the floor slab is in a cut section, then the subgrade for floor slab can be considered directly below the concrete. At least 12 inches of this type of subgrade shall be proof rolled to a density as specified in Section 02230 of this Specification.
- C. Grading or placing of under slab fill shall allow for placement of under slab insulation (Refer to Section 07210 of this Specification).

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

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SECTION 02221

TRENCHING, BACKFILLING AND COMPACTING

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Perform all trenching, backfilling and compacting for underground utilities as shown on Drawings and as herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Quality Control: Section 01710
 - 2. Waste Material Disposal: Section 02227
 - 3. Erosion and Sedimentation Controls: Section 02374
 - 4. Storm Sewer: Section 02520
- D. Abbreviations and/or References:
 - 1. The following organization reference shall be interpreted to mean:
 - a. ASTM - The American Society of Testing Materials, latest edition.
 - 2. The following piping references shall be interpreted to mean:
 - a. HDPE - high density polyethylene pipe.
 - b. RCP – reinforced concrete pipe.
 - c. PVC - polyvinyl chloride pipe.
 - d. DIP - ductile iron pipe.
- E. CONTRACTOR shall refer to Bid Form and Section 01220 - Unit Prices, for description of unit prices required under this Section.

1.2 QUALITY ASSURANCE:

- A. Inspection and Testing:
 - 1. Inspection and testing by OWNER'S Designated Representative and/or a Soils Technician, hired and paid for by OWNER, will be conducted as required during the trenching and backfill operations, to assure compliance with this Specification.
 - a. Refer to Section 01710 of this Specification for basis of payment for retesting.
- B. Requirements of Regulatory Agencies:
 - 1. It shall be CONTRACTOR'S responsibility and duty to be familiar with federal, state and local and rules and regulations relating to this type of Work and they shall assume the responsibility for compliance therewith.
 - 2. All permits required for Work under this Section shall be obtained and paid for by CONTRACTOR.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. General:

1. Unless otherwise indicated, soil materials shall conform to the minimum requirements of Section 02210 of this Specification.
- B. Topsoil Material:
1. The top layer of variable depth of soil consisting of vegetable matter, organic and inorganic soil. The color is usually darker than the subsoil.
- C. Unsuitable Materials:
1. All saturated and unsaturated mixtures of soil, which include organic and/or inorganic matter such as humus, spongy matter, roots, stumps, muck and peat or rubbish and other objectionable materials designated by OWNER as not suitable for foundation material regardless of moisture content.
 - a. Foundation material is defined as material either in place or in embankment areas that will have some type of loading superimposed upon it under this Contract or in the future as shown on Drawings.
 2. When installing pipe or conduit the following materials classified under the unified soil classification system are not to be use for bedding, haunching, or initial backfill:
 - a. Inorganic silts (MH).
 - b. Inorganic silts, elastic (ML).
 - c. Inorganic clays of high plasticity (CH).
 - d. Inorganic clays of low to high plasticity (CL).
 - e. Organic silts and organic silt clays (OL).
 - f. Organic clays of medium to high plasticity (OH).
 - g. Peat and other highly organic soils.
 - h. Frozen earth, debris and rocks larger than 3/4 inch (20 mm).
- D. Suitable Materials:
1. All earth materials except topsoil, rock and unsuitable materials.
- E. Definition of Rock:
1. All boulders and rocks measuring 1 cubic yard or more.
 2. Dolomite, granite, trap, quartzite, limestone, hard sandstone, slate, or other hard material, in natural ledges 6 inches or more in thickness, or displaced masses which, in the opinion of OWNER, is not practical to excavate and remove by use of:
 - a. Dozer or dozer ripper shall be equipped with at least 200 engine horsepower.
 - b. Backhoe or shovel with bucket capacity of not less than 1-1/2 cubic yards.
 - c. Non-power operated hand tools (but does require line drilling, blasting, presplitting, rock wedging, jack hammering and/or the use of other power tools).
 3. A rock ledge shall be considered to be a continuous deposit of any one of the above materials which may or may not include interbedded seams of soft material that can be measured for thickness either horizontally or vertically. If the vertical thickness of soft material between layers is less than 12 inches, then this material shall be included and measured as rock excavation. If the horizontal thickness of soft material between rock pinnacles measures less than 30 inches, then this material shall be included and measured as rock excavation.
- F. Granular Material:
1. Granular material fill around pipe, conduit, cable or concrete duct shall conform to the following:
- | <u>SIEVE SIZE</u> | <u>TOTAL PERCENT PASSING</u> |
|-------------------|------------------------------|
| No. 4 | 100 |
| No. 40 | 5 - 50 |
| No. 200 | 0 - 10* |
- *The fraction passing the No. 200 sieve shall not be more than 50 percent of the fraction passing the No. 40 sieve. The plasticity index shall be less than 5.

- G. Underground Utility Warning Tapes:
1. Underground (buried) utility warning tapes shall consist of a 3 inch wide, color coded, plastic ribbon with message repeated every 24 inches along its entire length as manufactured by Emed Company, Inc., Buffalo, New York (phone: 800/442-3633) or OWNER approved equal. Color coding and messages shall consist of the following:
 - a. Water mains - Blue - Caution Buried Water Line Below
 - b. Sewer lines - Green - Caution Buried Sewer Line Below
 - c. Electric lines - Red - Caution Buried Electric Line Below
 - d. Gas piping - Yellow - Caution Buried Gas Line Below
 - e. Oil piping - Yellow - Caution Buried Pipeline Below

3.0 PART 3 - EXECUTION

3.1 TRENCHING:

- A. General Excavation:
1. Excavation shall be made to the alignment and depth shown on Drawings and limited to not more than 100 feet in advance of pipe, conduit, cable or concrete duct laying, unless otherwise authorized by OWNER'S Designated Representative. All excavations shall be made by the open cut method unless otherwise approved by OWNER or shown on Drawings. The banks of trenches shall be so cut to meet the requirements of federal, state and local codes and regulations.
 2. Where the pipe, conduit, cable or concrete duct is to be within a controlled fill area, that portion of the controlled fill up to 24 inches above the pipe, conduit, cable or concrete duct shall be in place before trenching is begun.
- B. Rock Excavation:
1. Rock occurring in excavation shall be uncovered by CONTRACTOR and measured by OWNER before its removal by CONTRACTOR. Any rock removed before OWNER'S inspection and measurements shall be construed as general excavation and CONTRACTOR cannot obtain additional compensation for its removal. Rock occurring in excavation for pipe, conduit, cable or concrete duct Work shall be measured at its actual width but not more than 24 inches greater than the outside diameter of the pipe, conduit, cable or concrete duct. Rock occurring in excavation for manholes and other construction shall be measured to include 12-inch clearance from the outside face of the structure. The bottom of the rock excavation shall be 6 inches below the bottom of the pipe, conduit, cable or concrete duct. The volume in cubic yards will be computed by the method of average end areas.
 2. All Work with explosives shall have prior OWNER approval in writing and shall be done by competent personnel in such a manner as not to endanger life or property. All storage places for explosives and inflammable materials shall be clearly marked DANGEROUS. The method of storing and handling explosives, including inflammable materials, shall conform to all federal, state and local codes, laws, by-laws and regulations.
- C. Trench Width:
1. The minimum width of unsheeted trench shall be 18 inches, and for pipe 10 inches or larger, at least 12 inches greater than the nominal diameter of the pipe or conduit. The maximum clear width of trench at the top of the pipe or conduit shall be not more than 24 inches greater than the outside diameter of the pipe, conduit, cable or concrete duct.
 2. Wherever, for any reason, the maximum trench width is exceeded, the sewer pipe shall be supported on a concrete cradle 6 inches in depth below the bottom of the pipe and extend 1/4 the diameter up from the bottom. The cradle shall have a width at least 8 inches greater than the outside diameter of the pipe barrel. Concrete shall conform to the requirements of the concrete specifications in applicable sections.

3. Pavements of all types shall be cut with a saw or other equipment in order to provide a straight edge for replacement.
 4. Excavation for manholes, diversion boxes, catch basins and similar items shall be sufficient to permit the carrying out of the construction as required.
- D. Correcting Faulty Grade:
1. Wherever the excavation is carried below the plan grade and the bottom is considered to be in good soil as determined by the OWNER'S Designated Representative, CONTRACTOR shall, at their own expense, refill all over excavated space with suitable material and compact as hereinafter specified in Article 3.5 of this Section (refer to paragraph entitled "Backfill at Pipe, Conduit, Cable and Concrete Duct Zone").
- E. Dewatering:
1. CONTRACTOR shall form all dams or perform other Work necessary for keeping the excavation clear of water during the progress of the Work and, at their own expense, shall pump or otherwise remove all surface and perched water which accumulates in the trenches. Perched water that cannot be dewatered in 48 hours of continuous pumping at a minimum rate of 60 gallons per minute (GPM) in dry weather shall be considered ground water. Water weeping out of permeable soil lenses after the initial removal of water from the trench in 48 hours or less is considered to be perched water. All openings along the line of sewer, conduit or concrete duct shall be securely closed with suitable stoppers to prevent earth or other substances from entering the sewer, conduit or concrete duct at any time.
 - a. If dewatering is required to lower the static level of ground water it will be paid for by OWNER on a unit price basis per hour as extra compensation and shall be allowed as described in the Construction Contract.
- F. Disposal of Waste Materials:
1. Any material found in the excavation as determined by OWNER'S Designated Representative to be unsuitable for backfill shall be separated from the suitable material.
 - a. Refer to Section 02227 of this Specification for disposal of unsuitable and excess suitable materials.
 - b. Disposal of unsuitable material shall be on the Worksite as directed by OWNER'S Designated Representative.

3.2 SHORING AND SHEETING:

- A. Shoring, sheeting, bracing and similar items as may be required to support the side of the excavation and to prevent any movement which may in any way endanger personnel or injure or delay the Work or endanger adjacent buildings or other structures shall be put in place and maintained by CONTRACTOR at their own expense. Where sheeting and bracing are used, the trench width shall be of such width to allow proper placement of the pipe, conduit, cable or concrete duct and backfill. Bedding requirements shall be increased when the maximum trench width is exceeded as previously specified under Article 3.1 of this Section (refer to paragraph entitled "Trench Width"). Trench sheeting shall remain in place until pipe, conduit, cable or concrete duct has been laid, tested for defects, repaired if necessary, and the earth around it compacted to a depth of 12 inches over the top of the pipe, conduit, cable or concrete duct. Steel sheeting and bracing shall be removed in such manner as not to endanger the constructed sewer, conduit, concrete duct, structures, utilities or property, whether public or private.
- B. Where wood sheeting or wood skeleton sheeting is driven alongside the pipe it shall be cut off and left in place to an elevation 18 inches above the top of the pipe, conduit, cable, or concrete duct.
- C. If removal of the skeleton sheeting might cause a collapse of the trench wall and/or a widening of the trench at the top of the pipe, conduit, cable, or concrete duct the skeleton sheeting system may be left in place.

- D. A trench shield or trench box made of steel or wood and adequately braced may be used. This shield shall be pulled along in the trench and the pipe, conduit, cable, or concrete duct bedded and jointed inside the box. Care shall be exercised in moving the shield so that the previously laid pipe, conduit, cable, or concrete duct and backfill is not disturbed.

3.3 PIPE, CONDUIT, CABLE OR CONCRETE DUCT FOUNDATION:

A. In Good Soil:

1. The trench shall have a bottom conforming to the grade to which the pipe, conduit, cable, or concrete duct is to be laid. Machine excavation shall be halted above the invert grade and final excavation shall be done by hand. The bottom of the excavation shall have a cradle shaped to the outside of the pipe, conduit, cable, or concrete duct with minimum width equal to 1/2 the outside diameter of the pipe, conduit, cable or concrete duct. The pipe or conduit cable, or concrete duct shall be laid upon sound soil cut true and even, including excavation for joints, so that the barrel of the pipe, conduit, cable, or concrete duct will have a bearing for its full length.
2. Where pipe or conduit is HDPE or PVC the trench shall be excavated 4 inches below the invert grade and backfilled with granular material as previously specified under Article 2.1 of this Section and compacted to a density not less than 85 percent of maximum dry density as defined by ASTM D1557 (Modified Proctor).

B. In Poor Soil:

1. If wet, soft or unstable soil, incapable of properly supporting the pipe, conduit, cable, concrete duct or structures, is encountered in the trench as determined by OWNER'S Designated Representative, CONTRACTOR shall excavate to a depth set by OWNER below the pipe, conduit, cable, concrete duct or structure bottom to remove these unsuitable materials.
2. CONTRACTOR shall then backfill in 8-inch layers with crushed rock to the elevation allowed for machine excavation. The backfill shall be compacted to a density not less than 95 percent of maximum dry density as defined by ASTM D1557 (Modified Proctor). Such Work will be paid for by OWNER on a unit price basis (refer to Section 01220 of this Specification) or if no unit price has been requested, extra compensation shall be allowed as described in the Construction Contract. The pipe, conduit, cable or concrete duct shall then be bedded as previously specified in paragraph A above.

C. In Rock or Other Incompressible Materials:

1. Rock, boulders, hard pan and large stones shall be removed to provide a clearance of at least 6 inches below the outside barrel of the pipe, conduit, cable or concrete duct, valves or fittings. Provide a clear width of 6 inches on each side of all pipe, conduit, cable or concrete duct and appurtenances for pipe, conduit, cable or concrete duct 15 inches or less in diameter. Provide a clear width of 9 inches on each side of all pipe, conduit, cable or concrete duct and appurtenances for pipe, conduit, cable or concrete duct larger than 15 inches in diameter. Adequate clearance for properly jointing pipe, conduit, cable or concrete duct laid in rock trenches shall be provided. The space between the rock at the bottom of the trench and the bottom of the pipe, conduit, cable or concrete duct barrel and joint shall be filled with granular material and thoroughly compacted.
2. That part of the trench extended to a point 12 inches above the top of the pipe, conduit, cable or concrete duct shall be backfilled with granular material, free of deleterious matter carefully placed and tamped.
3. The providing of granular material is considered incidental and no additional compensation will be made by OWNER for this incidental Work.

3.4 BACKFILLING AND COMPACTING:

A. Backfill at Pipe, Conduit, Cable and Concrete Duct Zone:

1. Unless otherwise indicated on Drawings, selected suitable material backfill free from rock, frozen material, large clods of earth, broken concrete, boulders, chunks of wood and similar items, shall be deposited on both sides of the pipe, conduit, cable and concrete duct simultaneously by hand and to the full width of the trench. The backfill material shall be moistened if necessary, tamped in 4 inch layers either by hand or with mechanical tampers under and on each side of the pipe, conduit, cable and concrete duct to an elevation of at least 12 inches above the top of the barrels of the pipe, conduit, cable and concrete duct to a density not less than 85 percent of maximum dry density as defined by ASTM D1557 (Modified Proctor).
2. Where pipe or conduit is HDPE or PVC backfill material shall be granular type as previously specified under Article 2.1 of this Section, tamped in 4 inch layers by hand to at least 24 inches above the top of the barrel of the pipe or conduit.

B. Backfill Above Pipe, Conduit, Cable and Concrete Duct Zone:

1. General Area:
 - a. After the pipe, conduit, cable and concrete duct has been properly embedded, the remainder of the backfill shall be done in lifts of uniform layers not to exceed the depth shown in the compaction chart (refer to clause f hereinafter) and each lift shall be completely compacted over the full width of the excavated area.
 - b. The backfill material shall be suitable material free from pieces of rock, concrete or clay lumps more than 1 cubic foot in volume, roots, stumps, rubbish, frozen material and other similar articles whose presence in the backfill would cause excessive settlement. The material shall be compacted to a density at least equal to that of the surrounding soil.
 - c. Pipe, conduit, cable and concrete duct shall be covered with at least 36 inches of backfill material before a vibratory or sheepsfoot roller is operated over the pipe. For HDPE or PVC pipe or conduit provide at least 30 inches of cover before the trench is wheel loaded and at least 48 inches of cover before using a hydro hammer.
 - d. Special compaction shall be done around all manholes, hydrants, catch basins, valve boxes, curb boxes, end of sewer services, other structures, and utilities using pneumatic tampers, plate tampers, or plate vibrators with lifts not to exceed that shown in the compaction chart.
 - e. If CONTRACTOR elects to backfill the entire trench with granular material when the native soil is heavy clay or other hard-to-work soil materials, the granular backfill shall terminate 24 inches from the final grade and then the top 24 inches backfilled with the native soil to create a seal on the trench. The seal shall be eliminated for trenches inside buildings or when the trench crosses roadways, parking lots, rail spurs or other areas to be structurally loaded. For these areas, the granular backfill shall be placed full depth and compacted as hereinafter specified in subparagraph 2 of this paragraph.

f. Compaction Chart:

<u>Compactor Type</u>	<u>Maximum Loose Soil Lift Height In Feet</u>	
	<u>Granular Soil</u>	<u>Plastic Soil</u>
Vibratory Roller(Vibro-Plus CK-10) or equal:	4.0	Not allowed
Sheepsfoot(150 psi Minimum)	Not allowed	2.0
Vibratory Sheepsfoot (Essick VF-54T) or equal:	2.0	2.0
Button Head Pneumatic	0.5	0.5
Plate Tamper	1.0	1.0
Plate Vibrator	1.0	Not allowed

2. Surfaced Areas:

- a. Any open trenches under or across roadways, parking lots, truck dock areas or other areas to be paved shall be backfilled as previously specified in subparagraph 1 of this paragraph, except that the entire depth of trench shall be backfilled in 8 inch layers. The backfill shall be compacted to a density of not less than 90 percent of the maximum dry density as defined by ASTM 1557 except that the upper 6 inches shall be compacted to a density of not less than 95 percent of maximum dry density. This shall be done in such a manner as to permit the rolling and compaction of the filled trench together with the adjoining soil to provide the required bearing value so that paving or surfacing of the area can proceed shortly after backfilling is completed.
 - C. Moisture Content:
 - 1. CONTRACTOR shall either dry the material or add water to the backfill material so that the densities required can be attained.
 - 2. Settling of backfill by means of water flooding will not be permitted.
 - D. Improper Backfilling:
 - 1. Where there is evidence of improper backfilling, trenches shall be reopened to the depth required for proper compaction and backfilled as specified herein.
- 3.5 PROTECTION OF EXISTING UTILITIES:
- A. General:
 - 1. All existing utilities and structures shall be protected from damage during excavation and backfilling of trenches. If any existing utilities are damaged during construction, the damage shall be properly repaired by CONTRACTOR at their expense.
 - B. Underground Utility Warning Tapes:
 - 1. During backfilling of trenches, furnish and install underground warning tapes over underground utility piping, conduit, cable or concrete duct lines buried approximately 12 inches below finish grade.
- 3.6 RESTORATION OF SURFACE:
- A. Unless otherwise noted on Drawings, CONTRACTOR shall restore to original condition all surfaces disturbed from site drainage and/or utility construction under this Contract.
- 4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE
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SECTION 02227

WASTE MATERIAL DISPOSAL

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Dispose of all waste and excess materials as shown on Drawings and as herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Clearing and Grubbing: Section 02102
 - 2. Demolition: Section 02110
 - 3. Demolition or Wrecking of Structures: Section 02115
 - 4. Site Grading: Section 02210
 - 5. Foundation Excavation and Backfilling: Section 02220
 - 6. Trenching, Backfilling and Compaction: Section 02221
 - 7. Asphalt Concrete Paving: Section 02612
 - 8. Landscaping: Section 02800
 - 9. Turf Establishment: Section 02820

1.2 QUALITY ASSURANCE:

- A. Requirements of Regulatory Agencies:
 - 1. It is CONTRACTOR'S responsibility to comply with the requirements of all regulatory agencies for the disposal of materials on or off Worksite.
- B. Permits:
 - 1. CONTRACTOR shall obtain and pay for all permits required for the disposal of materials.
 - 2. OWNER will obtain and pay for all permits required for the disposal of materials.
 - 3. CONTRACTOR shall obtain and pay for all permits required for the disposal of materials except the following which OWNER will obtain and pay for:
 - a. Burning permit.
 - b. Dumping or disposal permit.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. General:
 - 1. Unless specified otherwise, soil materials shall conform to Section 02210 of this Specification.
- B. Unsuitable Materials:
 - 1. All saturated and unsaturated mixtures of soil which include organic and/or inorganic matter such as humus, spongy matter, roots, stumps, muck and peat or rubbish and other objectionable materials designated by OWNER as not suitable for foundation material regardless of moisture content. Foundation material is defined as material either in place

or in embankment areas that will have some type of loading superimposed upon it under this Contract or in the future as shown on Drawings.

2. Inert construction debris such as, but not limited to defective construction materials on Worksite, overruns and trimmings of construction materials, including asphaltic concrete, portland cement concrete, wood, brick, block, and similar items and cleanings from construction equipment.
- C. Rock Materials:
1. All boulders and ledge rock excavated to obtain the desired lines and grades shown on Drawings
- D. Excess Topsoil Materials:
1. Topsoil remaining in stockpile after the topsoiling requirements are met and completed.
- E. Excess Suitable Materials:
1. All surplus earth materials except topsoil, rock and unsuitable materials after excavation embankment and backfilling requirements are fully met.

3.0 PART 3 - EXECUTION

3.1 DISPOSAL OF MATERIALS:

- A. Unsuitable Materials:
1. CONTRACTOR shall remove and dispose of all unsuitable materials [such as broken concrete, pipe, conduit and bituminous scrap, wood, paper and similar items] from OWNER'S property.
 2. Remove all unsuitable materials from Worksite and dispose at a location designated on Drawings or by OWNER'S Designated Representative.
 3. Bury or place in fill on Worksite as shown on Drawings.
 4. Flammable portions may be burned on Worksite if permitted by regulatory agencies.
- B. Excess Topsoil Material:
1. CONTRACTOR shall remove and dispose of all surplus topsoil from OWNER'S property.
 2. Stockpile on Worksite as shown on Drawings. Grade pile with rounded breaks in grades and with sides to slopes not to exceed 4 horizontal to one vertical. Stockpile to be included in area to be seeded.
 3. Use in non-structural fills only where indicated on Drawings.
- C. Rock Material:
1. CONTRACTOR shall remove and dispose of all rock from OWNER'S property.
 2. Use for rip-rap, wall or erosion control construction as shown on Drawings.
 3. Stockpile on Worksite as [shown on Drawings or as directed by OWNER'S Designated Representative].
- D. Excess Suitable Material:
1. CONTRACTOR shall remove and dispose of all surplus suitable material from OWNER'S property.
 2. Remove all excess suitable material to a disposal area on Worksite where directed by OWNER'S Designated Representative.
 3. Place in embankments as shown on Drawings. Compact as specified in Section 02230 of this Specification.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 02230

SOIL COMPACTION CONTROL

PROJECT I.D. 0093940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Compact soils and granular materials as shown on Drawings and as herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Quality Control: Section 01710
 - 2. Site Grading: Section 02210
- D. Abbreviations and/or References:
 - 1. The following organization reference shall be interpreted to mean:
 - a. ASTM - The American Society of Testing Materials, latest edition.
 - b. AASHTO - American Association of State Highway and Transportation Officials standard applicable specifications, latest edition.
- E. Compaction Equipment:
 - 1. Compaction equipment shall be of a size and type permitting efficient compaction of the subgrade and/or base layer.
 - 2. Compaction performed over or immediately adjacent to culverts, walls, columns, structures and miscellaneous foundations shall be accomplished by compacting with hand tampers or by hand-operated mechanical tampers.

1.2 QUALITY ASSURANCE:

- A. Inspection and Testing:
 - 1. Inspection and testing by OWNER'S Designated Representative and/or a Soils Technician, hired and paid for by OWNER, will be conducted as required during soil compaction operations, to assure compliance with this Specification.
 - a. Refer to Section 01710 of this Specification for quality control requirements.
- B. Failed Tests:
 - 1. When tests indicate that the density of any layer or portion thereof is not within the requirements of this Specification, the particular layer or portion shall be reworked until the required results have been obtained.
 - a. Refer to Section 01710 of this Specification for basis of payment for retesting.

1.3 MINIMUM DENSITIES:

- A. Compaction shall meet the requirements of ASTM D1557 or AASHTO test T180 for densities measured by the Modified Proctor Method. Densities of at least the following minimum percentages shall be obtained for:
 - 1. Subgrade in excavation (cut areas):
 - a. Top 8 inches under paved areas, buildings and railroads: 95 percent
 - b. Top 8 inches in storage yard areas: 90 percent

	c. Grassed areas:	Not Required
2.	Subgrade in embankment (fill areas):	
	a. Fill under buildings:	95 percent
	b. Fill under paved areas and railroads (within upper 2 feet):	95 percent
	c. Fill under paved areas and railroads (below upper 2 feet):	90 percent
	d. Fill under grassed areas:	85 percent
3.	Granular backfill for additional excavation under foundations:	100 percent
4.	Aggregate base:	
	a. Aggregate base under building floor slabs and paved areas:	95 percent

2.0 PARTS 2 THROUGH 4 - NOT APPLICABLE

SECTION 02374

EROSION AND SEDIMENTATION CONTROL

PROJECT I.D. 0083940

1.1 PART 1 – GENERAL

1.1 KPDES (KENTUCKY GENERAL PERMIT) REQUIREMENTS

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. General. Sedimentation and erosion control requirements as per this specification, and in Kentucky Division of Water “Kentucky Pollution Discharge Elimination System General Permit
- C. 3M Center Utility Plant, Cynthiana, Kentucky Plant Permit
- D. KPDES Requirements:
 - 1. No land disturbing construction activity shall commence until permit is effective.
 - 2. Termination of Coverage: Within 30 days after one or more of the following:
 - a. Final stabilization has been achieved on all portions of the site for which the Permittee is responsible (including the removal of all temporary measures such as silt fence.
 - b. Another owner/operator (Permittee) has assumed control over all areas of the site that have not been finally stabilized.
 - 3. CONTRACTOR shall conform to the Project’s “Stormwater Pollution Prevention Plan” (SWPPP) as described later in this section.
 - 4. Record Retention.
 - a. The SWPPP, all changes to it, and inspections and maintenance records shall be kept at the site during construction by the Permittee who has operational control of that portion of the site. The SWPPP can be kept in either the field office or in an on site vehicle.
 - b. OWNER will keep the SWPPP, along with the following additional records, on file for three years after submittal of the Notice of Discontinuation.
 - 1) Any other permits required for the project.
 - 2) Records of all inspection and maintenance conducted during construction.
 - 3) All permanent operation and maintenance agreements that have been implemented, including all right of way, contracts, covenants and other binding requirements regarding perpetual maintenance.
 - 4) All required calculations for design of the temporary and permanent storm water management systems.
- E. STORM WATER POLLUTION PREVENTION PLAN (SWPPP)
 - 1. Provisions of SWPPP are included in the Drawings and specifications, no separate SWPPP exists for the project. Description of Construction Activity: Project involves the removal of the existing site fencing to accommodate a new building with loading dock and fire lanes. The fence will be relocated to encompass the building, and new fire lanes and connect to the existing site fence.
 - 2. Responsibilities:
 - a. SWPPP Overseer (responsible for overseeing the implementation of the SWPPP, and the installation, inspection and maintenance of the erosion prevention and sediment control BMPs before and during construction):

Name: TO BE PROVIDED

- b. Long term operation and maintenance of the permanent storm water management system:

3M Center Facilities Management

- c. Chain of responsibility with all operators on the site to ensure that the SWPPP will be implemented and stay in effect until the construction project is complete, the entire site has undergone final stabilization, and a Notice of Discontinuation has been submitted to the Kentucky Division of Water:

Names: TO BE PROVIDED

3. KPDES (Storm Water Discharge Design) Requirements:
- a. Temporary Sediment Basins. Less than ten acres of disturbed soil will drain to a common location; therefore, no temporary sediment basin will be provided.
 - b. Permanent Stormwater Management System:
 - 1) The project's ultimate development replaces vegetation and/or other pervious surfaces with less than one acre of cumulative impervious surface. There is an existing swale that collects the runoff from the proposed pavement and building roof.
4. KPDES (Construction Activity) Requirements:
- a. Construction activity requirements are described later in this section.
5. Discharges:
- a. Special Waters. No portion of the project drain to a discharge point within 2000 feet of a "special water" as defined in the permit.
 - b. Discharging To Wetlands. No portion of the project drains to wetlands.
 - c. Other Discharges.
 - 1) The project discharge will not affect endangered or threatened species or critical habitat.
 - 2) The project discharge will not affect historic places or archaeological sites.
6. Narrative describing the timing for installation of all erosion prevention and sediment control BMPs is provided later in this section.
7. SWPPP Requirements:
- a. Location and type of all temporary and permanent erosion prevention and sediment control BMPs along with procedures to be used to establish additional temporary BMPs as necessary for the site conditions during construction:
 - 1) The procedure used to establish temporary BMPs as necessary for the site conditions during construction is described later in this section.
 - 2) All surface waters and existing wetlands within one-half mile from the project boundaries, which will receive storm water runoff from the construction site, during or after construction.
8. Amending SWPPP
- a. CONTRACTOR shall amend the SWPPP as necessary to include additional requirements, such as additional or modified BMPs, designed to correct problems identified or address situations whenever:
 - 1) There is a change in design, construction, operation, maintenance, weather or seasonal conditions that has a significant effect on the discharge of pollutants to surface waters or underground waters.
 - 2) Inspections or investigations by site operators, local, state or federal officials indicate the SWPPP is not effective in eliminating or

- significantly minimizing the discharge of pollutants to surface waters or underground waters or that the discharges are causing water quality standard exceedances.
- 3) The SWPPP is not achieving the general objectives of controlling pollutants in storm water discharges associated with construction activity, or the SWPPP is not consistent with the terms and conditions of this permit.
9. Surface and Groundwater Standards
- a. There are no karst areas with site area and no additional measures as necessary to assure compliance with surface and ground water standards to ensure protection of drinking water supply management areas.
10. Impaired Waters
- a. Runoff from the site does not discharges to an impaired water which has an approved TMDL implementation plan containing requirements for construction storm water discharges.
11. Applicability Criteria
- a. If the Kentucky Division of Water Commissioner determines that storm water discharges associated with a construction activity are contributing to a violation of a water quality standard or would be more appropriately regulated by an individual permit, the Kentucky Division of Water Commissioner may require the OWNER to be covered by an individual storm water discharge permit. The Kentucky Division of Water Commissioner may require the owner to develop and implement specific BMPs and monitor the discharge from the site. If applicable, upon issuance of an individual permit, this general permit would no longer apply.
- b. If the terms and conditions of this general permit cannot be met, OWNER may request an individual permit, in accordance with State of Kentucky.
12. Response
- a. The SWPPP, including all certificates, reports, records, or other information required by this permit, must be made available to federal, state, and local officials within three hours upon request for the duration of the permit and for three years following the Notice of Discontinuation. This does not include any records after submittal of the Notice of Discontinuation.
13. Prohibitions
- a. Kentucky General Permit prohibits discharges of any material other than storm water, and discharges from dewatering or basin draining activities. For example, prohibited discharges include but are not limited to vehicle and equipment washing, maintenance spills, wash water, and discharges of oil and other hazardous substances.
14. Transfer Of Ownership Or Control
- a. This permit may not be assigned or transferred by the permit holder except when transfer occurs in accordance with the applicable requirements of the permit.
15. Civil and Criminal Liability
- a. Nothing in Kentucky General Permit must be construed to relieve the Permittees from civil or criminal penalties for noncompliance with the terms and conditions provided herein. Nothing in the permit must be construed to preclude the initiation of any legal action or relieve the Permittees from any responsibilities, liabilities, or penalties to which the Permittees is or may be subject. The Permittees are not liable for permit requirements for activities occurring on those portions of a site where another party has submitted a subdivision short form registration or a Notice of Discontinuation has been issued by the Kentucky Division of Water except for responsibilities listed as applicable.
16. Severability

- a. The provisions Kentucky General Permit are severable. If any provision of this permit, or the application of any provision of this permit to any circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this permit must not be affected thereby.
17. KPDES Rule Standard Conditions
 - a. The Permittees must comply with the provisions of Kentucky Division of Water General Permit No. 2. The permit does not require the submittal of a data monitoring report unless notified by the DNR.
 18. Inspection And Entry
 - a. The Permittees shall allow representatives of the State or City or any member, employee or agent thereof, when authorized by it, upon presentation of credentials, to enter upon any property, public or private, for the purpose of obtaining information or examination of records or conducting surveys or investigations.

2.1 MATERIALS

- A. See KYTC Section 827.
- B. Mulch: Per KYTC Section 827.05, Wood Cellulose Fiber.
- C. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons. KYTC Section 827.04.
- D. Silt Fence Fabric: KYTC Section 827.08 for Standard Machine Sliced or Heavy Duty type. Preassembled silt fence is not allowed. Follow DOT standards.
- E. Erosion Control Blankets: Per KYTC Section 827.07 for all slopes 8:1-4:1 or greater.
- F. Turf Reinforcement Mats: Per KYTC Section 827.07 for Slope greater than 3:1 and at pipe outlets.
- G. Outlet or Channel Scour Mat: Per KYTC Specification Section 4169.10 Section F for storm sewer outlet locations and within stormwater management pond and swale areas.
- H. Storm Drain Inlet Protection: Filter Bag insert or approved equivalent. Silt fence wrapped on casting or silt fence or strawbales surrounding catchbasin or manhole will not be allowed.
- I. Sediment Log: Per KYTC Section 827 Type Straw, Wood or Compost Sediment Log.

11.1 EROSION AND SEDIMENT CONTROL MEASURES INSTALLATION AND KPDES REQUIREMENTS

- A. General
 1. CONTRACTOR, as co-permittee must implement the BMP's identified in the SWPPP and in the permit and must be installed in an appropriate and functional manner.
- B. Erosion Prevention Practices
 1. CONTRACTOR shall plan for and implement appropriate construction phasing, vegetative buffer strips, horizontal slope grading, and other construction practices that minimize erosion, so that the inspection and maintenance requirements are complied with.
 2. The location of areas not to be disturbed shall be delineated (e.g. with flags, stakes, signs, silt fence etc.) on the development site before work begins.
 3. All exposed soil areas with a continuous positive slope within 200 lineal feet of a surface water, must have temporary erosion protection or permanent cover for the exposed soil areas year round, according to the following table of slopes and time frames. These areas include constructed storm water management pond side slopes, and any exposed soil

areas with a positive slope to a storm water conveyance system, such as a curb and gutter system, storm sewer inlet, temporary or permanent drainage ditch or other natural or man made systems that discharge to a surface water. Temporary stockpiles without significant silt, clay or organic components (e.g., clean aggregate stockpiles, demolition concrete stockpiles, sand stockpiles) are exempt from this requirement but must comply with Subparagraph C.5 below. "Time" refers to maximum time area can remain open when the area is not actively being worked on.

<u>Type of Slope</u>	<u>Time</u>
Steeper than 3:1	7 days
10:1 to 3:1	14 days
Flatter than 10:1	21 days

4. The normal wetted perimeter of any temporary or permanent drainage ditch that drains water from the construction site, or diverts water around the site, must be stabilized within 200 lineal feet from the property edge, or from the point of discharge to any surface water. Stabilization must be completed within 24 hours of connecting to a surface water.
5. Pipe outlets must be provided with temporary or permanent energy dissipation within 24 hours of connection to a surface water.

C. Sediment Control Practices

1. Sediment control practices must minimize sediment from entering surface waters, including curb and gutter systems and storm sewer inlets:
 - a. Temporary or permanent drainage ditches and sediment basins that are constructed as part of a treatment system (e.g., ditches with rock check dams) require sediment control practices only as appropriate for site conditions.
 - b. If the down gradient treatment system is overloaded, additional upgradient sediment control practices must be installed to eliminate the overloading, and the SWPPP must be amended to identify these additional practices.
 - c. In order to maintain sheet flow and minimize rills and/or gullies, there shall be no unbroken slope length of greater than 75 feet for slopes with a grade of 3:1 or steeper.
2. Sediment control practices must be established on all down gradient perimeters before any upgradient land disturbing activities begin. These practices shall remain in place until final stabilization has been established.
3. The timing of the installation of sediment control practices may be adjusted to accommodate short-term activities such as clearing or grubbing, or passage of vehicles. Any short-term activity must be completed as quickly as possible and the sediment control practices must be installed immediately after the activity is completed. However, sediment control practices must be installed before the next precipitation event even if the activity is not complete.
4. All storm drain inlets must be protected by appropriate BMPs during construction until all sources with potential for discharging to the inlet have been stabilized.
5. Temporary soil stockpiles must have silt fence or other effective sediment controls, and cannot be placed in surface waters, including storm water conveyances such as curb and gutter systems, or conduits and ditches.
6. Vehicle tracking of sediment from the construction site must be minimized by BMPs such as stone pads, concrete or steel wash racks, or equivalent systems. Street sweeping must be used if such BMPs are not adequate to prevent sediment from being tracked onto the street.

D. Dewatering and Basin Draining

1. Dewatering or basin draining (e.g., pumped discharges, trench/ditch cuts for drainage) related to construction that may have turbid or sediment laden discharge water must be discharged to a temporary or permanent sedimentation basin on the project site whenever

possible. If the water cannot be discharged to a sedimentation basin prior to entering the surface water, it must be treated with the appropriate BMPs, such that the discharge does not adversely affect the receiving water or downstream landowners. CONTRACTOR shall ensure that discharge points are adequately protected from erosion and scour. The discharge must be dispersed over natural rock riprap, sand bags, plastic sheeting or other accepted energy dissipation measures. Adequate sedimentation control measures are required for discharge water that contains suspended solids.

2. All water from dewatering or basin draining activities must be discharged in a manner that does not cause nuisance conditions, erosion in receiving channels or on downslope properties, or inundation in wetlands causing significant adverse impact to the wetland.

E. Inspections and Maintenance

1. CONTRACTOR shall routinely inspect the construction site once every seven (7) days during active construction and within 24 hours after a rainfall event greater than 0.5 inches in 24 hours.
2. All inspections and maintenance conducted during construction shall be recorded in writing and these records shall be retained with the SWPPP. Records of each inspection and maintenance activity shall include:
 - a. Date and time of inspections.
 - b. Name of person(s) conducting inspections.
 - c. Findings of inspections, including recommendations for corrective actions.
 - d. Corrective actions taken (including dates, times, and party completing maintenance activities).
 - e. Date and amount of all rainfall events greater than 1/2 inch (0.5 inches) in 24 hours.
 - f. Documentation of changes made to the SWPPP.
3. Where parts of the construction site have undergone final stabilization, but work remains on other parts of the site, inspections of the stabilized areas may be reduced to once per month. Where work has been suspended due to frozen ground conditions, the required inspections and maintenance must take place as soon as runoff occurs at the site or prior to resuming construction, whichever comes first.
4. All erosion prevention and sediment control BMPs shall be inspected to ensure integrity and effectiveness. All nonfunctional BMPs shall be repaired, replaced, or supplemented with functional BMPs. CONTRACTOR shall investigate and comply with the following inspection and maintenance requirements:
 - a. All silt fences must be repaired, replaced, or supplemented when they become nonfunctional or the sediment reaches 1/3 of the height of the fence. These repairs must be made within 24 hours of discovery, or as soon as field conditions allow access.
 - b. Temporary and permanent sedimentation basins must be drained and the sediment removed when the depth of sediment collected in the basin reaches 1/2 the storage volume. Drainage and removal must be completed within 72 hours of discovery, or as soon as field conditions allow access.
 - c. Surface waters, including drainage ditches and conveyance systems, must be inspected for evidence of sediment being deposited by erosion. CONTRACTOR shall remove all deltas and sediment deposited in surface waters, including drainage ways, catch basins, and other drainage systems, and restabilize the areas where sediment removal results in exposed soil. The removal and stabilization must take place within seven (7) days of discovery unless precluded by legal, regulatory, or physical access constraints. CONTRACTOR shall use all reasonable efforts to obtain access. If precluded, removal and stabilization must take place within seven (7) calendar days of obtaining access. CONTRACTOR is responsible for contacting all local, regional, state and federal authorities and receiving any applicable permits, prior to conducting any work.

- d. Construction site vehicle exit locations must be inspected for evidence of off-site sediment tracking onto paved surfaces. Tracked sediment must be removed from all off-site paved surfaces, within 24 hours of discovery.
 - e. CONTRACTOR is responsible for the operation and maintenance of temporary and permanent water quality management BMPs, as well as all erosion prevention and sediment control BMPs, for the duration of the construction work at the site. CONTRACTOR is responsible until OWNER has assumed control over all areas of the site that have not been finally stabilized or the site has undergone final stabilization.
 - f. If sediment escapes the construction site, off-site accumulations of sediment must be removed in a manner and at a frequency sufficient to minimize off-site impacts.
5. All infiltration areas must be inspected to ensure that no sediment from ongoing construction activities is reaching the infiltration area and these areas are protected from compaction due to construction equipment driving across the infiltration area.
- F. Pollution Prevention Management Measures
1. CONTRACTOR shall implement the following pollution prevention management measures on the site:
 - a. Solid Waste: Collected sediment, asphalt and concrete millings, floating debris, paper, plastic, fabric, construction and demolition debris and other wastes must be disposed of properly and must comply with Kentucky Division of Water disposal requirements.
 - b. Hazardous Materials: Oil, gasoline, paint and any hazardous substances must be properly stored, including secondary containment, to prevent spills, leaks or other discharge. Restricted access to storage areas must be provided to prevent vandalism. Storage and disposal of hazardous waste must be in compliance with Kentucky Division of Water regulations.
 - c. External washing of trucks and other construction vehicles must be limited to a defined area of the site. Runoff must be contained and waste properly disposed of. No engine degreasing is allowed on site.
- G. Final Stabilization
1. Final stabilization can be achieved in one of the following ways:
 - a. All soil disturbing activities at the site have been completed and all soils must be stabilized by uniform perennial vegetative cover with a density of 70 percent over the entire pervious surface area, or other equivalent means necessary to prevent soil failure under erosive conditions and;
 - 1) All drainage ditches, constructed to drain water from the site after construction is complete, must be stabilized to preclude erosion;
 - 2) All temporary synthetic, and structural erosion prevention and sediment control BMPs (such as silt fence) must be removed as part of the site final stabilization; and
 - 3) CONTRACTOR shall clean out all sediment from conveyances and from temporary sedimentation basins that are to be used as permanent water quality management basins. Sediment must be stabilized to prevent it from being washed back into the basin, conveyances or drainage ways discharging off-site or to surface waters. The cleanout of permanent basins must be sufficient to return the basin to design capacity.
- H. Timing of Installation
1. All erosion and sediment controls must be constructed, stabilized, and functional before any site disturbance within tributary areas of those controls. Any disturbed area on

- which activity has ceased and which will remain exposed for more than 20 days must be stabilized immediately.
2. Install stabilized construction entrances.
 3. Install temporary erosion control measures including silt fence, hay bale structures, and inlet protection.
 4. Utilities:
 - a. Install/replace all underground utilities.
 - b. Limit daily trench excavation to length of pipe placement, plug installation, and backfilling that can be completed same day. Daily backfilling of trench may be delayed for maximum of 6 days for certain cases requiring testing of installed pipe.
 - c. Water accumulating in open trench will be completely removed by pumping to facility for removal of sediment before pipe placement and/or backfilling begins.
 - d. On day following pipe placement and trench backfilling, disturbed area will be graded to final contours and appropriate temporary erosion and sediment pollution control measures/facilities will be installed.
 5. Rough grade site and area to proposed sub-grade elevations and grades.
 6. Re-grade and surface roadways and parking areas.

SECTION 02520

STORM SEWERS

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install storm sewers and appurtenances as shown on Drawings and as herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Trenching, Backfilling and Compacting: Section 02221
 - 2. Waste Material Disposal: Section 02227
 - 3. Cast-In-Place Concrete: Section 03300
- D. Abbreviations and/or References:
 - 1. The following organization reference shall be interpreted to mean:
 - a. ASTM - the American Society of Testing Materials, latest edition.
 - 2. The following piping references shall be interpreted to mean:
 - a. RCP - reinforced concrete pipe.
 - b. DIP - ductile iron pipe.

1.2 QUALITY ASSURANCE:

- A. Qualifications of Installer:
 - 1. Provide at least 1 person at all times during execution of this portion of Work who is thoroughly familiar with the type of materials being installed and is directly responsible for all Work performed under this Section.
- B. Allowable Tolerances:
 - 1. Pipe alignment:
 - a. When lamping for horizontal and vertical alignment, the full circle of the pipe shall be visible.
- C. Design Criteria:
 - 1. The class of pipe specified in this Section is based on the fact that the width of trench, backfill procedure and bedding adhere to the requirements specified in Section 02221 of this Specification and to Drawings. If CONTRACTOR wishes to change the installation requirements for their convenience, they shall submit to OWNER in writing the changes requested. If the changes require a higher strength pipe or increased bedding requirements, CONTRACTOR shall provide these at no additional cost to OWNER.

1.3 SUBMITTALS:

- A. Product Data:
 - 1. Prepare and submit product data for each item herein specified for OWNER'S approval.
- B. As-Built (Record) Drawings:
 - 1. During the course of the installation carefully show in red line on a print of the sewer system Drawings all changes made to the system.

- a. All changes require OWNER'S approval prior to doing the Work.
2. Upon completion of the storm sewer system installation, and as a condition of its acceptance, obtain as-built or existing invert and top of casting elevations and coordinates of the new sewer system and carefully transfer all such data to new clean prints of said system and submit 2 sets of marked-up drawings to OWNER. Surveyor shall be a Registered Land Surveyor approved by OWNER before obtaining the as-built survey.

1.4 PRODUCT HANDLING:

- A. Protection:
 1. Use all means necessary to protect storm sewer system materials before, during and after installation and to protect the installed Work and materials of all other trades.
- B. Replacements:
 1. In the event of damage, immediately make all repairs and replacements necessary to the approval of OWNER and at no additional cost to OWNER.
- C. Lifting:
 1. Precast elements shall be constructed with lifting loops or other means to facilitate handling in the field.

2.0 PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS:

- A. Reinforced Concrete Pipe (RCP):
 1. Reinforced concrete pipe and fittings, unless otherwise indicated, shall conform to ASTM C76, Class III. Refer to Drawings for pipe sizes.
 2. Reinforced concrete aprons shall conform to ASTM C76, Class II with holes for tie bolts.
- B. Ductile Iron Pipe (DIP):
 1. Ductile iron pipe and fittings, unless otherwise indicated, shall be push-on joint type conforming to OWNER'S Piping Specifications, Sheet U-10 (refer to Part 4 of this Section). Refer to Drawings for pipe sizes.

2.2 PIPE JOINT CONNECTIONS:

- A. Joint Connections for RCP Pipe:
 1. Rubber compression and/or o-ring type rubber gaskets for concrete sewer and culvert pipe shall conform to ASTM C443.
- B. Joint Connection for PVC Pipe:
 1. Rubber o-ring fitted into the spigot shall conform to ASTM D1864 and the connection shall conform to ASTM D3212 for push-on joints.

2.3 STANDARD MANHOLES AND CATCH BASINS:

- A. Precast Concrete Sections:
 1. Precast reinforced concrete circular manhole or catch basin sections shall conform to ASTM C478. The top section for 48 inch diameter structures shall be an eccentric cone as indicated on Drawings with a 27 inch opening. Sections shall have manhole steps cast in at the factory that meet OSHA requirements.
 - a. CONTRACTOR may with approval of OWNER'S Engineer, at their option provide a concrete flat top, cast to match top section, complete with 27 inch

- opening. Refer hereinafter to paragraph entitled "Concrete Bases and Flat Tops".
2. Precast reinforced concrete rectangular manholes and catch basins shall be as shown on Drawings or be designed to support a 5 ton wheel load and have inside dimensions as shown on Drawings and shall conform to applicable provisions of ASTM C478.
 3. Joint sealing mortar materials shall consist of the following:
 - a. Portland cement shall conform to ASTM C150, Type I.
 - b. Lime shall be hydrated type conforming to ASTM C207 or hydraulic hydrated type conforming to ASTM C141.
 - c. Sand shall conform to ASTM C33.
 - d. Water shall be fresh, clean and potable.
 4. Bituminous mastic joint sealing material shall be "Ram-Nek Sealant" as manufactured by K. T. Snyder Corporation, Houston, Texas (phone: 800/231-4549) or OWNER approved equal.
 - a. Primer shall be as recommended by the above manufacturer.
 5. Rubber compression and/or o-ring type rubber gaskets for circular concrete sewer and culvert pipe shall conform to ASTM C443.
- B. Concrete Bases and Flat Tops:
1. Concrete bases shall consist of either precast concrete or cast-in-place concrete. Concrete shall have a minimum cement content of 6 bags per cubic yard, 5 to 7 percent air entrainment and a minimum 28 day compressive strength of 4000 pounds per square inch (psi).
 - a. Cast-in-place concrete bases shall be as indicated on Drawings, complete with reinforcement
 - b. Precast concrete bases shall be with welded wire fabric cast as indicated on Drawings, complete providing a minimum of 0.20 square inches of steel per foot of sectional area each way or No. 3 reinforcement bars spaced 6 inches on center each way.
 - 1) Precast base shall set on a 6 inch thick sand cushion layer, minimum.
 - c. Precast concrete manhole flat tops shall be cast as indicated on Drawings, complete with minimum No. 6 reinforcement bars spaced 6 inches on center each way, placed on bottom of casting 2 inches clear of concrete surfaces. Thickness shall be minimum 11 inches and outside diameter shall match manhole radius.
- C. Cement Mortar:
1. Cement mortar used for unit masonry shall conform to ASTM C270, Type M.
 2. Cement mortar used for grouting, paving inverts, filling lift holes, patching anchoring castings and similar items shall consist of 1 part portland cement ASTM C150, Type 1, with 3 parts mortar sand ASTM C144 and sufficient water for proper consistency. The entrained air content of the mortar shall be 7-10 percent.
- D. Precast Covers:
1. Precast covers for structures shall be Type II precast reinforced concrete with a 27 inch opening.
- E. Frame and Cover Castings:
1. Manhole and catch basin frame and covers shall be gray iron as manufactured by the Neenah Foundry Company, Neenah, Wisconsin (phone: 414/725-7000) or OWNER approved equivalent. The identification number of each casting is shown on Drawings.
- F. Adjusting Rings:
1. Adjusting rings shall be precast concrete 2 inches thick reinforced with a minimum of one continuous strand of 8 gage steel wire. The rings shall be circular and of such size that provides an extension of the manhole or catch basin.

2.4 MISCELLANEOUS MATERIALS:

A. Insulation Board:

1. Insulation board shall be an extruded polystyrene type board "Styrofoam SM" as manufactured by Dow Chemical Company, Midland, Michigan (phone: 800/258-2436) or OWNER approved equal. Thickness shall be as indicated on Drawings.

B. Tie Bolt Assembly:

1. Tie bolt assemblies shall be either "Adjustable U-Bolt" or "Tectonics Fastener" as manufactured by the Cretex Industries, Inc., Elk River, Minnesota (phone: 612/441-2121) or OWNER approved equal.

C. Riprap:

1. Stone for riprap shall conform to the following:

<u>SIEVE SIZE</u>	<u>TOTAL PERCENT PASSING</u>
18	100
12	75
9	50
3	10

D. Riprap Filter:

1. The filter blanket material shall be well graded and sound (3 inch maximum size) gravel or crushed stone with no more than 30 percent by weight passing the number 40 sieve.

E. Filter Cloth:

1. Filter cloth shall be "Mirafi 140" fabric as available from Celanese Fibers Marketing Company, a division of the Celanese Corporation, Charlotte, North Carolina (phone: 704/554-2000); "Trevira (R) Style 1115" as manufactured by Hoechst Fibers Industries, Spartanburg, South Carolina (phone: 800/845-7597) or OWNER approved equivalent.

2.5 MISCELLANEOUS STRUCTURES:

- A. Form material shall be as specified in Sections 03100 of this Specification.

3.0 PART 3 - EXECUTION

3.1 DEFECTIVE MATERIALS:

- A. Pipe, fittings and structure materials shall be inspected by CONTRACTOR for defects before installation and any defective material shall be removed and replaced as directed by OWNER.

3.2 PIPE INSTALLATION:

A. Alignment and Grade:

1. CONTRACTOR shall set their own alignment and grade stakes and shall have them approved by OWNER before trenching is started.
2. All sewer pipe shall be laid using approved grade boards furnished and set by CONTRACTOR using acceptable surveying instruments or by using laser equipment.
3. If CONTRACTOR chooses to use grade boards, they shall be set according to the grade stakes and spaced not more than 25 feet apart with at least 3 grade boards set at any one time to check the proper grade and alignment. CONTRACTOR shall provide and use a suitable grade rod to insure the proper grade of the pipe.

B. Pipe Laying:

1. The type, kind and class of pipe to be used shall be as shown on Drawings or as herein specified. All pipe shall be laid and maintained to the required line and grade with necessary fittings, bends, manhole risers and other appurtenances placed at the required locations.
2. No foreign material or dirt will be permitted to accumulate in the pipe line during and after laying.
3. Pipe laying shall proceed upgrade with spigot or tongue ends pointing in the direction of flow. Any defective or damaged pipe, or any pipe, which had its grade or joint, disturbed after laying shall be taken up and replaced.
4. No pipe shall be laid in water, or when the trench conditions are unsuitable for such Work. Pipe which connect with inlet structures or manholes shall terminate flush with the inside of the structure wall. Cut pipe where required to facilitate installation of manhole in correct location. Exposed end of pipe that has been cut shall have the reinforcing cut flush and covered with cement mortar.

C. Pipe Jointing:

1. Jointing for each type of pipe shall be made using the material or alternate materials if listed in Part 2 of this Section in a manner that fills and/or seals the joint.
2. When rubber rings or gaskets are used the joint shall be lubricated with an approved lubricant before the pipe sections are slipped together.
3. Existing pipe joints disturbed during construction operations shall be inspected for integrity. O-ring joints may be cleaned, lubricated and reassembled. Other joints shall be cleaned, primed and sealed using mastic sealer.
4. Mastic joint sealer materials shall be applied in accordance with the manufacturer's recommendation.
5. Concrete aprons shall be securely fastened to the adjacent pipe using tie bolt assemblies.
6. Concrete pipe sections shall be securely fastened to each other where shown on Drawings using tie bolt assemblies.

D. Connection to Existing Manhole:

1. When connecting a new sewer line to an existing manhole, CONTRACTOR shall cut a hole into the side of the manhole at the design invert just large enough to accept the pipe. The pipe shall be inserted flush with the inside wall of the manhole (allow for pipe expansion if pipe material requires it). The annular space between the pipe and manhole shall be filled and patched with cement mortar.
2. A concrete collar shall be poured around the connection outside the manhole at least 6 inches thick and at least 12 inches long.

E. Insulation:

1. Place insulation boards as shown on Drawings on a smooth compacted subgrade or sand cushion.

3.3 MANHOLE AND CATCH BASIN CONSTRUCTION:

A. General:

1. Manholes and catch basins shall be constructed as shown on Drawings and as specified hereinafter.

B. Inverts:

1. The manhole invert channels shall be smooth and accurately shaped to a semicircular bottom conforming to the inside of the adjacent sewer section. Invert channels and manhole bottom shall be shaped with mortar or lean concrete.
2. Changes in size and grade of invert shall be made gradually and evenly. Changes in the direction of the sewer and entering branch or branches shall have a true curve of as large a radius as the size of the manhole will permit.

- C. Castings:
 - 1. The cast iron frame shall be firmly embedded in mortar 1/2 inch thick, minimum, with the top set to the proper grade.
- D. Adjusting Rings:
 - 1. Manhole rings may be used to make adjustments in grade providing that the initial adjustment ring is embedded in mortar and the exterior of the rings are parged with mortar not less than 1/2 inch thick. No more than 4 rings or less than 2 will be permitted in making manhole elevation adjustment.
 - 2. CONTRACTOR shall install at least 2 and not more than 4 rings on each catch basin in case surface drainage has to be relieved into the sewer before the final surface is complete.

3.4 RIPRAP:

- A. The subgrade for the riprap shall be excavated and shaped to the design indicated on Drawings. All loose subgrade material shall be thoroughly compacted.
- B. Install filter cloth on the bottom and sides of the area to be riprapped.
- C. Place 6 inches of granular filter blanket material over the prepared riprap foundation.
- D. Hand place riprap stones by firmly embedding in the foundation material. The ends and edges of each riprap area shall be well defined using selected stones set to line and grade.
- E. After the larger stones are placed, the spaces between the stones shall be filled with firmly seated smaller stones to obtain a uniform surface.

3.5 MISCELLANEOUS STRUCTURE CONSTRUCTION:

- A. Construct miscellaneous structures as shown on Drawings.
- B. Forming, reinforcing and concrete placement shall be as specified in Section 02620 of this Specification.

3.6 FINAL INSPECTION:

- A. After completion of backfilling operations and before acceptance of the Work, OWNER'S Designated Representative shall make a visual inspection of the sewer (such as lamping) between successive manholes, terminal points, catch basins and similar structures. The completed sewer shall be true in line and grade and shall present a full and complete circle in appearance for its full length. It shall be completely free of obstructions, sand and foreign materials of any kind.
- B. If the interior of the pipe shows poor alignment, poor joints, displaced pipe or any other defects and if the manholes and catch basins show defects or poor workmanship, the defects and poor workmanship as pointed out by OWNER shall be remedied by CONTRACTOR at their expense.

4.0 PART 4 - RELATED DOCUMENTS – NOT APPLICABLE

SECTION 02560

SANITARY SEWER

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all sanitary sewers and appurtenances as shown on Drawings and herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Trenching, Backfilling and Compacting: Section 02221
 - 2. Waste Material Disposal: Section 02227
 - 3. Subdrainage Systems: Section 02510
 - 4. Storm Sewers: Section 02520
 - 5. Chemical Sewers: Section 02561
 - 6. Exterior Portland Cement Concrete: Section 02620
 - 7. Concrete Formwork: Section 03100
 - 8. Concrete Reinforcement: Section 03200
 - 9. Cast-In-Place Concrete: Section 03300
- D. Abbreviations and/or References:
 - 1. The following organization reference shall be interpreted to mean:
 - a. ASTM - the American Society of Testing Materials, latest edition.
 - 2. The following piping references shall be interpreted to mean:
 - a. DIP - ductile iron pipe.

1.2 QUALITY ASSURANCE:

- A. Qualifications of Installer:
 - 1. Provide at least 1 person at all times during execution of this portion of Work who is thoroughly familiar with the type of materials being installed and is directly responsible for all Work performed under this Section.
- B. Allowable Tolerances:
 - 1. Horizontal Pipe Alignment:
 - a. When lamping at least 7/8 of the horizontal diameter of the pipe shall be visible.
 - 2. Vertical Pipe Alignment:
 - a. When lamping the full vertical diameter of the pipe shall be visible.
- C. Design Criteria:
 - 1. The class of pipe specified in this Section is based on the fact that the width of trench, backfill procedure and bedding adhere to the requirements specified in Section 02221 of this Specification and to Drawings. If CONTRACTOR wishes to change the installation requirements for their convenience, they shall submit to OWNER in writing the changes requested. If the changes require a higher strength pipe or increased bedding requirements, CONTRACTOR shall provide these at no additional cost to OWNER.

D. Filtration Testing:

1. Pipe Leakage(Pipes Between Manholes):

a. For CIP line exfiltration or infiltration, tests shall indicate a leakage not to exceed 0.04 gallon/inch/hour/100 lineal foot.

b. Air testing of PVC, PPE, HDPE and CIP lines shall indicate the time required in minutes for the air pressure to decrease 1.0 PSIG when tested at an average pressure of 3.0 PSIG greater than any back pressure exerted by ground water that may be above the pipe at the time of testing. The required time shall be less than the following rates:

<u>PIPE DIAMETER IN INCHES</u>	<u>TIME IN MINUTES</u>
4	3.0
6	4.5
8	6.0
10	7.5
12	8.25
15	11.25
18	12.25
21	15.00
24	17.25

2. Manhole leakage:

a. Exfiltration or infiltration tests shall indicate a leakage not to exceed 8 gallons/hour. Infiltration testing applies when the water table is 24 inches or more above the top of the sewer pipe.

1.3 SUBMITTALS:

A. Product Data:

1. Prepare and submit product data for OWNER'S. Product data shall include manufacturer's recommended installation instructions.

B. As-Built (Record) Drawings:

1. During the course of the installation, carefully show in red line on a print of the sewer system Drawings, all changes made to the system.

a. All changes require OWNER'S approval prior to doing the Work.

2. Upon completion of the sanitary sewer system installation, and as a condition of its acceptance, obtain as-built or existing invert and top of casting elevations and coordinates of the new sewer system and carefully transfer all the as-built data to new, clean prints of said system and submit 2 sets of marked up Drawings to OWNER. Surveyor shall be a Registered Land Surveyor approved by OWNER before performing the as-built survey.

1.4 PRODUCT HANDLING:

A. Protection:

1. Use all means necessary to protect sanitary sewer system materials before, during and after installation and to protect the installed Work and materials of other trades.

B. Replacements:

1. In the event of damage, immediately make all repairs and replacements necessary to the approval of OWNER and at no additional cost to OWNER.

C. Lifting:

1. Precast elements shall be constructed with lifting loops, holes or other means to facilitate handling in the field.

2.0 PART 2 - PRODUCTS

2.1 PIPE:

A. Ductile Iron Pipe (DIP):

1. Ductile iron pipe and fittings, unless otherwise indicated, shall be push-on type conforming to 3M's Piping Specification, Sheet U-10T (refer to Part 4 of this Section). Refer to Drawings for pipe sizes.

2.2 PIPE JOINT CONNECTIONS:

A. Joint Connection for DIP Pipe:

1. Fittings shall be bell and spigot conforming to ASTM A48, Grade CL.30B.
2. Gaskets (seals) shall be bell and spigot conforming to ASTM D2240, Grade 1149.

2.3 MANHOLES:

- A. Precast reinforced concrete manhole sections shall conform to the requirements of ASTM C478 and to the size and dimensions shown on Drawings.
- B. Rubber compression type rubber gaskets for circular concrete sewer pipe and manholes shall conform to the requirements of ASTM C443.
- C. Manhole steps shall polypropylene plastic as manufactured by Improved Construction Methods (ICM), Inc., Jacksonville, Arkansas (phone: 501/982-4571) or OWNER approved equal.
- D. Manhole frames and covers shall be gray iron as manufactured by the Neenah Foundry Company, Neenah, Wisconsin (phone: 414/725-7000) or OWNER approved equal. Frame shall be 7 inches in depth complete with solid cover. The identification number of each casting is shown on Drawings.
- E. Concrete Base Construction:
 1. Concrete base construction shall consist of either precast concrete or cast-in-place concrete. Concrete shall have a minimum cement content of 6 bags per cubic yard, 5 to 7 percent air entrainment and a minimum 28-day compressive strength of 4000 pounds per square inch (psi).
 - a. Cast-in-place concrete bases shall be as indicated on Drawings, complete with reinforcement.
 - b. Precast concrete bases shall be with welded wire fabric cast as indicated on Drawings, complete providing a minimum of 0.20 square inches of steel per foot of sectional area each way or No. 3 reinforcement bars spaced 6 inches on center each way.
 - 1) Precast base shall set on a 6 inch thick sand cushion layer, minimum.
 - 2) Concrete for paving U-channel inverts shall be the same as above for cast-in-place concrete.
- F. Cement Mortar:
 1. Cement mortar used to patch openings and to provide a mortar bed for the frame casting and similar items shall consist of 1 part portland cement ASTM C150, Type 1, with 3 parts mortar sand ASTM C144 and sufficient water for proper consistency. The entrained air content of the mortar shall be 7-10 percent.

G. Polyethylene Manholes:

1. Manhole sections shall consist of a section of 48 inch pipe meeting the requirements of ASTM D1248, Type III, Grade P34, Category 5 and shall have a polyethylene base at least 1-1/4 inches thick and of the same material as the pipe section, factory fused into a

2.4 MISCELLANEOUS MATERIALS:

A. Insulation Board:

1. Insulation board shall be an extruded polystyrene type board "Styrofoam SM" as manufactured by Dow Chemical Company, Midland, Michigan (phone: 800/258-2436) or OWNER approved equal. Thickness shall be as indicated on Drawings.
2. single monolithic unit. Inlet and outlet pipe stubs of the sizes designated on Drawings shall be "shop welded" at the design elevations and locations at the factory. The stub lengths shall be at least 48 inches.
 - a. Manhole frames and covers shall be cast gray iron type "Heavy Duty No. R-1670" as manufactured by the Neenah Foundry Company, Neenah, Wisconsin or OWNER approved equal. Frame shall be 7 inches in depth complete with solid cover.

3.0 PART 3 - EXECUTION

3.1 DEFECTIVE MATERIALS:

- A. Pipe, fittings and structure materials shall be inspected for defects before installation and any defective material shall be removed and replaced as directed by OWNER.

3.2 PIPE INSTALLATION:

A. Layout:

1. All sewer pipe shall be laid using approved grade boards, furnished and set by CONTRACTOR or by using acceptable surveying instruments or laser equipment. If grade boards are used by CONTRACTOR, they shall be set according to the grade stakes and spaced not more than 25 feet apart with at least 3 grade boards set at any one time to check the proper grade and alignment. CONTRACTOR shall provide and use a suitable grade rod to insure the proper grade of the pipe.

B. Pipe Laying:

1. Pipe laying shall proceed up-grade (the spigot ends of bell-and-spigot pipe shall point in the direction of flow). Pipe shall be laid in straight and true alignment conforming to invert elevations shown on Drawings. As the Work progresses, the interior of the sewer shall be cleaned of all dirt and superfluous materials of every description. Trenches shall be kept free from water until the pipe is installed and pipe shall not be laid when the condition of the trench or weather is unsuitable for such Work. At all times when Work is not in progress, all open ends of pipe and fittings shall be securely closed, so that no trench water, earth or other substance will enter the pipe or fittings.

C. Pipe Jointing:

1. Pipe joint connections shall be made in accordance with the manufacturer's written instructions.

D. Connection to Existing Manhole:

1. When connecting a new sewer line to an existing manhole, CONTRACTOR shall cut a hole into the side of the manhole at the design invert just large enough to accept the pipe. The pipe shall be inserted flush with the inside wall of the manhole

(allow for pipe expansion if pipe material requires it). The annular space between pipe and manhole shall be mortared with cement mortar.

2. A concrete collar shall be poured on the outside of the manhole around the pipe, at least 6 inches thick all around and at least 12 inches long.

3.3 MANHOLE CONSTRUCTION:

A. Concrete Manhole:

1. All concrete manholes shall be built of precast concrete units as shown on Drawings.

2. Drop manholes shall be constructed when the difference in pipe invert elevations exceed 24 inches. Construct as shown on Drawings.

3. The cast iron frame shall be firmly embedded in mortar with the top at the plan elevation.

B. Polyethylene Manhole:

1. All polyethylene manholes with factory molded attached pipe stubs shall be installed as follows:

a. After the manhole is properly positioned on its base, the sewer pipes shall be connected to the stubs by means of thermal butt-fusion.

3.4 INSPECTION AND TESTING OF SEWER:

A. Alignment and Jointing Inspection:

1. Immediately after the sewer system is completed, OWNER'S Designated Representative shall check the lines between manholes by lamping. If the interior of the pipe shows poor alignment, poor joints, displaced pipe or any other defects, the defects designated by OWNER shall be remedied by CONTRACTOR at their expense.

B. Leakage Test:

1. CONTRACTOR shall furnish the plugs, standpipe, weirs and other material and labor for placing the plugs, standpipe and similar appurtenances in the sewer and shall perform the tests in the presence of the OWNER'S Designated Representative. CONTRACTOR shall receive no additional compensation for making the leakage tests or corrective Work necessary to reduce leakage below the maximum allowed by the Specifications.

2. All service plugs shall be secured in place to prevent displacement during testing operations.

3. In case measurements indicate a leakage greater than the maximum allowable, additional measurements shall be taken and continued until all leaks are located and the necessary repairs and corrective Work have reduced the leakage in the section being tested below the maximum allowed by the Specifications. All repair Work and materials used must be approved by OWNER. For purposes of the test, the line between adjoining manholes will be considered a section and will be tested as such.

4. If results of any of these tests are not satisfactory, repairs or pipe replacement may be required until OWNER is satisfied that the leakage requirements are being met.

5. The introduction of any substance into the water used for testing with the intent of sealing such leaks as may be indicated will not be permitted.

6. Exfiltration Test:

a. After the sewer lines have been lamped by OWNER and CONTRACTOR has remedied any defects found by that test, CONTRACTOR shall make exfiltration tests of the sewer system.

b. Each manhole shall be tested by bulkheading or plugging the pipe openings and filling the manholes with water to an elevation 36 inches above the lowest invert or the ground water table whichever is higher. This head of water

shall be maintained for a period of 30 minutes during which it is presumed that full absorption of the manhole body has taken place, and thereafter for a period of 1 hour for the initial test of leakage. During this 1-hour test period, the actual amount of leakage shall be recorded in gallons. This figure will be used later when the lines between manholes are tested.

c. After this initial test, the manhole shall be filled with water to an elevation 6 inches below the base of the frame casting. This head of water shall be maintained for a period of 30 minutes for absorption of the manhole body. Thereafter, for a period of 1 hour, the second test of leakage shall be conducted. During this 1-hour test period, the measured rate of exfiltration for any manhole shall not exceed the allowable rate.

d. After the manholes are tested, CONTRACTOR shall proceed to test the pipe.

e. The test section shall be bulkheaded and the pipe subjected to hydrostatic pressure produced by a head of water at a depth of 36 inches above the invert of the sewer at the upper manhole under test. In areas where ground water exists, this head of water shall be 36 inches above the existing water table.

f. This head of water shall be maintained for a period of 1 hour during which it is presumed that full absorption of the pipe body has taken place, and thereafter for a further period of 1 hour for the actual test of leakage.

g. To determine the amount of leakage between manholes, the initial manhole recorded amount shall be subtracted from the recorded amount of each section of sewer.

7. Infiltration Test:

a. If the ground water level is greater than three feet above the invert of the upper manhole and OWNER gives approval, infiltration tests may be allowed in lieu of the exfiltration tests.

b. Manholes shall be measured separately using rubber plugs or devices that will permit no leakage into the area being tested.

c. The line between each manhole shall be tested for leakage. After deducing the allowable leakage previously measured in the manhole, the leakage shall not exceed the allowable rate stated in Part 1 of this Section.

8. Air Test:

a. In lieu of testing the sanitary sewer lines between successive manholes with water, CONTRACTOR may choose to use air-testing equipment.

b. CONTRACTOR shall perform these tests with equipment similar to "Air-Loc" equipment manufactured by Cherne Industrial, Inc., Hopkins, Minnesota.

c. The air test shall be made when the sewer is clean. The line shall be plugged at each manhole with pneumatic balls. Low pressure air shall be introduced into the plugged line until the internal air pressure reaches 4.0 PSIG greater than the average back pressure of any ground water pressure that may submerge the pipe. At least 2 minutes shall be allowed for the air temperature to stabilize before readings are taken and the timing started.

d. After the stabilization period (3.5 PSIG minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected and the time in minutes shall be recorded for the pressure to drop from 3.5 to 2.5 PSIG (greater than the average back pressure of any ground water that may be over the pipe invert).

e. If the installation fails this test, this testing equipment may be used to determine the location of the pipe leak.

C. Flushing Sewer:

1. Prior to final acceptance of each section of the sewer line, CONTRACTOR shall flush a ball, near the full diameter of the sewer, through the line. All dirt and debris shall be prevented from entering the existing sewer system by means of watertight plugs or other suitable methods.

D. Final Checkout:

1. Upon completion of the Contract, OWNER will carefully inspect all sewers and appurtenances. Any unsatisfactory Work shall be removed and replaced in a proper manner and the invert of the sewer and manholes shall be left clean and free from any obstructions through the entire line.

4.0 PART 4 - RELATED DOCUMENTS

4.1 ATTACHMENTS:

- A. 3M Standard Piping Specifications required and/or referenced within this Section are listed under the Appendices (refer to Table of Contents) and are a part of Work of this Section.
 - B. The following attached 3M Standard Piping Specifications referenced within this Section are a part of Work of this Section:
 - U-10T Ductile Iron Push-On Joint
 - W-10T Polypropylene Plastic (PPE) Piping
-

SECTION 02612

ASPHALT CONCRETE PAVING

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and construct all asphalt concrete paving and aggregate base as shown on Drawings and herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Quality Control: Section 01710
 - 2. Site Grading: Section 02210
 - 3. Waste Material Disposal: Section 02227
 - 4. Soil Compaction Control: Section 02230
 - 5. Asphalt Concrete Surface Repair: Section 02616
 - 6. Exterior Portland Cement Concrete: Section 02620
- D. Abbreviations and/or References:
 - 1. The following organization reference shall be interpreted to mean:
 - a. "KYTC Specifications" - The Kentucky Transportation Cabinet Standard Specification for Construction, latest edition.
 - b. ASTM - The American Society of Testing Materials, latest edition.
 - c. AASHTO - American Association of State Highway and Transportation Officials Standard Applicable Specifications, latest edition.
- E. CONTRACTOR shall refer to Bid Form and Section 01220 - Unit Prices for description of unit prices required under this Section.

1.2 QUALITY ASSURANCE:

- A. Entrance Permit:
 - 1. OWNER will obtain the entrance permit for access to the public roadways as shown on Drawings. CONTRACTOR shall comply with all the requirements of the permit.
- B. Allowable Tolerances:
 - 1. Subgrade after fine grading:
 - a. Shall not vary more than 0.05 feet from plan elevation.
 - 2. Aggregate base:
 - a. Shall not vary more than 0.05 feet from plan elevation.
 - 3. Bituminous base course:
 - a. Shall not vary more than 0.05 feet from the plan elevation.
 - 4. Bituminous binder course:
 - a. Shall not vary more than 0.04 feet from the plan elevation.
 - b. Shall not vary more than 0.04 feet from specified thickness.
 - 5. Bituminous wearing course:
 - a. Shall not vary more than 0.03 feet from the plan elevation.
 - b. Shall not vary more than 0.02 feet from specified thickness.

- c. Shall not vary more than 0.015 feet from the edge of a 10 foot straight edge laid thereon parallel to or at right angles to the direction of paving.
- C. Test and Design Mix Criteria:
 - 1. CONTRACTOR, at their expense, shall employ the services of an independent testing laboratory to perform the following tests and design mixes. Materials and mix designs shall be approved at least 10 days before starting of construction.
 - a. Aggregate tests (Aggregate Base Course):
 - 1) The material to be used for the aggregate base course shall be tested as follows:

Gradation:	ASTM C136 and C117
Abrasion Loss:	ASTM C131
Spall Material:	ASTM C123
 - 2) A preliminary job mix formula shall be developed for the bituminous surfacing material using the Marshall method (50 blow) ASTM D1559.
 - 3) Resubmit a new job mix formula for OWNER'S approval if it becomes necessary to change the source of aggregates or when unsatisfactory results or other conditions warrant a change in mixture requirements.
 - b. Preliminary job mix formula (Bituminous Surfacing):
 - 1) The aggregate and mineral filler to be used for the bituminous surfacing shall be tested as follows:

Soundness:	AASHTO T104
Gradation:	ASTM C136 and C117
Abrasion Loss:	ASTM C131
Spall Material:	ASTM C123

1.3 SUBMITTALS:

- A. Test Reports and Mix Designs:
 - 1. CONTRACTOR shall submit an original and 2 copies of all test reports and mix designs for OWNER'S approval.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Aggregate for base construction shall conform to KYTC Section 805, Class 5 consisting of 100 percent crushed quarry rock.
- B. Aggregate for base construction shall conform to KYTC Section 805, Class 5 gravel or crushed quarry rock or a combination thereof.
- C. Aggregate for bituminous base shall conform to KYTC Section 806 (1 ½ inch max.).
- D. Aggregate for bituminous binder shall conform to KYTC Section 806 (¾ inch max.) or No. 5 (1 ½ inch max.).
- E. Aggregate for bituminous wearing shall conform to KYCT Section 806.
- F. Mineral filler shall conform to KYTC Section 806, limestone dust or hydrated lime.
- G. Aggregate for surface course shall conform to KYTC Section 806, Plastic Index 0 to 3 (ASTM D424), Liquid Limit not more than 25 (ASTM D423).

- H. Aggregate for shoulders shall conform to KYTC Section 806, Plastic Index 0 to 3 (ASTM D424), Liquid Limit not more than 25 (ASTM D423).
- I. Bitumen for the following uses shall conform to KYTC Section 806 for the grade specified:
 - 1. Bituminous base - Asphalt cement, 85 to 100 penetration.
 - 2. Bituminous binder - Asphalt cement, 85 to 100 penetration.
 - 3. Bituminous wear - Asphalt cement, 85 to 100 penetration.
 - 4. Bituminous fine mix wear - Asphalt cement, 85 to 100 penetration.
 - 5. Prime coat - MC-30 or MC-70.
 - 6. Bituminous tack coat - CSS-1, CSS-1h, RC-70, MC-250, or OWNER approved equal.
 - 7. Bituminous tack coat (Fabric Placement) - Asphalt amount 85 to 100 penetration.
- J. Fabric blanket shall be a non-woven polypropylene or polyester type fabric "Petromat" as manufactured by Phillips Fibers Corporation/Phillips 66 Company, Greenville, South Carolina (phone: 803/242-6600); "Trevira S1114" as manufactured by Hoechst Fibers Industries, Spartanburg, South Carolina (phone: 800/845-7597) or OWNER approved equal.
 - 1. Fabric blanket shall conform to ASTM D1682, for grab strength and elongation.
- K. Traffic marking and/or striping paint shall be a quick dry alkyd base "Premium Traffic Paint - Dutch Boy Brand (white A-350 or yellow A-351)" as manufactured by the Division of Sherwin-Williams Company, Cleveland, Ohio or OWNER approved equal. Refer to Drawings for location and striping patterns and/or layouts.
 - 1. Roadway markings shall be a hot inlay applied skip film type "3M Stamark Brand (white no. 5730 or yellow no. 5731)". Refer to Drawings for type, size, quantity and location.

2.2 MIXTURES:

- A. Bituminous base mixture shall conform to KYTC Section 403, with 3.5 to 4.5 percent bitumen by weight.
- B. Bituminous binder mixture shall conform to KYTC Section 403, with the following properties: Marshall stability 800 minimum; Flow 8 to 16; Percent air voids 3 to 5; Percent voids in mineral aggregate 14 minimum; 4.0 to 5.0 Percent bitumen by weight.
- C. Bituminous wearing mixture shall conform to KYTC Section 403, with the following properties: Marshall stability 1000 minimum; Flow 8 to 16; Percent air voids 3 to 5; Percent voids in mineral aggregate 14 minimum; 4.7 to 6.5 percent bitumen by weight.
- D. Bituminous curb mixture shall conform to KYTC Section 403, using mineral filler with the following properties: Marshall stability 1400 minimum; Flow 8 to 16; Percent air voids 3 to 5; Percent voids in mineral aggregate 14 minimum; Increase bitumen content 0.5 to 1.0 percent over bituminous wearing course.

3.0 PART 3 - EXECUTION

3.1 SUBGRADE PREPARATION:

- A. Fine grade and compact subgrade to the plan cross-section. Compaction shall be as specified in Section 02230 of this Specification.
- B. After compaction, cut-out soft spots and unstable areas in the subgrade and fill with granular fill as defined in Section 02210 and compact as specified in Section 02230 of this Specification.

3.2 AGGREGATE BASE:

- A. Construct the aggregate base as shown on Drawings on the prepared subgrade as soon as possible after final shaping and compaction of the subgrade is completed.

- B. Construction requirements shall conform to KYTC Section 805 and be compacted to a density of at least 95 percent as defined by ASTM D1557 (Modified Proctor).
 - C. Density tests shall be taken as deemed necessary by OWNER and no bituminous layer shall be applied on the aggregate base course until it is approved by OWNER.
- 3.3 BITUMINOUS PRIME COAT:
- A. Construct a bituminous prime coat as shown on Drawings and conforming to KYTC Section 405.
- 3.4 BITUMINOUS BASE COURSE:
- A. Construct a plant mixed bituminous base course as shown on Drawings and conforming to KYTC Section 403.
- 3.5 BITUMINOUS TACK COAT:
- A. Apply a bituminous tack coat to an existing bituminous surface if it has been dirtied by traffic or by other means just before constructing another bituminous course. The face of all concrete surfaces to which the bituminous surface will come in contact with shall be sprayed or painted with tack oil.
 - B. Bituminous tack coat shall conform to KYTC Section 406.
- 3.6 BITUMINOUS TACK COAT (FABRIC PLACEMENT):
- A. The entire pavement area to be resurfaced shall be cleaned of dust, dirt, vegetation and other foreign materials.
 - B. Apply bituminous tack coat at the rate of 0.25 to 0.30 gallons per square yard residual asphalt. Hand spray those areas inaccessible to the distributor.
 - 1. Temperature of the tack coat shall be 290 degrees F. minimum to 325 degrees F. maximum.
 - C. If the fabric is not fully saturated after first laydown, the rate of tack coat application shall be increased to 0.30 to 0.35 gallons per square yard.
- 3.7 FABRIC BLANKET INSTALLATION:
- A. Place fabric onto the fresh tack coat according to manufacturer's recommendations with care to avoid wrinkles.
 - 1. Fabric shall be unrolled (best method is with mechanical equipment) so that the "soft side" is unwound into the tack coat.
 - 2. Broom the fabric from center outward to remove air bubbles and wrinkles and to establish uniform contact with tack coat.
 - 3. Transverse and longitudinal joints are made by overlapping 2 to 3 inches.
 - 4. Use sand to blot any areas showing excessive tack coat material.
 - B. It is recommended that overlay operations commence shortly after the fabric is in place. Traffic over the fabric blanket shall be kept to a minimum.
- 3.8 BITUMINOUS BINDER COURSE:
- A. Construct a plant mixed bituminous binder course as shown on Drawings using a mechanical paver equipped with automatic screed controls.
 - B. Construction shall conform to KYTC Section 403.

3.9 BITUMINOUS WEARING COURSE:

- A. Construct a plant mixed bituminous wearing course as shown on Drawings using a mechanical paver equipped with automatic screed controls.
- B. Construction shall conform to KYTC Section 403.

3.10 FINE MIX BITUMINOUS WEARING COURSE [AND OVERLAY]:

- A. Construct a plant mixed fine mix bituminous wearing course as shown on Drawings and conforming to KYTC Section 403 as modified by this Specification.
- B. Bituminous paver shall be equipped with automatic screed controls [for overlay construction. Other Work shall be placed with a mechanical paver wherever possible].

3.11 AGGREGATE SURFACE COURSE:

- A. Construct the aggregate surface course as shown on Drawings and conforming to KYTC Section 805 modified to require compacting to 95 percent of the maximum density as defined by ASTM D1557 (Modified Proctor).

3.12 AGGREGATE SHOULDERING:

- A. Construct the aggregate shouldering as shown on Drawings and conforming to KYTC Section 805.

3.13 PAINT MARKING/STRIPING:

- A. As soon as possible after the bituminous paving operation has been completed (while the [pavement or parking lot] is still clean), the striping/markings shall be completed.
 - 1. Application of paint shall be in strict accordance with manufacturer's latest printed instructions.
 - 2. White paint shall be used to delineate the parking lanes, yellow paint for "NO PARKING" areas.

3.14 TAPE PAVEMENT (STAMARK) MARKINGS:

- A. Tape pavement (3M Stamark Brand) markings shall be inlaid in the newly paved asphalt surfaces by a compaction roller during the paving operation and while the asphalt is still above 140 degrees Fahrenheit.
 - 1. Installation shall be in accordance with 3M Informational Folder 2000, dated May 1986.
 - 2. Compaction shall be accomplished with at least a 5 ton type roller with no turning allowed over the stripe.
- B. All markings shall be applied in strict accordance with the manufacturer's recommendations at the location shown on Drawings with tape embedded flush with pavement surface.
 - 1. Yellow tape shall be used to delineate roadway centerlines, white tape for pedestrian walk areas as shown on Drawings.

3.15 FIELD QUALITY CONTROL:

- A. From time to time during progress of the Work and/or upon completion of the Work, OWNER may require that testing be performed to determine that materials provided for the Work and its installation meet the specified requirements.
- B. Refer to Section 01710 of this Specification for quality control requirements and payment provisions thereof.

3.16 DEFECTIVE WORK:

- A. When tests and inspections ordered by OWNER of the aggregate base and/or bituminous Work indicate non-compliance with the Specification, CONTRACTOR and OWNER shall mutually agree on the number and location of additional tests to define and/or verify the deficiency. If the average of the tests for a given area indicate non-compliance, the area is considered defective and CONTRACTOR shall:
1. Remove and replace defective Work at no cost to OWNER; or
 2. Correct the Work at no cost to OWNER in a manner acceptable to OWNER; or
 3. Give OWNER a credit towards the Contract Price if said credit is acceptable to OWNER.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 02620

EXTERIOR PORTLAND CEMENT CONCRETE

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and construct all exterior portland cement concrete as shown on Drawings and herein specified.
 - 1. Work to be included under this Section shall consist of the following:
 - a. Pavement
 - b. Miscellaneous pads or slabs on grade and diversion box structures.
- C. Related Work Specified Elsewhere:
 - 1. Quality Control: Section 01710
 - 2. Site Grading: Section 02210
 - 3. Foundation Excavating and Backfilling: Section 02220
 - 4. Trenching, Backfilling and Compaction: Section 02221
 - 5. Waste Material Disposal: Section 02227
 - 6. Soil Compaction Control: Section 02230
 - 7. Fibrous Reinforcing: Section 03240
 - 8. Shrinkage Compensating Cement: Section 03310

1.2 QUALITY ASSURANCE:

- A. Qualifications of Installers:
 - 1. Provide at least 1 person at all times during execution of this portion of Work and who is thoroughly familiar with the type of materials being installed and is directly responsible for all Work performed under this Section.
- B. Requirements of Regulatory Agencies:
 - 1. It is CONTRACTOR'S responsibility to comply with the requirements of the regulatory agencies, including the purchase of any permits at their own expense.
- C. Construction Tolerances:
 - 1. Vertical alignment shall not vary more than 1/8 inch from the edge of a 10-foot straight edge.
 - 2. Horizontal alignment shall not vary more than 1/2 inch from the plan alignment for pavement and sidewalk.
 - 3. Horizontal alignment for vertical faces of curb and gutter or curb shall not vary more than 1/2 inch from the plan alignment.
 - 4. Concrete thickness shall not be less than specified.
 - 5. Reinforcing bars shall be placed to the following tolerances:
 - a. Clear distance to formed surface, plus or minus 1/4 inch.
 - b. Sheared length, plus or minus 1 inch.
 - c. Concrete cover on top bars in slabs and beams 8 inches deep or less, 2 inches plus or minus 1/4 inch.

- d. Concrete cover on top bars in members 8 inches to 24 inches deep, 2 inches plus or minus 1/2 inch.
 - e. Crosswise or lengthwise spacing, plus or minus 2 inches provided minimum spacing and cover requirements are not violated.
- D. Referenced Standards:
- 1. The current editions of the following American Concrete Institute(ACI) publications shall govern all Work performed hereunder, unless otherwise specified:
 - a. Recommended Practice for Concrete Floor and Slab Construction - ACI 302.
 - b. Recommended Practice for Hot Weather Concreting - ACI 305.
 - c. Recommended Practice for Cold Weather Concreting - ACI 306.
 - d. Recommended Practice for Construction of Concrete Pavements and Concrete Bases - ACI 316.
 - e. Building Code Requirements for Reinforced Concrete - ACI 318.
- E. Design Criteria:
- 1. CONTRACTOR shall employ an approved independent materials testing laboratory and pay for the service of setting up the design mixes and to analyze the fine and coarse aggregate for the various uses of concrete utilized on the project. Design mixes shall be in accordance with the previously cited ACI 318 publication and in compliance with this Specification. The proposed mixes shall be submitted to OWNER for approval prior to placing of any concrete. The approved mixes established by the laboratory shall be used in the Work as long as the characteristics of the ingredients remain unchanged. If any significant change is made in the ingredients, new mixes shall be prepared and submitted to OWNER for approval.
 - 2. Concrete shall consist of a minimum 28 day compressive design strength of 4,000 psi using 6 bags of portland cement, aggregate, air entraining admixture, water and an air content ranging from 5 to 7 percent. Slump of concrete shall have a range of 2 to 4 inches.
 - a. If any of the conditions vary from those as described, CONTRACTOR shall submit a revised mix design prepared by the testing laboratory along with a written request for the variance desired to OWNER for their consideration and approval.
 - b. Concrete for portions of the structure required to be watertight, such as water storage and waste treatment tanks, shall be air-entrained and have a water-cement ratio not exceeding 0.48.
 - c. Admixtures shall be used only with the approval in writing by OWNER'S Civil Department. All admixtures shall be used in accordance with the manufacturer's instructions and shall be added at the plant. Calcium chloride shall not be used as an admixture.
 - d. Mix designs shall be based on Type I cement. Type III (high-early) cement or any other types of cement shall be used only when approved in writing by OWNER. When high-early cement is used, the 7-day strength test shall exceed the specified 28-day strength tests.

1.3 SUBMITTALS:

- A. Product Data:
 - 1. Prepare and submit product data for OWNER'S approval. Product data shall include manufacturer's recommended installation instructions.
- B. Samples:
 - 1. If requested by OWNER, submit samples for approval of proposed materials.
- C. Certification:
 - 1. Submit 3 copies of certification of material compliance as requested by OWNER.

- D. Delivery Tickets:
 - 1. Submit a delivery ticket with each truck load of concrete delivered which indicates OWNER'S design mix, truck number, project number, CONTRACTOR, ready mix producer, time of batching and total yards of concrete.
- E. Test Reports and Design Mixes:
 - 1. Submit 3 copies of design mixes and material test reports to OWNER. Refer to Section 01710 "Report Handling" of this Specification.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Form Material:
 - 1. Form material shall be either sound lumber or steel, free of defects and variations in dimensions. The sides of all lumber shall be surfaced and matched to prevent mortar leakage. Metal forms shall be of standard manufacture and need not be new, but shall be free from rust and dirt. Metal forms shall be flat and true to line without punctures. All form material shall be sized and of strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal of same.
 - a. Rigid forms are to be utilized on tangent alignment and curves having a radius of 150 feet or greater.
 - b. Curved forms shall be utilized on the curved Work with a radius of 150 feet or less, and shall consist of flexible spring steel or laminated lumber.
- B. Reinforcement Materials:
 - 1. Reinforcing bars and dowels shall be of new billet steel conforming to ASTM A615, Grade 40 (40,000 psi yield). Sizes of bars shall be as indicated on Drawings or herein specified.
 - a. Dowel bars when used for contraction and expansion joints shall be smooth steel bars coated with a thin uniform coating of liquid asphalt (MC-250) or road tar RT-6 on 1/2 the length of the bar plus 2 inches. In addition, dowel bars for expansion joints shall be furnished with end caps designed with one end closed, a minimum length of 3 inches and be positioned to allow bar movement of not less than 1 inch.
 - b. Dowel bar assemblies may be permitted if fabricated to the width of the pavement section.
 - c. Tie bars for control, longitudinal and construction joints shall be deformed bars.
 - 2. Reinforcing mesh shall be welded wire fabric conforming to ASTM A185. Mesh not otherwise indicated shall be fabricated from 4 wires spaced 6 inches each way (6x6-W2.9xW2.9). Mesh shall be furnished in flat sheets.
 - 3. Fibers for reinforcing for exterior concrete shall be as specified in Section 03240 of this Specification. Manufacturer or producer of concrete shall include use of fibers in the OWNER approved mix design.
- C. Concrete Materials:
 - 1. Portland cement shall conform to ASTM C150.
 - a. Cement shall be a low alkali cement (Type I) containing not more than 0.6 percent by weight of tri-sodium silicate oxide.
 - 2. Shrinkage compensating cement for exterior concrete shall be as specified in Section 03310 of this Specification. Manufacturer or producer of concrete shall include use of shrinkage compensating cement in the OWNER approved mix design.
 - 3. Coarse aggregate shall conform to Size [57 or 67] grade requirements of Table 2 of ASTM C33 standard.
 - 4. Fine aggregate shall conform to ASTM C33 with fineness modules not to vary more than 0.20 from value assumed in design mix.

5. Water shall be potable, clean and free from deleterious amounts of acid, alkali or organic material.
- D. Admixtures:
1. Air entraining agent shall conform to ASTM C260 and shall be added at the mixer.
 2. Water reducing agents, (such as super plasticizers), retarding agents, accelerating agents and all other admixtures, shall require approval by OWNER and if used, shall conform to ASTM C494. In no case shall admixtures be permitted as substitute for cement content specified, unless approved by OWNER.
- E. Expansion Joint Material:
1. Joint filler material shall consist of a non-extruding standard bituminous bound type "Sealtight Asphalt Expansion Joint" as manufactured by W.R. Meadows, Inc., Elgin, Illinois (phone: 800/342-5976) or OWNER approved equal.
 - a. Material shall conform to ASTM D994.
 2. Joint filler material shall consist of preformed non-extruded bituminous bound type "Sealtight-Fibre Expansion Joint" as manufactured by W.R. Meadows, Inc., Elgin, Illinois (phone: 800/342-5976); "Code 1390" as manufactured by W.R. Grace Company, Cambridge, Massachusetts (phone: 800/852-1400) or OWNER approved equal.
 - a. Material shall conform to ASTM D1751.
 - b. Material shall be 1/2 inch thick, unless otherwise noted, of widths equal to slab thickness less 1/2 inch or as otherwise indicated.
 3. Joint sealant shall be a single component cold applied rubber asphalt type "Sealtight 158" as manufactured by W.R. Meadows, Inc., Elgin, Illinois (phone: 800/342-5976) or OWNER approved equal.
 - a. Material shall conform to ASTM D1850.
- F. Waterstops:
1. Waterstops shall be a 6 inch wide extruded polyethylene type "Style No. 040" as manufactured by Western Textile (Westec) Corporation, Inc., St. Louis, Missouri (phone: 800/793-7832) - no substitution.
- G. Manhole Steps:
1. Manhole steps shall be of high tensile cast iron type similar to "Catalog No.R-1981-Y" as manufactured by Neenah Foundry Company, Neenah, Wisconsin (phone: 414/725-7000) or OWNER approved equal.
 - a. Refer to Drawings for quantity and location.
- H. Control Gates:
1. Control gates shall be a manual operated cast iron, bronze mounted type with solid bronze adjustable wedges "Resilient Wedge Valve F-6102" as manufactured by the Clow Corporation, Oskaloosa, IA (phone: 800/829-2569) or OWNER approved equal.
 - a. Furnish complete with extended stem, stem guide, hand wheel and all other appurtenances for a complete installation.
 - b. Refer to Drawings for size and type of mounting.
 - c. Submit product data for OWNER'S approval.
- I. Concrete Treating Oil:
1. Equal parts of boiled linseed oil (ASTM D260) and either mineral spirits (ASTM D235), kerosene, or turpentine.
- J. Curing Materials:
1. Kraft paper shall be waterproof and nonstaining "Sisalkraft 5K-10" conforming to ASTM C171.
 2. Polyethylene film shall be white opaque sheet or roll material not less than 0.006 inch thick (6 mil) conforming to AASHTO-M171.

3. CONTRACTOR may at their option use a liquid curing compound for surfaces that will not receive treating oil or waterproofing membrane. Liquid curing compound shall conform to ASTM C309 and shall consist of the following:
 - a. Type 1D, translucent with fugitive dye;
 - b. Type 2, white pigmented, Class B (vehicle solids restricted to all resin).

K. Granular Base Material:

1. Granular base material shall consist of pit-run or crushed granular material conforming to the following gradation:

<u>SIEVE SIZE</u>	<u>TOTAL PERCENT PASSING</u>
2 Inches	100
Number 10	40 - 100
Number 200	2 - 10

2.2 PRODUCTION:

- A. Concrete shall be ready-mixed, and shall be batched, mixed and transported in accordance with "Specification for Ready-Mixed Concrete" ASTM C94. The production plant equipment and facilities shall meet the requirements of the National Ready Mixed Concrete Association.

3.0 PART 3 - EXECUTION

3.1 JOB CONDITIONS:

A. Hot Weather Conditions:

1. The following precautions shall be adhered to:
 - a. Reject concrete mixture having temperature of 85 degrees Fahrenheit or greater.
 - b. Prewet subgrade.
 - c. Crushed or flaked ice may be utilized in reducing temperature of mixture.
 - d. If necessary, reduce temperature of reinforcing steel with wet burlap.
 - e. Reduce mixing time (agitating time) in truck to 45 minutes.
 - f. During periods of high winds, shelter windward side with adequate wind breaks.
 - g. Apply no chemical retarder to finished surface unless permission is granted in writing by OWNER.

B. Cold Weather Conditions:

1. When ambient temperature is 40 degrees Fahrenheit or less, the following precautions are to be adhered to:
 - a. Subbase shall not be frozen.
 - b. Concrete mixture delivered at Worksite shall be 55 degrees (minimum) 85 degrees (maximum) Fahrenheit.
 - c. No calcium chlorides, salts or other chemical accelerators shall be permitted, unless otherwise acceptable in writing by OWNER.
 - d. Concrete surface shall be maintained at a minimum of 50 degrees Fahrenheit with appropriate thermal insulation for a period of 7 days (normal concrete), 3 days (high early-strength concrete).
 - e. Refer to previously cited ACI 306 for minimum thickness of thermal protection required.
 - f. Any concrete that has frozen or disintegrated as a result of freezing shall be removed and replaced at CONTRACTOR'S expense.

3.2 SUBGRADE PREPARATION:

- A. Fine grade and compact subgrade to the plan cross section. Compaction shall be as specified in Section 02230 of this Specification.
- B. After compaction, cut-out soft spots and unstable areas in the subgrade and fill with granular fill as defined in Section 02210 and compact as specified in Section 02230 of this Specification.

3.3 GRANULAR BASE:

- A. Construct the granular base as shown on Drawings on the prepared subgrade after the final shaping and compacting of the subgrade is completed.
- B. Compact as specified for under slab base in Section 02230 of this Specification.
- C. When natural soil is granular and meets the requirements of granular base material and when the bottom elevation of the proposed concrete is in a cut section, then the subgrade for the concrete can be considered directly below the concrete. At least 8 inches of this type of subgrade shall be proof rolled to a density as specified in Section 02230 of this Specification.

3.4 FORM CONSTRUCTION:

- A. Forms shall have the strength and rigidity, regardless of material, such that when they are set in place and braced, they will withstand weight of equipment and weight of concrete without settlement or lateral displacement.
- B. Keyway forms in the edge of pavement slabs and at construction joints shall be constructed to the dimensions shown on Drawings. Wood keyway forms, if used, shall be bolted or nailed to the side forms. Metal keyway forms shall be fixed or held rigidly in place by staking or other OWNER approved method.
- C. Forms shall be coated prior to the placement of concrete, with a nonstaining form release agent. Wooden form may be prewetted with water. No standing water, adjacent to forms, shall be permitted.

3.5 REMOVAL OF FORMS:

- A. Forms for slabs on grade shall not be removed earlier than 12 hours after the placement of concrete has been completed. Within 24 hours of form removal backfill adjacent to the pavement shall be completed.
- B. Forms supporting the weight of concrete shall not be released until the concrete has reached its specified 28-day strength. Minimum time elapse after casting and before the false Work supports are released shall be 8 days for spans up to 96 inches center to center of supports, plus 1 additional day for each 12 inches of increase in span length over 84 inches up to 14 days for span of 14 feet and over. Such time period shall be exclusive of those time intervals during which the concrete surface temperature is below 40 degrees Fahrenheit. If temperature remains below 40 degrees Fahrenheit during the casting and curing period no forms shall be removed until approved field tests indicating adequate concrete strength have been provided.

3.6 REINFORCEMENT PLACEMENT:

- A. Tie bars, reinforcement bars and dowel bars shall be clean, free from rust and shall be placed on adequate supports in locations as shown on Drawings. Provide the following minimum thickness of concrete cover:
 - 1. Concrete deposited on ground: 3 inches
 - 2. Formed surfaces against ground: 1-1/2 inches
 - 3. Beams, girders and columns: 1-1/2 inches
 - 4. Slabs, walls and joists: 1 inch

5. Clear distance between parallel bars: 1 inch or nominal bar distance
6. For No. 6 bars or larger: 2 inches
7. No broken brick, block or concrete shall be permitted as reinforcement supports.

3.7 CONCRETE PLACEMENT:

- A. Place concrete to required depth and width to form a continuous mass requiring a minimum of rehandling. Concrete adjacent to side forms and fixed structures shall be consolidated by means of portable vibrators or by mechanical means with the use of hand spading. Vibrators shall not be used to move concrete horizontally.
- B. If it is necessary to place a construction joint prior to a contraction joint, the distance between the construction joint and the previous contraction joint shall not be less than 60 inches.

3.8 JOINTS:

- A. General:
 1. Construct expansion, contraction and construction joints with face perpendicular to surface of concrete.
 - a. Where joining existing structures, match existing contraction or expansion joints.
- B. Expansion Joints:
 1. All fixed objects, such as buildings and structures or pavement, sidewalks or curb intersections shall be separated by a 1/2 inch expansion joint placed at the full depth of the concrete thickness. Expansion joints, in addition to the above, shall be placed at 50 foot intervals in the following:
 - a. Sidewalks
 - b. Curb and gutter
 - c. Curb
 2. For pavement construction, place expansion joints as shown on Drawings.
- C. Contraction Joints:
 1. Contraction joints shall be placed at the following intervals and dimensions or as shown on Drawings:
 - a. Sidewalks - 5 feet; 1/8 inch wide by 1/4 of the depth.
 - b. Curb and gutter - 10 feet; 1/8 inch wide by 2 inch depth.
 - c. Curb - 10 feet; 1/8 inch wide by 2 inch depth.
 - d. Concrete pavement - refer to Drawings.
 2. Cut plastic concrete with appropriate tool to specified depth. Finish edges with 1/4 inch radius tool.
 3. Saw-cut joints to specified width and depth on hardened concrete as soon as concrete has hardened sufficiently to prevent raveling or damage to the joint.
- D. Joint Sealer:
 1. Apply joint sealer to a clean and dry expansion or contraction joint to a point approximately 1/4 inch below the top surface. Where oil treatment is specified, joint sealer shall be applied prior to application of the oil.

3.9 WATERSTOPS:

- A. Waterstops shall be installed continuous in all concrete where indicated on Drawings. Care shall be taken in the correct positioning of waterstops during installation with the centerline of the water stop coinciding with the exact position within the concrete Work. Concrete shall be well worked around the water stop during placing so as to insure maximum density and imperviousness at the joint. Field splicing shall be kept at a minimum. Straight splices are to be a heat welded butt joint. All intersections are to be mitered and welded as per manufacturer's directions. No open flame

shall be used. Joints shall develop watertightness fully equal to that of the continuous water stop material. Waterstops shall not be pierced for any reason.

3.10 CONCRETE FINISH:

- A. After initial strike-off and floating, and prior to finishing, test surface with 10-foot straightedge. Correct irregularities prior to final finishing operations.
- B. Apply the following surface finish after surface sheen or excess moisture has disappeared:
 - 1. Apply wood float or magnesium float finish:
 - a. Sidewalk
 - 2. On inclined surfaces, after steel trowel finish, provide a coarse finish transversely to line of traffic, with the use of stiff bristle broom:
 - a. Sidewalk
 - b. Concrete pavement

3.11 CONCRETE CURING AND PROTECTION:

- A. Cure concrete surfaces for 7 days (normal concrete) and for 3 days (high early-strength concrete), using appropriate means of protection as previously cited in ACI 305 and ACI 306.
- B. Curing methods shall consist of one of the following:
 - 1. Keep concrete surface continuously wet by ponding with water.
 - 2. Apply moistureproof fabric to entire area lapping joints and edges at least 3 inches. Tape interior joints and weight edges down with sand or other approved material.
 - 3. Apply liquid membrane curing compound to the finished surface in a 2 coat continuous operation with second application applied transversely to the direction of the first application, and in accordance with the manufacturer's directions. Replace damaged areas with equal applications of membrane using compound. Liquid membrane curing compound shall not be permitted where the surface will be subjected to an application of waterproof coatings, bonding agents, treating oil or paint.
- C. Oil treatment (anti-spalling) shall consist of the following:
 - 1. Apply concrete treating oil, after a 28-day period to a clean dry surface at the rate of approximately 130 square yards per gallon, applied in 2 applications. Second application shall be deferred until first application has been thoroughly absorbed. Before applying the treatment, the surface must be clean and free of oil, grease or other foreign materials which might interfere with the penetration of the treating oil into the pores of the concrete surface.

3.12 TESTING AND EVALUATION:

- A. Concrete materials and operations shall be tested and inspected as the Work progresses, by an independent testing laboratory. CONTRACTOR shall furnish any necessary labor who is familiar with methods of sampling and shall assist the designated testing agency in obtaining and handling samples, and for safe storage and proper curing of concrete test specimens on Worksite.
- B. Mold and cure three standard 6-inch diameter specimens from each sample in accordance with ASTM C31. Compressive strength test specimens shall be in accordance with ASTM C39. Two specimens shall be tested at 28 days for acceptance and one shall be tested at 7 days for information. The acceptance test results shall be the average of the strengths of the two specimens tested at 28 days. If one specimen in a test manifests evidence of improper sampling, molding or testing, it shall be discarded and the strength of the remaining cylinder shall be considered the test result. Should both specimens in a test show any of the above defects, the entire test shall be discarded. When high-early strength concrete is used, the first specimen shall be tested at 3 days; the remaining two at 7 days.

- C. Make at least one strength test for each 100 cubic yards, or fraction thereof, of each mix design of concrete placed in any one day.
- D. Determine slump of the concrete sample for each strength test and whenever consistency of concrete appears to vary, using standard slump cone as per ASTM C143.
- E. The testing laboratory shall report all test and inspection results to OWNER'S Designated Representative, OWNER'S Engineer, and CONTRACTOR immediately after they are performed. All concrete test reports shall include name of job, date of placement, date of test, batch mix design, slump and the exact location in the Work at which the batch represented by the test was deposited.
- F. All costs necessary to prepare concrete test cylinders, make tests and furnishing of written reports shall be borne by the CONTRACTOR.

3.13 DEFECTIVE WORK:

- A. When tests and inspections ordered, by OWNER, of the aggregate base and/or concrete Work indicate non-compliance with the Specification, CONTRACTOR and OWNER shall mutually agree on the number and location of additional tests to define and/or verify the deficiency. If the average of the tests for a given area indicate non-compliance the area is considered defective and CONTRACTOR shall:
 - 1. Remove and replace defective Work at no cost to OWNER; or
 - 2. Correct the Work at no cost to OWNER in a manner acceptable to OWNER; or
 - 3. Give OWNER a credit towards the Contract Price if said credit is acceptable to OWNER.
 - 4. If Work is found to be in noncompliance, CONTRACTOR shall pay for the defective area removal and replacement, and the tests and inspection costs.
 - 5. If Work is found to be in compliance, OWNER shall pay for tests and inspection costs.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 02711

CHAIN LINK FENCES

PROJECT I.D. 0083940

1.0 PART 1

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Relocate and install all new chain link fencing as shown on Drawings and herein specified.
 - 1. Chain link fences shall include the following:
 - a. Galvanized steel finish systems.
- C. Installer must examine all Worksite conditions under which the fence and gates are to be installed and shall accept the premises as they find them and do all Work required by Drawings and this Specification.
- D. Related Work Specified Elsewhere:
 - 1. Demolition: Section 02110
 - 2. Waste Material Disposal: Section 02227

1.2 QUALITY ASSURANCE:

- A. Source Quality Control:
 - 1. Provide each type of steel fence and gates as a complete unit produced by a single manufacturer, including necessary erection accessories, fittings and fastenings.
- B. Abbreviations and/or References:
 - 1. The following organization reference shall be interpreted to mean:
 - a. CLFMI - The Chain Link Fence Manufacturers Institute, current standards of manufacture.
 - b. ASTM - The American Society of Testing Materials, latest edition.

1.3 SUBMITTALS:

- A. Shop Drawings:
 - 1. Prepare and submit shop drawings for OWNER'S approval. Shop drawings for chain link fences and gates shall include plan layout and details illustrating fence height, location and sizes of posts, rails, braces, gates and footings, hardware list and erection procedures.
- B. Product Data:
 - 1. For information only, submit 2 copies of manufacturer's data specifications and installation instruction for chain link fences and gates to OWNER. Indicate by transmittal that a copy of each instruction has been forwarded to CONTRACTOR and Installer.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver materials to Worksite and store in a safe dry place with all labels intact and legible at time of installation.

2.0 PART 2 - PRODUCTS

2.1 FABRIC MATERIALS:

- A. Fabric:
 - 1. Fabric shall be 1 piece width fabricated from number 9 gage (0.148 inch) steel wire, woven into a 2 inch diamond mesh. Chain link fabric is for fences up to 12 feet in height.
 - a. Fabric 72 inches high and over shall be knuckled at one selvage and twisted at the other.
 - b. Fabric 60 inches high and under shall be knuckled at both selvages.
 - c. The selvage of fabrics with meshes less than 2 inches shall be knuckled.
- B. Fabric Finish:
 - 1. Galvanized finish with not less than 2.0 ounce zinc per square foot, complying with ASTM A392, Class II.

2.2 FRAMEWORK AND APPURTENANCES:

- A. General:
 - 1. Pipe sizes indicated are commercial steel pipe sizes. Equivalent tubular sections, H-sections or roll-formed sections may be substituted for pipe sections, if approved by OWNER.
 - 2. Galvanized finish with not less than minimum weight of zinc per square foot (PSF), complying with the following:
 - a. Pipe: ASTM A120 (ounce zinc PSF).
 - b. Square tubing: ASTM A123 (ounce zinc PSF).
 - c. C and H-sections: ASTM A123 (ounce zinc PSF).
 - d. Hardware and accessories: ASTM A153 (zinc weight per Table I).
- B. Line Posts:
 - 1. Pipe sizes indicated are commercial steel pipe sizes. Equivalent tubular sections, H-sections or roll-formed sections may be substituted for pipe sections, if approved by OWNER.
 - a. Steel pipe shall be 1.90 inches (outside diameter) weighing 2.72 pounds per lineal foot.
- C. Corner, End and Pull Posts:
 - 1. Steel pipe shall be 2.875 inches (outside diameter), weighing 5.79 pounds per lineal foot.
- D. Top Rail and Braces:
 - 1. Steel pipe shall be 1.660 inches (outside diameter), weighing 2.27 pounds per lineal foot.
- E. Barbed Wire Supporting Arms:
 - 1. Barbed wire supporting arms shall be pressed steel wrought iron, or malleable iron, complete with provision for anchorage to posts and attaching 3 rows of barbed wire to each arm. Supporting arms may be either attached to posts or integral with post top weather cap. Provide the following type:
 - a. Single vertical arm, 1 for each post where indicated.
 - b. Single 45 degree arm, 1 for each post where indicated.
 - c. Vee-type with 2 arms at 45 degrees to vertical, 1 set for each post where indicated.
 - d. Inverted Vee-type with 2 cross-braced arms at 45 degrees to vertical, 1 set for each post where indicated.
- F. Barbed Wire:
 - 1. Barbed wire shall be 2 strand, 12-1/2 gage wire with 14 gage, 4-point barbs spaced 5 inches on center as follows:
 - a. Galvanized, complying with ASTM A121, Class 3.
 - b. Aluminized, complying with ASTM A585, Class 2.

- c. PVC coated, per manufacturer's standards.
- G. Post Tops:
 - 1. Post tops shall be steel, wrought iron, or malleable iron designed as a weathertight closure cap (for tubular posts). Provide 1 cap for each post unless equal protection is afforded by combination post top cap and barbed wire supporting arm, where barbed wire is required.
 - a. Furnish caps with openings to permit through passage of the top rail.
- H. Stretcher Bars:
 - 1. Stretcher bars shall be 1 piece lengths equal to full height of fabric, with a minimum cross-section of 3/16 inch by 3/4 inch.
- I. Stretcher Bar Bands:
 - 1. Stretcher bar bands shall be steel, wrought iron or malleable iron bands that are the manufacturer's standard will be accepted.
- J. Tension Wire:
 - 1. Tension wire shall be galvanized 7 gage coiled spring wire.
- K. Wire Fasteners:
 - 1. Wire clips shall be 6 gage, galvanized.
 - 2. Tie wires shall be 9 gage, galvanized.
 - 3. Hog rings shall be 11 gage, galvanized.
- L. Concrete:
 - 1. Concrete shall have a minimum cement content of 5-1/2 bags per cubic yard, a maximum slump of 3 inches, 5 to 7 percent air entrainment and a minimum 28-day compressive strength of 3500 pounds per square inch (psi).
 - 2. Concrete shall conform to the requirements of Section 02620/03300 of this Specification, except the minimum 28-day compressive strength maybe of 3500 pounds per square inch (psi).

3.0 PART 3 - EXECUTION

3.1 GENERAL:

- A. On existing terrain outside of the site grading limits remove all brush, trees and other obstructions which interfere with the construction of the fence and dispose in accordance with Section 02227 of this Specification. A reasonably smooth ground profile shall be provided at the fence line.
- B. Within the site grading limits the final grading shall be completed with finish elevations established before installing the fence, unless otherwise permitted by OWNER.
- C. In general, the bottom of the fence shall be not more than 2 inches above the contour of the ground. At stream crossings, drainage ditches, and other locations where it is impractical to conform the fence to the ground contour the fence shall span the depression. Unless Drawings require otherwise, the space below the bottom of the fence shall be closed with extra fabric or barbed wire as instructed by OWNER'S Designated Representative. If extra length posts are needed at such locations, CONTRACTOR shall furnish and install the longer post in lieu of the standard length posts, together with any intermediate posts, stakes, braces, extra fabric or wire as may be required.
- D. Drill holes of diameters and spacings shown, for post footings in firm, undisturbed or compacted soil.
 - 1. Excavate hole depths approximately 3 inches lower than the post bottom. All line, corner, pull and end posts shall be set not less than 36 inches below the surface and all gate posts shall be set not less than 48 inches below the surface when in firm undisturbed soil.

Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads.

2. Spread soil from excavations uniformly adjacent to the fence line, or on adjacent areas of the site, as directed.
- E. When solid rock is encountered near the surface, drill into rock at least 12 inches for line posts and at least 18 inches for end, pull, corner, and gate posts. Drill hole at least 1 inch greater diameter than the largest dimension of the post to be placed.
1. If solid rock is below soil overburden, drill to full depth required, except penetration into rock need not exceed the minimum depths specified above.

3.2 FENCE INSTALLATION AND ERECTION:

A. Post Spacing:

1. All line posts shall be spaced equally along the fence line on a maximum of 10-foot centers.
2. Pull posts shall be placed at intervals of 500 feet in the fence line or at abrupt changes in grade.

B. Setting Posts:

1. Remove all loose and foreign materials from sides and bottoms of holes, and moisten soil prior to placing concrete.
2. Center and align posts in holes 3 inches above bottom of excavation.
3. Place concrete around posts in a continuous pour, and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.
4. Trowel finish tops of footings, and slope or dome to direct water away from posts. Extend footings for gateposts to the underside of bottom hinge. Set keeps, stops, sleeves and other accessories into concrete as required.
5. Grout-in posts set into sleeved holes, concrete constructions, or rock excavations with non-shrink portland cement grout, or other acceptable grouting material.
6. Concrete, when deposited in weather less than 40 degrees Fahrenheit (F), shall be at a temperature not less than 50 degrees F., and not more than 85 degrees F. In freezing weather, suitable means shall be provided for maintaining the concrete at a temperature not lower than 45 degrees F., for 4 days. Amounts of additional cement to accelerate hardening of concrete in cold weather shall be used with no calcium chloride permitted as an accelerator.
7. Allow concrete to attain at least 75 percent of its minimum 28-day compressive strength, but in no case sooner than 7 days after placement, before rails, tension wires, barbed wire, or fabric is installed. Do not stretch and tension fabric and wires, and do not hang gates until the concrete has attained to its full design strength.

C. Extension Arms:

1. Extension arms shall be set on top of each line post positioned as indicated on Drawings.

D. Top Rails:

1. Top rails shall pass through base of extension arms and form a continuous brace from end to end of each stretch of fence. Top rails shall be securely fastened to end, corner, pull and gate posts by means of suitable malleable fittings.
2. Couplings shall connect top rails at 20-foot intervals with an expansion coupling placed every 100 feet.

E. Braces:

1. Braces shall be spaced midway between top rail and ground and shall extend from gate, corner, pull or end post to first adjacent line post. Braces shall be fastened to posts with suitable connections and then trussed from line post back to gate, corner, pull or end post

with 3/8-inch diameter adjustable truss rod. When the horizontal deflection angle at corners is less than 10 degrees, bracing will not be required.

F. Fabric:

1. Fabric shall be fastened as follows:

- a. To line posts at 12 inches on center with wire clips.
- b. To top rail at 18 inches on center with tie wires.
- c. To tension wire at 24 inches on center with hog rings.
- d. To gate, corner, pull and end post thread stretcher bars through fabric and secure to posts with metal bands spaced 15 inches on center. Provide 1 stretcher bar for each gate and end post, and 2 for each corner and pull post except where fabric is integrally woven into the post.

G. Tension Wires:

1. Tension wires shall be installed by weaving through the fabric and tying to each post with wire clips.

H. Fasteners:

1. Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.3 CLEAN UP:

A. The installation shall be left in a neat professional condition and all waste and excess material shall be removed from Worksite in accordance with Section 02227 of this Specification.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 03100

CONCRETE FORMWORK

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all concrete formwork as shown on Drawings and herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Foundation Excavating and Backfilling: Section 02220
 - 2. Exterior Portland Cement Concrete: Section 02620
 - 3. Concrete Reinforcement: Section 03200
 - 4. Cast-In Place Concrete: Section 03300

1.2 QUALITY ASSURANCE:

- A. Referenced Standards:
 - 1. The current edition of the American Concrete Institute Publication "ACI Standard Recommended Practice for Concrete Formwork (ACI-347)" shall govern all Work performed hereunder, unless otherwise specified.
- B. Design Criteria:
 - 1. The design and engineering of formwork, as well as its construction, shall be the responsibility of CONTRACTOR. Forms shall be designed to have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall also be designed for sufficient rigidity to maintain specified tolerances.
 - 2. Earth cuts shall not be used as forms for vertical surfaces, unless authorized in writing by OWNER'S Designated Representative.
- C. Construction Tolerances:
 - 1. CONTRACTOR shall establish and maintain in an undisturbed condition and until final completion and acceptance of the project sufficient control points and bench marks to be used for reference purposes to check tolerances.
 - 2. Unless otherwise indicated on Drawings, formwork shall be constructed so that the concrete surfaces will conform to the following tolerance limits:
 - a. Variation from plumb:
 - 1) In the lines and surfaces of columns, piers, walls, and in arises:

In any 10 feet of length	1/4 inch
Maximum for the entire length	1 inch
 - 2) For exposed corners, columns, control-joint grooves, and other conspicuous lines:

In any 20 feet length	1/4 inch
Maximum for the entire length	1/2 inch
 - b. Variation from the level or from the grades specified in the contract documents:
 - 1) In slabs:

In any 10 feet of length	1/4 inch
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- In any bay or in any feet length 3/8 inch
 - Maximum for the entire length 3/4 inch
 - c. Variation of the linear building lines from established position in plan and related position of columns, walls and partitions:
 - 1) In any bay 1/2 inch
 - In any 20 feet of length 1/2 inch
 - Maximum for the entire length 1 inch
 - d. Variation in the sizes and location of sleeves, floor openings, and wall openings, plus or minus 1/4 inch
 - e. Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls:
 - Minus: 1/4 inch
 - Plus: 1/2 inch
 - f. Footings:
 - 1) Variations in dimensions in plan:
 - Minus: 1/2 inch
 - Plus: 2 inch
 - 2) Misplacement or eccentricity: 2 percent of the footing width in the direction of misplacement but not more than: 2 inch
 - 3) Thickness:
 - Decrease in specified thickness 5 percent
 - Increase in specified thickness No limit
 - g. Variation in steps:
 - 1) In a flight of stairs:
 - Rise, plus or minus 1/8 inch
 - Tread, plus or minus 1/4 inch
 - 2) In consecutive steps:
 - Rise, plus or minus 1/16 inch
 - Tread, plus or minus 1/8 inch
- 3. CONTRACTOR shall design and construct formwork in such manner as to ensure that concrete surfaces will conform to the tolerances of Chapter 2, Section 2, Section "Suggested Tolerances" as published in the previously cited ACI specification.
- 4. Construction tolerances for exterior concrete Work shall consist of the following:
 - a. Vertical alignment shall not vary more than 1/8 inch from the edge of a 10-foot straight edge.
 - b. Horizontal alignment shall not vary more than 1/2 inch from the plan alignment for pavement and sidewalk.
 - c. Horizontal alignment for vertical faces of curb and gutter or curb shall not vary more than 1/2 inch from the plan alignment.
 - d. Concrete thickness shall not be less than specified.

1.3 SUBMITTALS:

A. Shop Drawings:

- 1. If requested by OWNER, CONTRACTOR shall prepare and submit shop drawings of formwork for OWNER'S approval.
- 2. Submit diagrams of construction joint layout for OWNER'S approval.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Forms for all concrete shall consist of either lumber, plywood, or steel. Wood forms shall be sound, clean lumber or plywood (marine grade type), free from holes or defects. Metal forms shall be of standard manufacture and need not be new but shall be true to line and dimension.
- B. Form oil shall be as manufactured for the type form material used and shall prevent adhesion or sticking of concrete to forms. Form oil that will discolor or injure concrete will not be used.
- C. Form ties and accessories shall be of standard manufacture and of such design that they have a minimum working strength (when fully assembled) of at least 3,000 pounds.
- D. Compressible material between cast-in-place concrete and earth shall be a corrugated cardboard form as manufactured by Surevoid Products, Inc., Englewood, Colorado (phone: 800/458-5444 website: www.arcvoid.com) or OWNER approved equal. Refer to Drawings for sizes and location.

3.0 PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Forms shall be constructed to conform to the shape, lines and dimensions of the members shown on Drawings; be true to line, plumb and level or to the slopes indicated and be substantial and sufficiently tight to prevent leakage. Form structures shall be capable of presenting a smooth, dense, homogenous mass free from excessive form lines, irregularities, burrs, dents, sags, or holes, when used for permanently exposed faces. All formwork shall be subject to the approval of OWNER'S Designated Representative before pouring of concrete.
 - 1. Location of construction joints shall be at such points and locations as are shown on Drawings or required by OWNER. The method of construction and materials used shall be subject to the approval of OWNER'S Designated Representative.

3.2 ACCESSORIES AND EMBEDDED ITEMS:

- A. Securely place in forms all accessories and embedded items specified or shown. This includes ties, rods, spacers, anchorage devices and similar items, which when in place shall be approved by OWNER before pouring of concrete. Wood spacers shall be removed just prior to depositing of concrete.
 - 1. Bolts and rods used for internal ties shall be so arranged that when forms are removed the embedded portion of the ties shall terminate not less than two (2) diameters or twice the minimum dimension of the tie from the formed faces of concrete to be permanently exposed to view, except that in no case shall this distance be less than 3/4 inch. When the formed face of the concrete is not to be permanently exposed to view, form ties may be cut off flush with the formed surfaces.
 - 2. Embedded items in concrete are specified in other sections of this Specification; however, CONTRACTOR shall cooperate with other trades for installation of same.

3.3 PREPARATION OF FORM SURFACES:

- A. All surfaces of forms and embedded materials shall be cleaned of any accumulated mortar or grout from previous concreting and of all other foreign material before concrete is placed in them.
- B. Lumber, plywood and hardboard forms shall be treated with a non-staining form oil or lacquer. If oil is used, all excess oil shall be wiped off with rags to leave the surface of the forms just oily to the touch. Coating of deleterious material shall be removed from contact surfaces on forms before placing of concrete. Concrete shall not be placed in any forms until it is inspected by OWNER and permission is given to start placing. Where exposed "as-cast" finishes are required, materials, which will impart a stain to the concrete, shall not be applied to the form surfaces. Where the

finished surface is to be painted or coated, the material applied to form surfaces shall be compatible with the type of paint or coating to be used. Do not allow form oil to puddle in forms, nor shall such coating be allowed to come in contact with hardened concrete against which fresh concrete is to be placed.

3.4 REMOVAL OF FORMS:

- A. CONTRACTOR shall remove all forms and shall assume full liability for all damage due to the removal of forms.

3.5 INSPECTION OF CONCRETE SURFACES:

- A. OWNER'S Designated Representative will inspect the completed concrete Work after forms have been removed. Work that does not conform to the slopes, lines and dimensions shown on Drawings and within the tolerances as previously cited (Article 1.2, paragraph C) as determined by the OWNER'S Designated Representative shall be repaired or removed to OWNER'S satisfaction.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 03200

CONCRETE REINFORCEMENT

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all concrete reinforcement as shown on Drawings and herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Exterior Portland Cement Concrete: Section 02620
 - 2. Concrete Formwork: Section 03100
 - 3. Cast-In-Place Concrete: Section 03300

1.2 QUALITY ASSURANCE:

- A. Referenced Standards:
 - 1. The current editions of the following American Concrete Institute (ACI) publications shall govern all Work performed hereunder, unless otherwise specified:
 - a. Manual of Standard Practice for Detailing Reinforcing Concrete Structures - ACI 315.
 - b. Building Code Requirements for Reinforced Concrete - ACI 318.
 - 2. The current edition of the "Recommended Practice for Placing Reinforcing Bars" of the Concrete Reinforcing Steel Institute (CRSI) shall govern where applicable, unless otherwise specified.
- B. Construction Tolerances:
 - 1. Reinforcing bars shall be placed to the following tolerances:
 - a. Clear distance to formed surface, plus or minus: 1/4 inch
 - b. Top bars in slabs and beams 8 inches deep or less, plus or minus: 1/4 inch
 - c. Top bars in members 8 inches to inches, plus or minus: 1/2 inch
 - d. Top bars more than 24 inches deep, plus or minus: 1 inch
 - e. Crosswise or lengthwise spacing, plus or minus: 2 inches
 - 2. Unless shown on Drawings, bars shall be located so as to have the following minimum thickness of concrete cover:
 - a. Concrete deposited on ground: 3 inches
 - b. Formed surfaces against ground: 1-1/2 inches (refer to f.)
 - c. Sides and bottoms of beams, girders and columns: 1-1/2 inches
 - d. Slabs, walls and joists: 3/4 inch
 - e. Clear distance between parallel bars: 1 inch or nominal bar diameter
 - f. For No. 6 bars or larger: 2 inches
 - g. Top slab and beam bars: 2 inches
 - h. Bottom slab bars: 1 inch
 - i. Column ties: 1-1/2 inches

1.3 SUBMITTALS:

A. Shop Drawings:

1. Prepare and submit shop drawings and setting diagrams for OWNER'S approval. Reinforcing steel shall be detailed in accordance with previously cited reference standards, unless specifically shown otherwise. The number, type and spacing of supports and other accessories shall be as recommended in the ACI "Manual of Standard Practices".
2. Shop drawings shall indicate bending diagrams, assembly diagrams, splicing and laps of rods, shapes, dimensions and details of bar reinforcing and accessories. Show location, type and quantities of bolsters, spacers and support bars.
3. Scaled dimensions from Structural Drawings shall not be used in determining the length of reinforcing rods.
4. All footings shall have a minimum of two (2) number 5 bars, unless otherwise detailed.
5. Show concrete cover dimension from face of form to reinforcing bars.

B. Certification:

1. Contractor shall, when requested by OWNER, furnish two (2) certified copies of mill test reports indicating conformance with the applicable ASTM specifications for reinforcing steel used in the Work.
2. In case of questionable resteel, OWNER will have tests performed by an independent testing firm. OWNER shall have the option of rejecting a shipment based on the test report.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver reinforcement to Worksite in bundles marked with metal tags indicating bar size and length.
- B. Immediately after delivery, reinforcing steel shall be sorted for size, shape and length or by final usage. Store on racks clear of ground, protected at all times from contamination and the weather.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. All reinforcing bars shall be of new billet steel conforming to ASTM A615, Grade 60 (60,000 psi yield). Sizes of bars shall be as indicated on Drawings or herein specified.
- B. Reinforcing bars and dowels for exterior concrete flat Work shall conform to Grade 60 similar to above, except for the following:
 1. Dowel bars when used for contraction and expansion joints shall be smooth steel bars coated with a thin uniform coating of liquid asphalt (MC-250) or road tar (RT-6) on the length of the bar plus 2 inches. In addition, dowel bars for expansion joints shall be furnished with end caps designed with one end closed, a minimum length of 3 inches and be positioned to allow bar movement of not less than 1 inch.
 2. Dowel bar assemblies may be permitted if fabricated to the width of the pavement section.
 3. Tie bars for control, longitudinal and construction joints shall be deformed bars.
- C. Reinforcing mesh shall be welded wire fabric conforming to ASTM A185. Mesh not otherwise indicated shall be fabricated from 4 wires spaced 6 inches each way (6x6 - W2.9xW2.9).
 1. Welded wire fabric shall be furnished in flat sheets and be lapped a minimum of 12 inches.

- D. Furnish all stirrups, ties, spacers, chairs, bolsters, turnbuckles, or similar accessories required for assembling, placing and supporting the reinforcing.
 - 1. Hy-chairs shall be welded steel construction and all spacers, supports, bars, hy-chairs shall be of design approved by OWNER.
 - 2. Plastic slab bolsters and chairs may be used with approval from OWNER.

2.2 FABRICATION AND MANUFACTURE:

- A. Reinforcing steel shall be shop fabricated to conform to approved shop drawings, and in accordance with the previously cited ACI 315 standard.
- B. No bars shall be fabricated in a manner that will injure the material. Heating of bars for bending will not be permitted.
- C. Provide corner bars to make reinforcing continuous at all times, including intersections at footings, walls, beams or caps. Such bars shall be the same size and spacing as the horizontal reinforcing and each leg shall have a length of at least 30 inches.
- D. All bar splices shall be Class 'B' lap minimum in accordance with the previously cited ACI 318 standard, but never less than 12 inches. Provide two number 5 bars extra on all four sides of openings in slabs or walls with all bars extending minimum of 24 inches beyond edges of opening, unless otherwise detailed.

3.0 PART 3 - EXECUTION

3.1 PLACING:

- A. All reinforcing steel shall be placed in exact position and spacing in strict accordance with approved shop drawings and in accordance with the previously cited CRSI standard. The steel shall be supported at the proper distance from the forms and spaced at proper distances apart by means of approved bar supports, chairs, spacers and other approved devices. Reinforcement shall be adequately and securely wired or tied to ensure against displacement during concrete pouring operations. Set wire ties that ends are directed away from concrete surfaces.
 - 1. Concrete blocks or bricks or portions thereof may be used to support rods in slabs on the ground. Spacing of supports shall not exceed 48 inch centers.
 - 2. Reinforcement shall not pass through expansion joints or contraction joints. Concrete bases shall be reinforced as detailed.
- B. Exposed reinforcing steel shall be sufficient cause for the rejection of the concrete section or panel in which the exposed bar occurs.
- C. Reinforcing bars at time of embedding in concrete shall be free from rust, mill scale, paint, oil, grease, mortar, dirt, ice or any other coating that will reduce or destroy the bond with the concrete. The placing of any bars while concrete is being poured will not be permitted.
 - 1. A thin film of rust may be permitted at the discretion of OWNER'S Designated Representative.

3.2 MESH REINFORCEMENT:

- A. All mesh in slabs on grade shall be adequately and securely supported during placing of concrete to insure its proper position in the slab, either by use of brick batts, chairs and bars or by placing the mesh on a layer of fresh concrete of the correct depth before placing the upper layer of the slab.
 - 1. Mesh shall not be lifted into place with hooked rods during the placement of concrete.

2. Unless otherwise indicated, wire mesh shall be placed into the center one-third of the slab to ensure complete embedment and coverage of mesh with maintained specified tolerances.
- B. Mesh reinforcement in slabs shall have sides and ends lapped not less than one mesh. Do not make end laps midway between supporting beams, or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps.
1. If flat sheet mesh is used, the sides and ends shall be lapped not less than two mesh.

3.3 INSPECTION:

- A. All reinforcement shall be inspected by OWNER'S Designated Representative after placement in forms and approval of OWNER shall be obtained prior to pouring of concrete. Approval of reinforcing by OWNER shall be for placement, spacing and tying only. It shall not relieve CONTRACTOR of responsibility for structural integrity of the building or structure.
1. The placing of concrete in any section before the steel for the entire section has been placed is prohibited. Concrete improperly placed shall be subject to removal at OWNER'S discretion.
 2. Where there is delay in depositing concrete, reinforcement shall be reinspected before placing concrete to insure that reinforcement is dry and clean of partially set cement or mortar and all other foreign matter.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 03300

CAST-IN-PLACE CONCRETE

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and construct all cast-in-place concrete as shown on Drawings and herein specified.
 - 1. Work shall also include concrete Work required for mechanical and electrical equipment, openings in concrete, and other Work unless otherwise indicated (refer to Mechanical and Electrical Drawings for information).
- C. Related Work Specified Elsewhere:
 - 1. Foundation Excavating and Backfilling: Section 02220
 - 2. Exterior Portland Cement Concrete: Section 02620
 - 3. Concrete Formwork: Section 03100
 - 4. Concrete Reinforcement: Section 03200
- D. CONTRACTOR shall keep one copy of "Specifications for Structural Concrete for Building" (ACI-301) with selected ACI and ASTM references, SP-15, in the field office at all times to be used for reference. Published by the American Concrete Institute, P.O. Box 19150, Redford Station, Detroit, Michigan 48219.

1.2 QUALITY ASSURANCE:

- A. Referenced Standards:
 - 1. The current editions of the following American Concrete Institute (ACI) publications shall govern Work performed hereunder, unless otherwise specified:
 - a. Building Code Requirements for Reinforced Concrete - ACI 318
 - b. Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete - ACI 304
 - c. Recommended Practice for Hot Weather Concreting - ACI 305
 - d. Recommended Practice for Cold Weather Concreting - ACI 306
 - e. Consolidation of Concrete - ACI 309
 - f. Recommended Practice for Selecting, Proportions, for Normal and Heavyweight Concrete - ACI 211.1
 - g. Recommended Practice for Concrete Floor and Slab Construction - ACI 302
 - h. Recommended Tolerances for Concrete Construction and Materials - ACI 117
- B. Design Criteria:
 - 1. CONTRACTOR shall employ an approved independent materials testing laboratory and pay for the service of setting up the design mixes and to analyze the fine and coarse aggregate for the various uses of concrete utilized on the project. Design mixes shall be in accordance with the previously cited ACI 318 publication and in compliance with this Specification. The proposed mixes shall be submitted to OWNER for approval prior to placing of any concrete. The approved mixes established by the laboratory shall be used in the Work as long as the characteristics of the ingredients remain unchanged. If any

significant change is made in the ingredients, new mixes shall be prepared and submitted to OWNER for approval.

- a. Where indicated on Drawings, concrete floors shall have a floor hardener as herein specified.
2. All concrete, except interior concrete slab-on-grade, shall have a 28-day compressive strength of 4,500 pounds per square inch (psi), unless otherwise indicated on Drawings. Concrete shall have a minimum cement content of 5 bags (94 pounds per bag) per cubic yard. The slump of all concrete shall not exceed 4 inches, except where concrete is pumped. In the event that a paver or power driven vibrator screeds are used, the slump of the concrete shall be reduced to 2 inches. The design mix shall be approved in writing by the Structural Engineer of Record.
 - a. Exterior concrete flat Work such as sidewalks, pavements, curbs and gutters, miscellaneous concrete pads or slabs on grade, shall have a 28 day compressive strength of 4,500 psi, same as above, except that a minimum cement content per cubic yard shall consist of 6 bags per cubic yard.
 - b. Concrete for interior slabs shall be proportioned with a maximum water cement ratio 0.48 and a minimum cement content of 540 pounds per cubic yard.
 - c. Concrete for portions of the structure exposed to frequent cycles of freezing and thawing shall be air-entrained and have a water-cement ratio not exceeding 0.48.
 - d. Concrete subjected to deicers shall be air-entrained and have a water-cement ratio not exceeding 0.45 and a cement content not less than 6 bags of cement per cubic yard.
3. The total air content of air-entrained concrete as measured by ASTM C231 or ASTM C173 shall not exceed the following:

<u>MAXIMUM SIZE (INCHES)</u> <u>COARSE AGGREGATE</u>	<u>TOTAL AIR CONTENT</u> <u>(PERCENT) BY VOLUME</u>
1 - 1/2	4 - 7
1	4-1/2 - 7-1/2
3/4	5 - 8

4. The nominal maximum size of the aggregate shall not be more than one-fifth of the narrowest dimension between sides of forms, one-third of depth of slabs, nor three-fourths of the minimum clear spacing between reinforcing bars. For members 12 inches or less, the maximum size of aggregate shall be 3/4 inch.
 - a. The proportions of fine and coarse aggregates shall be such that the ratio of the coarse aggregates to the fine aggregates shall not be less than 1 to 1 or more than 2 to 1.
5. Admixtures shall be used only with approval in writing by the Structural Engineer of Record. All admixtures shall be used in accordance with the manufacturer's instruction and shall be added at the plant. Calcium chloride shall not be used as an admixture.
6. Mix designs shall be based on Type I cement. Type III (high-early) cement or any other types of cement shall be used only when approved in writing by OWNER. When high-early cement is used, the 7-day strength test shall exceed the specified 28-day strength tests.
7. The amounts and proportions of fine and coarse aggregates to be used in each batch shall be such as to produce a plastic, workable mix, which can readily be puddled into the corners and angles of the forms and around reinforcement and other embedded Work without excess spading and without undue accumulation of water or laitance on the surface, and such that there will be no honeycombing in the structure.
8. The use of fly ash shall be limited to 15% replacement of the Portland cement and shall be specifically approved in writing by the Structural Engineer of Record.

1.3 SUBMITTALS:

- A. Samples:
 - 1. If requested by OWNER, submit samples for approval of proposed materials.
 - a. Each sample of aggregate shall be identified by indicating source, size, type and classification.
- B. Certification:
 - 1. Submit certification of material compliance as requested by OWNER.
 - 2. Certification of approved laboratory design mix for each truck load is required, complete with an authenticated ticket stating the truck number, project number, CONTRACTOR, ready-mix producer, time of batching, total yards of concrete and the quantities and materials contained in that load.
- C. Product Data:
 - 1. Submit manufacturer's product data information for Owner's Information Only on products herein specified.
 - 2. Submit manufacturer's product data information for Owner's approval on all admixtures herein specified.
 - 3. Submit manufacturer's product data information for Owner's approval on floor hardener herein specified.
- D. Design Mix Data:
 - 1. Submit design mix data for OWNER'S approval in accordance with provisions set forth under Article 1.2 of this Section.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Portland cement shall conform to ASTM C150. Cement type uses shall be as previously specified under Article 1.2, Paragraph of this Section.
 - 1. Cement shall be a low alkali cement (Type I) containing not more than 0.6 percent by weight of tri-sodium silicate oxide.
 - 2. Cement shall consist of only one brand to be used on the Work.
- B. Air entraining agent shall conform to ASTM C260 and shall be added at the mixer.
- C. Water reducing agents (such as super plasticizers), retarding agents, accelerating agents and all other admixtures shall require approval by OWNER and if used shall conform to ASTM C494. In no case shall admixtures be permitted as substitute for cement content specified, unless approved by OWNER.
- D. Concrete aggregates shall conform to ASTM C33. Aggregates shall be screened, washed and well-graded having clean, hard, strong, durable, uncoated particles, and shall be free from injurious amounts of dust, lumps, soft or flaky particles, shale, alkali, organic matter, loam or other deleterious substances.
 - 1. Coarse aggregate for exterior concrete shall conform to Grade 57 or 67 (river gravel) requirements of Table 2 of the above ASTM standard.
 - 2. Fine aggregate for exterior concrete shall have a fineness modulus not varying more than 0.20 from value assumed in design mix.
- E. Water shall be potable, clean and free from deleterious amounts of acid, alkali or organic material.
- F. Curing materials shall consist of the following:
 - 1. Kraft paper shall be waterproof and non-staining "Sisalkraft Fortifiber SK-10", conforming to ASTM C171, as manufactured by Fortifiber, Incline Village, Nevada (phone: 800/433-4079 website: www.fortifiber.com) or OWNER approved equal.

2. Polyethylene film shall be white or clear sheet or roll material not less than 0.006 inch thick (6 mil) conforming to AASHTO M171. Polyethylene curing membrane exposed to sun or sunlight shall be opaque.
 3. Exterior concrete flat Work may be cured with a translucent fugitive dye (Type 10) or white pigmented type (Type 2, Class B-vehicle solids restricted to all resins) curing compound conforming to ASTM C309, spray applied.
- G. Expansion joint material for interior of building structure shall consist of the following:
1. Joint filler material for (isolation joints) shall be a non-extruding cork type "Sealtight Standard Cork" as manufactured by W.R. Meadows, Inc., Hampshire, Illinois (phone: 800/342-5976 website: www.wrmeadows.com) or OWNER approved equal.
 - a. Material shall conform to ASTM D1752, Type II.
 - b. Material shall be 1/4 inch thick, unless otherwise noted, of widths equal to slab thickness less 1/2 inch or as otherwise indicated.
 2. Joint filler material shall be a non-bituminous pre-molded treated wood type "Homex 300" as manufactured by Homasote Company, West Trenton, New Jersey (phone: 800/257-9491 website: www.homasote.com) or OWNER approved equal.
 - a. Material shall conform to ASTM D1751.
 - b. Material shall be 1/2 inch thick, unless otherwise noted, of widths equal to slab thickness less 1/2 inch or as otherwise indicated.
 3. Joint filler material shall be a closed cell polyethylene foam type "Sonofoam Closed-Cell Backer-Rod" as manufactured by Sonneborn Building Products, Inc., Shakopee, Minnesota (phone: 800/433-9517 website: www.chemrex.com); "Ethafom" as manufactured by Dow Chemical Company, Midland, Michigan (phone: 800/258-2580 website: www.dow.com) or OWNER approved equal.
 - a. Material shall conform to ASTM D994.
 - b. Material shall be 1/2 inch thick, unless otherwise noted, of widths equal to slab thickness less 1/2 inch or as otherwise indicated.
 4. Joint sealer material shall be a one-component, non-priming, self-leveling polyurethane (pour grade) sealant "Sonolastic SL 1" as manufactured by Sonneborn Building Products, Inc., Shakopee, Minnesota (phone: 800/433-9517 website: www.chemrex.com) or OWNER approved equal.
- H. Control joint material for interior concrete Work shall consist of the following:
1. Joint filler material (traffic areas and aisles) shall be a two-component, 100 percent solids, moisture insensitive epoxy type "MM-80 Heavy Duty Joint Filler" as manufactured by Metzger/McGuire Company, Concord, New Hampshire (phone: 800/223-6680 website: www.metzgermcguire.com); "Sikadur 51 NS/SL Joint Compound" as manufactured by Sika Corporation, Lyndhurst, New Jersey (phone: 800/933-7452 website: www.sikausa.com) or OWNER approved equal.
 2. Joint sealer material (traffic areas and aisles) shall be a two-component, solvent-free, flexible, epoxy resin type "Sikadur 51 NS/SL" as manufactured by Sika Corporation, Lyndhurst, New Jersey (phone: 201/933-8800; 800/933-7452 website: www.sikausa.com) or OWNER approved equal. Color as selected by OWNER.
 3. Joint sealer material (all other areas) shall be a single component polyurethane (non-sag) elastomeric type "Sikaflex-la" as manufactured by Sika Corporation, Lyndhurst, New Jersey (phone: 800/933-7452 website: www.sikausa.com) or OWNER approved equal. Color as selected by OWNER.
 - a. Primer and joint backer rod material shall be as recommended by the above manufacturer.
- I. Expansion joint material for exterior concrete Work shall consist of the following:
1. Joint filler material shall consist of preformed non-extruded bituminous bound type "Sealtight Fibre Expansion Joint" as manufactured by W.R. Meadows, Inc., Hampshire,

- Illinois (phone: 800/342-5976 website: www.wrmeadows.com) or OWNER approved equal.
- a. Material shall conform to ASTM D994 or ASTM D1751.
 - b. Material shall be 1/2 inch thick, unless otherwise noted, of widths equal to slab thickness less 1/2 inch or as otherwise indicated.
2. Joint sealant shall be a single component hot pour applied rubber asphalt type "Sealtight 164" as manufactured by W.R. Meadows Inc., Hampshire, Illinois or (phone: 800/342-5976 website: www.wrmeadows.com) or OWNER approved equal.
 - a. Material shall conform to ASTM D1190.
 3. Joint sealant, if required, shall be a single component, polyurethane type "Sikaflex-la" as manufactured by Sika Corporation, Lyndhurst, New Jersey or (phone: 800/933-7452 website: www.sikausa.com) or OWNER approved equal. Color as selected by OWNER.
- J. Floor hardener shall be a two-coat application type "Seal Hard" as manufactured by Laticrete International, Inc., (phone 800/243-4788, ext. 235; website www.laticrete.com) or OWNER approved equal.
- K. Concrete treating oil for exterior concrete flat Work shall consist of equal parts of boiled linseed oil (ASTM D260) and either mineral spirits (ASTM D235) kerosene or turpentine.
- L. Granular base material for exterior concrete flat Work shall consist of pit-run or crushed granular material conforming to the following gradation:

<u>SIEVE SIZE</u>	<u>TOTAL PERCENT PASSING</u>
2 Inches	100
Number 10	40 - 100
Number 200	2 - 10

2.2 PRODUCTION:

- A. Concrete shall be ready-mixed and shall be batched, mixed and transported in accordance with "Specification for Ready-Mixed Concrete" ASTM C94. The production plant equipment and facilities shall meet the requirements of the National Ready Mixed Concrete Association.
 1. Each central mixer, truck mixer or agitator shall have attached thereto in a prominent place a metal plate or plates on which are plainly marked the gross-volume of the drum, the capacity of the drum or container in terms of the volume of mixed concrete, and the minimum and maximum mixing speeds of rotation of the drums, blades or paddles. No water from the truck-water system or elsewhere shall be added after the initial introduction of the mixing water for the batch. Mixing time, mixing speed and permissible drum revolutions shall conform to ASTM C94.
- B. Concrete ingredients shall be mixed to the required consistency and mixing shall be continued for not less than 1-1/2 minutes after all materials are in the mixer and until concrete of uniform consistency is produced. Under careful supervision and followed by additional mixing, a small increment of water may sometimes be added to improve workability of batches in mixers, provided maximum allowable water/cement ratio is not exceeded. Indiscriminate retempering or addition of water to increase slump after concrete is first mixed is prohibited.
- C. There shall be a maximum of 60 minutes between the time concrete is originally mixed and the placing of concrete in final position.
- D. In cold or hot weather, the production of the concrete shall be such as to meet the requirements set forth in Article 3.1 hereinafter specified.

3.0 PART 3 - EXECUTION

3.1 JOB CONDITIONS:

A. Hot Weather Conditions:

1. Hot weather concreting shall comply with the previously cited ACI 305 Standard. In order to achieve the concreting results herein specified, CONTRACTOR shall plan in advance as to the methods or procedures necessary to give total protection and workability of concrete during hot weather construction. Such methods or procedures shall have the approval of OWNER'S Designated Representative.
2. During mixing and placing, concrete temperature shall be maintained at less than 85 degrees Fahrenheit to reduce the concrete temperatures. Ice may be used in the mixing water in quantities up to 50 percent of the specified water provided that all the ice be melted when mixing is complete.
3. Transport trucks shall be dispatched to avoid delays and the Work shall be organized to use the concrete promptly to prevent unnecessary additional mixing at Worksite.
4. When necessary, arrangements for installation of windbreaks, shading, spraying, sprinkling or wet covering of a light color shall be made in advance of placement, and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.

B. Cold Weather Conditions:

1. Cold weather concreting shall comply with the previously cited ACI 306 standard, whenever temperatures are at 32 degrees Fahrenheit or below. Methods and procedures to protect concrete from freezing and to maintain temperatures above the designated minimum for the time required shall be made well in advance by CONTRACTOR. Such methods and procedures shall have the approval of OWNER'S Designated Representative.
 - a. Concrete when placed in weather less than 40 degrees Fahrenheit shall have an internal temperature of not less than 50 degrees Fahrenheit and not more than 80 degrees Fahrenheit.
 - b. Concrete Work, which has been damaged by freezing, will be rejected and shall be immediately removed and be replaced by CONTRACTOR at their expense.
2. To avoid the possibility of flash set when either aggregate or water is heated to a temperature in excess of 100 degrees Fahrenheit, water and aggregate should be mixed prior to the addition of the cement.
3. To prevent thermal shock at the end of the curing period or at the time of form removal, the concrete shall be protected so the temperature drop is gradual and shall not exceed 40 degrees Fahrenheit in 24 hours.
4. All equipment, enclosures, protection, heating and method of carrying on the Work shall be subject to OWNER'S approval, but the responsibility for the Work and its protection shall be CONTRACTOR'S.

3.2 GRADE PREPARATION FOR EXTERIOR CONCRETE WORK:

A. Subgrade Preparation:

1. Fine grade and compact subgrade to the plan cross section. Compaction shall be as specified in Section of this Specification.
2. After compaction, cut-out soft spots and unstable areas in the subgrade and fill with granular fill as defined in Section 02210 and compact as specified in Section 02230 of this Specification.

B. Granular Base:

1. Construct the granular base as shown on Drawings on the prepared subgrade after the final shaping and compacting of the subgrade is completed.
2. Compact as specified for under slab base in Section 02230 of this Specification.

3. When natural soil is granular and meets the requirements of granular base material and when the bottom elevation of the proposed concrete is in a cut section, then the subgrade for the concrete can be considered directly below the concrete. At least 8 inches of this type of subgrade shall be proof rolled to a density as specified in Section 02230 of this Specification.

3.3 PLACING:

- A. Before placing any concrete, the formwork shall have been completed, foreign material, snow, ice and water shall have been removed; reinforcement shall have been secured in place; expansion joint material, waterstops, anchors and other embedded items shall have been positioned; and the entire preparation shall have been approved by OWNER.
 1. Subgrade shall be sprinkled sufficiently to eliminate suction. Puddling of water will not be allowed. Concrete shall not be placed on frozen ground.
- B. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods satisfactory to OWNER'S Designated Representative, which will prevent segregation or loss of ingredients and in a manner which will assure that the required quality of the concrete is maintained.
- C. Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete, which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located as shown on the Contract Documents or as approved. Placing shall be carried on at such a rate that the concrete, which is being integrated, with fresh concrete is still plastic. Concrete, which has partially hardened or has been contaminated by foreign materials shall not be deposited. Temporary spreaders in forms shall be removed when the concrete placing has reached an elevation rendering their service unnecessary.
- D. Placing of concrete in supported elements shall not be started until the concrete previously placed in columns and walls is no longer plastic and has been in place at least 2 hours. Where placing fresh concrete against hardened concrete, such as between footings and walls or columns, or between beams or floors, the hardened concrete shall be thoroughly wetted and apply neat cement slurry to existing surface prior to placing of fresh concrete.
- E. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall not be subjected to any procedure, which will cause segregation. If concrete is spouted through chutes, the chutes shall be of metal or shall be metal-lined and the slope of the chutes shall be such that there will be no segregation. Chutes and hoppers shall be thoroughly flushed with water before and after each run. The water used for this purpose shall be discharged outside the forms. In no case shall concrete be dropped more than 48 inches. In walls and columns, where drop exceeds the maximum specified, concrete shall be placed by a drop chute.
- F. CONTRACTOR shall advise OWNER'S Designated Representative as to the amount of concrete Work to be completed in each placement. Concreting shall not be started until sufficient material and working force are available to complete the part of the Work designated as a placement and OWNER'S Designated Representative is satisfied that such is the case. Concreting shall continue uninterrupted until the completion of the pour, even though overtime work is required for such completion, so that in no place will concrete be deposited in contact with concrete that has attained its initial set.

3.4 VIBRATION OF CONCRETE:

- A. Vibration of concrete shall comply with the previously cited AC1 309 standard.

- B. CONTRACTOR shall provide sufficient labor and equipment to thoroughly consolidate the freshly placed concrete by internal mechanical vibration. Before each concrete placing operation is started, CONTRACTOR shall have on hand at the project 2 complete high cycle (minimum 8000 vibrations per minute) vibrator outfits in good operating condition of each size and type of vibrator needed to adequately consolidate the concrete scheduled to be placed. All concrete shall be compacted with the aid of high cycle internal electrical mechanical vibrators for a sufficient duration and intensity to fill all voids, thoroughly consolidate and compact the concrete in place to produce a dense smooth surface of concrete without honeycomb and minimum of bug holes. Vibrator for each lift shall be extended down into the previous lift to assure bond. Vibrators shall be inserted and withdrawn at points approximately 18 inches apart. At each insertion, the duration shall be sufficient to consolidate the concrete but not sufficient to cause segregation, generally from 5 to 15 seconds. Over vibrating and use of vibrators to transport concrete within forms shall not be allowed.

3.5 EMBEDDED ITEMS:

- A. Carefully examine Drawings and build in all inserts, dowels, sleeves, pipe anchors, bolts, waterstops, angle frames, and similar items indicated or required. CONTRACTOR shall furnish suitable materials to build in all sleeves, block-outs, formed openings, and other items furnished or required by other trades. Install securely to prevent displacement during concrete placement.
1. Refer to Section 03200, Article 3.3 of this Specification for other related embedded items within concrete Work.
 2. Voids in sleeves, inserts, anchor slots and block-outs shall be filled temporarily with readily removable material to prevent entry of concrete into voids.
 - 3.
- B. All Contractors, whose Work is related to the concrete or must be supported by it, shall be given ample notice and opportunity to introduce and to furnish embedded items before concrete is placed.

3.6 JOINTS:

- A. Construction Joints:
1. Construction joints shall be made where shown on Drawings, specified below, or as may be required, but only with approval of OWNER. Joints not shown shall be made so as to least impair the strength of the structure. Joints shall be keyed to develop maximum shear strength and be perpendicular to the main reinforcement.
 - a. For exterior concrete flat Work it may be necessary to place a construction joint prior to the contraction joint, the distance between the construction joint and the previous contraction joint shall not be less than 60 inches.
 2. Vertical construction joints in walls and wall footings shall be located midway between points of load concentration, except as otherwise directed. Maximum horizontal spacing shall be 60 feet.
 3. All reinforcement shall be continued across construction joints, except for slabs on grade.
 4. Preformed metal keyways for building structures shall not be used.
- B. Expansion Joints:
1. Expansion joints shall be constructed as detailed on Drawings. Reinforcement or other embedded metal items bonded to the concrete shall not extend through the joint.
 - a. Where oil treatment is specified, joint sealer shall be applied prior to application of the oil.
 2. Joints for exterior concrete at fixed objects, such as buildings and structures or pavement, sidewalks or curb intersections shall be separated by a 1/2 inch expansion joint placed at full depth of the concrete thickness, allowing for 1/2 by 1/2 inch joint sealant. Joint filler or sealer will be required.

- a. Expansion joints for sidewalks, curbs and gutters shall be placed as shown on Drawings, and if not shown, they shall be placed not to exceed 50-foot intervals.
- C. Isolation Joints (Bond Breaker):
1. Isolation joints shall be constructed between two differing conditions as shown on Drawings. Prior to construction of the floor the vertical wall surface shall be surfaced with felt paper, or painted with a bituminous paint. In no case shall the paper or paint extend above the surface of the floor. At each column, unless otherwise indicated, install a diamond or circular shaped isolation joint one-inch beyond the supporting pier.
- D. Contraction (Control) Joints:
1. Contraction (control) joints in interior and exterior slabs on grade shall be saw cut or tooled as indicated on Drawings. Saw cut joints shall be cut without any chamfers on the concrete edges. Tooled joints may be used for exterior Work, when used they shall be to the full depth of the leg of tool and with all top edges sharp and clean without any broken edges. Joints, both tooled and saw cut, shall be 1/8 inch wide by one-third of the slab thickness or maximum 1-1/2 inch deep.
 - a. Tooled joints for exterior Work shall have 1/4-inch radius finish edges.
 2. Saw cutting of joints shall be timed properly with the set of the concrete. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent aggregates being dislodged by the saw and shall be completed before shrinkage stresses become sufficient to produce cracking. The earliest time for start is about 12 hours; however, the Work shall be completed within 24 hours after placement. The first saw cut in each section of concrete placed shall be at the center of the slab, and each succeeding saw joint shall divide the remaining slab in approximately half. Maximum joint spacing shall be 20 feet or as shown on Drawings.
 3. Contraction joints for exterior concrete Work shall be as shown on Drawings. No joint filler is required. Where joining existing structures, match or continue existing contraction joint pattern or spacing.
 - a. Sidewalk joints shall not exceed 6-foot intervals.
 - b. Curb and gutter joints shall not exceed 10-foot intervals.
- E. Joint Filler:
1. Saw cut joints in the traffic areas or aisles of interior floor slabs shall be filled. Joints to be filled shall be cleaned of all loose particles and then filled with polyethylene rod stock (Ethafoam) to within 1/4 inch of finished surface using a wheeled depth gage. Then fill flush to surface of floor slab with epoxy joint filler using a caulking/grouting gun equipped with proper size orifice. Joint filler shall be installed in such manner so that filled joints give a level floor flush with surrounding concrete. Filler shall be mixed in strict accordance to manufacturer's directions. After joints have been filled and epoxy cured, all high spots shall be ground flush and low areas refilled so that joints are perfectly level with adjacent surfaces.
 2. Epoxy joint filler shall be installed as late as possible after slab placement and not sooner than 90 days.
- F. Joint Sealer:
1. Apply joint sealer to slabs, where indicated, to a clean and dry expansion, control or contraction joints, fill joint flush with the top surface. Mixing and application procedures shall be in accordance with manufacturer's recommendations.

3.7 FLOORS, SLABS AND EXTERIOR FLAT WORK:

- A. Compaction and fine grading for interior building structure slabs on grade is specified elsewhere and is not a part of Work of this Section. Compaction and fine grading for exterior concrete is previously specified under Article 3.2 of this Section. However, before placement of concrete,

CONTRACTOR shall thoroughly wet down the subgrade and tamp it down into a solid firm mass. The subgrade shall be free of frost before concreting begins.

1. Exterior concrete curbs and gutters may be placed with automatic machine, if acceptable to OWNER. If machine placement is to be used, submit revised mix design and laboratory test results, which meet or exceed the minimum herein specified. Machine placement must produce curbs and gutters to the required cross-section, lines, grades, finish and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified.
- B. Edge forms and intermediate screed strips shall be set accurately at about 120 inches centers to produce the designated elevations and contours of the finished surface, and shall be sufficiently strong to support vibrating screeds or roller pipe screeds if they are to be used.
- C. Mixing and placing shall be carefully coordinated with finishing. Concrete shall not be placed on the subgrade or forms more rapidly than it can be spread, straight-edged, and darbyed or bull floated. To obtain good surfaces and avoid cold joints, the size of finishing crews shall be planned with due regard for the effects of concrete temperature and atmospheric conditions on the rate of hardening of the concrete.
- D. The concrete shall be placed to produce the thickness required, properly tamped with power and hand tampers to produce a slab of maximum density, free from honeycomb and voids, which shall provide suitable bond with reinforcement and embedded fixtures. The concrete shall then be struck off and leveled.
- E. After the concrete has been placed, consolidated, struck off and leveled, the concrete shall not be worked further until ready for floating. Floating shall begin when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation. During or after the first floating, planeness of surface shall be checked with a 120-inch straightedge applied at not less than two different angles. All high spots shall be cut down and all low spots filled during this procedure to produce a surface within tolerance throughout. The slab shall then be refloated immediately.
- F. Following the float finish the slab shall next be power troweled, and finally hand troweled. The first troweling after power floating shall produce a smooth surface which is relatively free of defects but which may still show some trowel marks. Additional troweling shall be done by hand after the surface has hardened sufficiently. The final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The surface shall be thoroughly consolidated by the hand troweling operations. The finished surface shall be essentially free of trowel marks, uniform in texture and appearance and shall be plane to the tolerances specified in Section 03100 of this Specification.
- G. Final finish for all exterior concrete flat Work shall have two (2) applications of steel trowel finish, followed by:
 1. Miscellaneous structures (solvent trap) shall have a wood float or magnesium finish.
 2. Concrete pavement, including curbs and sidewalks, shall have a light broom type finish applied transverse to the direction of water flow.

3.8 CURING:

- A. Beginning immediately after placement, concrete shall be protected from premature drying, excessively hot or cold temperatures, and mechanical injury. Concrete shall be maintained with minimal moisture loss and at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing shall be subject to OWNER'S approval.
 1. Wherever metallic hardener is used, CONTRACTOR shall comply with all recommendations of the hardener manufacturer when curing concrete.

- B. For concrete surfaces not in contact with forms an application of curing material covering shall be applied to the concrete immediately after completion of placement and finishing, without marring the surface. Anchor curing material in place with sand placed continuously around the edges and with all lapped joints or seams taped with "3M Brand" masking tape as necessary to hold it in place and provide an integral covering.
 - 1. No liquid curing agent will be permitted where a sealer, hardener or epoxy finish is to be applied.
- C. Moisture loss from surfaces placed against wooden forms or metal forms exposed to heating by the sun shall be minimized by keeping the forms wet until they can be safely removed. After form removal, the concrete shall be cured until the end of the time prescribed.
- D. Curing shall be continued for at least 7 days in the case of all concrete except high-early strength concrete for which the period shall be at least 3 days.
- E. The provisions of hot weather concreting and cold weather concreting shall be part of this Article. When necessary, provision for windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering with a light colored material shall be made in advance of placement, and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.
 - 1. No sprinkling of cement or cement and sand will be permitted.

3.9 FLOOR HARDENER:

- A. All interior concrete floor areas exposed in the finished Work shall be treated with floor hardener applied in strict accordance with manufacturer's latest printed instructions. Before applying the treatment, the floor must be thoroughly cured and free of oil, grease or other foreign materials, which might interfere with the penetration of the hardener into the pores of the cement surface.
 - 1. It is recommended to use a manufacturer's Approved Applicator.
- B. Areas to receive carpet, resilient flooring or other types of finish floor material will not require a floor hardening treatment.

3.10 OIL TREATMENT:

- A. Apply concrete treating oil to all exposed exterior concrete surfaces, after a 28 day period to a clean dry surface at the rate of approximately 130 square yards per gallon, applied in applications. Second application shall be deferred until first application has been thoroughly absorbed. Before applying the treatment, the surface must be clean and free of oil, grease or other foreign materials which might interfere with the penetration of the treating oil into the pores of the concrete surface.

3.11 FINISHING OF FORMED SURFACES:

- A. Surface defects, including tie holes, shall be repaired immediately after form removal. Tie holes shall be cleaned and dampened and filled solid with patching mortar as specified below.
- B. All honeycombed and other defective concrete shall be removed down to sound concrete. If chipping is necessary, the edges shall be perpendicular to the surface or slightly undercut. No feather-edges will be permitted. The area to be patched and an area at least 6 inches wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. A bonding grout shall be prepared using a mix of approximately 1 part cement to 1 part fine sand passing a number 30 mesh sieve, mixed to the consistency of thick cream, and then well brushed into the surface.
- C. The patching mixture shall be made of the same materials and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than 1 part cement to 2-1/2 parts sand by damp loose volume. White Portland cement shall be substituted for a part of the gray Portland cement on exposed

concrete in order to produce a color matching the color of the surrounding concrete, as determined by a trial patch. The quantity of mixing water shall be no more than necessary for handling and placing. The patching mortar shall be mixed in advance and allowed to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that will permit placing.

- D. After surface water has evaporated from the area to be patched, the bond coat shall be well brushed into the surface. When the bond coat begins to lose the water sheen, the premixed patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and struck off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for at least 1 hour before being finally finished. The patched area shall be kept damp for 7 days. The patched area shall match the texture of the adjacent surface using appropriate tools to achieve the desired effect.
- E. For all concrete surface not exposed to public view, surface defects shall be repaired, tie holes plugged and fins exceeding 1/4 inch in height shall be chipped off or rubbed off.
- F. For all concrete surfaces exposed to public view, the form facing material used shall produce a smooth, hard, uniform texture on the concrete. Tie holes and defects shall be patched. All fins shall be completely removed.

3.12 TESTING AND EVALUATION:

- A. Concrete cylinders shall be tested as the Work progresses, by an independent testing laboratory and shall be paid for by CONTRACTOR. CONTRACTOR shall furnish any necessary labor who is familiar with methods of sampling and shall assist the designated testing agency in obtaining and handling samples, and for safe storage and proper curing of concrete test specimens on Worksite.
 - 1. Refer to Section 01710 of this Specification for basis of payments for inspection and tests.
- B. Mold and cure three standard 6 inch diameter specimens from each sample in accordance with ASTM C31/C31M. Compressive strength test specimens shall be in accordance with ASTM C39. Two specimens shall be tested at 28 days for acceptance and one shall be tested at 7 days for information. The acceptance test results shall be the average of the strengths of the two specimens tested at 28 days. If one specimen in a test manifests evidence of improper sampling, molding or testing, it shall be discarded and the strength of the remaining cylinder shall be considered the test result. Should both specimens in a test show any of the above defects, the entire test shall be discarded. When high-early strength concrete is used, the first specimen shall be tested at 3 days; the remaining two at 7 days.
- C. Make at least one strength test for each 100 cubic yards, or fraction thereof, of each mix design of concrete placed in any one day. When the total quantity of concrete with a given mix design is less than 50 cubic yards, the strength tests may be waived by OWNER'S Designated Representative if, in their judgment, adequate evidence of satisfactory strength is provided, such as strength test results for the same kind of concrete supplied on the same day and under comparable conditions to other Work or other projects.
- D. Determine slump of the concrete sample for each strength test and whenever consistency of concrete appears to vary, using standard slump cone as per ASTM C143.
- E. The testing laboratory shall report all test and inspection results to OWNER'S Designated Representative and CONTRACTOR immediately after they are performed. All concrete test reports shall include name of job, date of placement, date of test, batch mix design, slump and the exact location in the Work at which the batch represented by the test was deposited.

3.13 FIELD QUALITY CONTROL:

- A. Completed concrete Work, which fails to meet one or more of the specified requirements and which cannot be brought into compliance, may be accepted or rejected by the OWNER'S Designated Representative. In this event, modifications may be required to assure that remaining Work complies with the requirements.
- B. Tolerance causes for rejection may be formed surfaces larger or smaller than tolerances allow, members cast in the wrong location, or floor slabs exceeding level tolerances.
- C. Strength of structure causes for rejection may include strength of concrete, reinforcing steel size, quantity and arrangements, or improper curing or protection.
- D. All Work which needs to be modified to meet the requirements or Work that is rejected and must be replaced shall be done by CONTRACTOR at their own expense.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 05500

METAL FABRICATIONS

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all metal fabrications as shown on Drawings and herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Painting: Section 09900

1.2 QUALITY ASSURANCE:

- A. Referenced Standards:
 - 1. The current edition of the "Code of Arc and Gas Welding in Building Construction" of the American Welding Society (AWS) shall govern where applicable, unless otherwise specified.
- B. The current edition of the following American Institute of Steel Construction (AISC) publication shall govern all Work performed hereunder unless otherwise specified:
 - 1. AISC Code of Standard Practice for Steel Buildings and Bridges.

1.3 SUBMITTALS:

- A. Shop Drawings:
 - 1. Prepare and submit shop drawings for OWNER'S approval.
- B. Product Data:
 - 1. Prepare and submit product data for OWNER'S approval of shop applied primer.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. All material shall be transported, stored and erected in a manner that will avoid any damage of any kind. No damaged or rusted material shall be used in the Work.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Miscellaneous Steel Shapes:
 - 1. All miscellaneous metal, including structural steel shapes, miscellaneous plates, bars and angles, shall conform to a minimum of ASTM A36/A36M. All metal shall be new material and shall be free from defects impairing strength, durability or appearance.
 - a. Square and rectangular steel tubing shall be hot formed conforming to ASTM A1085, Grade 50, minimum yield stress 50 ksi.

fastenings or connections shall be welded or riveted. Do not use screws or bolts where they can be avoided; where used, exposed heads shall be countersunk screwed up tight, and threads nicked to prevent loosening. Field connections or fastening shall be bolted, unless noted otherwise on Drawings. Provide standard frame type connections or better to develop the full strength of the members connected. Connections shall be made symmetrical about the axis of the members as nearly as practical.

a. In general, all bolts, anchors for bucks, wall plates and similar items shall be 1/2-inch diameter, hooked on one end, and provided with a nut and large washer. Bolts shall extend at least 8 inches into concrete or horizontal joints of masonry. Bolts set vertically in masonry shall extend a minimum of 16 inches.

4. Punching, drilling and tapping of steel and iron Work shall be done by this subcontractor for the attachment of other materials insofar as information is available before approval of shop drawings.

B. Welding:

1. All welding shall be done by certified, experienced operators, each of whom shall submit satisfactory evidence of experience and skill in welding structural steel with the kind of welding required in the Work and shall make uniformly good welds of the type required.
2. Surfaces to be welded shall be well cleaned by wire brushing, sanding, grinding, chipping and hammering as may be necessary to remove scale, rust, paint and other foreign matter. Immediately upon completion, each weld shall be wire brushed and examined and shall show uniform section, smoothness of weld metal, feather edges without overlaps and freedom from porosity and clinkers. Each weld shall show good fusion with and penetration into base metals. All exposed welds shall be ground flush with base metal and finished clean and smooth. Touch up welds in galvanized metal with "ZRC" primer.

C. Shop Painting:

1. All miscellaneous ferrous items, except galvanized Work, before leaving the shop shall be thoroughly cleaned of all mill scale, rust and foreign matter and shall be given 1 coat of paint, applied thoroughly and evenly and well worked into joints and other open spaces. Parts inaccessible after assembly shall be given 2 coats of shop primer, preferably of different colors. Contact surfaces shall be cleaned before assembly but not painted. Steel surfaces, which will be embedded in concrete, shall be cleaned but not painted. Paint shall be thoroughly dry before steel is loaded for shipment. Paint shall be used strictly in accordance with the manufacturer's printed directions. All paint shall be applied in a workmanlike manner by skilled mechanics.

2.3 RAILINGS:

A. Railings, shall be fabricated of minimum 1-1/4 inch inside diameter steel pipe with welded joints ground smooth and exposed ends rounded and welded closed. Joints in rail members shall have internal sleeves to maintain true alignment and backup for welding. Top rail shall extend continuously the entire length without sharp edges, corners or fastenings. Provide pipe flanges where railings terminate or return to walls.

1. Railings, unless otherwise indicated, shall consist of a three rail high type design having the top rail at 42 inches with two intermediate rails spaced equally between floor or platform with 4 inch high toe plates. Standards shall be spaced not to exceed 72-inch centers.

a. .

B. Installed railings shall be capable of withstanding a 200-pound force or a uniform load of 50 pounds per lineal foot applied in any direction.

2.4 GRATED TRENCH COVERS:

- A. Provide steel grated trench covers where indicated on Drawings. Bearing bars shall extend in the direction of the span with ends of grating sections occurring directly over supports. Anchoring of grating shall be in a secure and substantial manner as indicated on approved shop drawings. Installed grating shall be at the elevations shown, free from warp or camber and present a level and even surface. Notching of bearing bars at supports to maintain elevations will not be permitted.
 - B. Trench frames are hereinafter specified.
- 2.5 ANGLE FRAMING:
- A. Furnish and install angles for fastening metal panels, roof edge flashing curb opening members, and similar items, complete with anchor bolts and nuts.
- 2.6 TRENCH FRAMES:
- A. Furnish and install trench frames as shown on Drawings consisting of steel angles, sized to accommodate grating herein before specified. Frames shall be of welded construction complete with anchors for embedment into concrete.
- 2.7 DOCK LEVELER FRAMES:
- A. Furnish and install dock leveler frames as shown on Drawings, consisting of steel angles, sized to accommodate leveler. Frames shall be of welded construction, complete with anchors for embedment into concrete.
- 2.8 TOE PLATES, GUARD ANGLES AND TOE ANGLES:
- A. Furnish and install toe plates, guard angles and toe angles where indicated on Drawings, complete with proper anchoring devices.
- 2.9 PIPE GUARD POSTS (BOLLARDS):
- A. Furnish and install all pipe guard posts (bollards); each side of overhead doors, dock doors, equipment locations and as indicated on Drawings. Posts shall be extra strong/heavy duty 6 inches in diameter, primed steel pipe embedded into concrete at least 42 inches and extending 42 inches above ground. Fill posts solid with concrete and shape top slightly concave.
 - 1. Install polyethylene covers on all posts in accordance with manufacturer's instructions. Finish painting of bollards will not be required.
- 2.10 ANCHOR BOLTS:
- A. Furnish and install all anchor bolts required, including those for roof edge members, pump and motor bases, and similar areas. Anchor bolts shall be set in accordance with details and tolerances required.
 - B. Anchor bolts required for Metal System are included in Specification 13 602.
- 3.0 PART 3 - EXECUTION
- 3.1 ERECTION:
- A. All metal fabrications Work shall be erected as indicated on Drawings, as confirmed by field measurements and in accordance with approved shop drawings. Furnish erection bolts, wedges,

temporary bracing, and all other required appurtenances for a complete installation. Work shall be set accurately in place and permanently fastened in a neat and workmanlike manner. The Work shall be plumb, level, or to the slopes indicated. CONTRACTOR shall do all cutting, fitting and similar Work required to properly assemble and install their Work. They shall furnish all sleeves, bolts, screws and anchors, expansion shields, and similar anchoring devices, for assembling and securing their Work and shall do all drilling, tapping, cutting, and all other required operations necessary for a complete installation.

- B. All field welding shall be in accordance with AWS as previously cited by certified welders.
- C. Field splicing of fabricated items is not allowed, unless said items exceed standard shipping length or change of direction requires splicing. Mechanical splicing by means of wedges without full welding shall not be allowed.
- D. Metal Work in place shall be OWNER approved before being covered by subsequent materials.
- E. Each fabricated item shall be complete with attachment devices as shown or required to completely install each item in a secure manner.

3.2 FIELD TOUCH UP:

- A. Immediately after erection and before subsequent materials placed, CONTRACTOR shall touch up all erection bolts, all field welds and all scratched or abraded areas in shop coat. All touch up areas shall be first cleaned and then painted using a matching rust-inhibitive paint in color and formulation to match shop coat.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 06100

ROUGH CARPENTRY

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all rough carpentry as shown on Drawings and herein specified.
 - 1. Work shall include such items as wood blocking, wood nailers, and similar items, complete with appropriate anchoring and/or fastening devices.
- C. Related Work Specified Elsewhere:
 - 1. Concrete Formwork: Section 03100
 - 2. Building Insulation: Section 07210
 - 3. Finish Door Hardware: Section 08710
 - 4. Gypsum Wallboard Partition Systems: Section 09270

1.2 QUALITY ASSURANCE:

- A. Reference Standards:
 - 1. The current edition of the "American Softwood Lumber Standard PS 20", issued by the National Bureau of Standards (NBS), shall govern where applicable, unless otherwise specified.
 - 2. The current edition of the "U.S. Product Standard PS 1", issued by the National Bureau of Standards (NBS), shall govern where applicable, unless otherwise specified.
 - 3. The current editions of the following American Wood-Preservers Association (AWPA) publications or standards shall govern all Work performed hereunder, unless otherwise specified:
 - a. Structural Lumber - Fire Retardant Treatment by Pressure Processes (C27-74).
 - b. Plywood - Fire Retardant Treatment by Pressure Processes (C27-74).

1.3 SUBMITTALS:

- A. Certification:
 - 1. CONTRACTOR shall furnish to OWNER a certificate of wood treatment compliance from the treating plant stating the size and quantity of lumber treated, the type, moisture content, chemical content, manufacturer and amount of treatment.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. All lumber shall be delivered, piled and handled so as to protect it from warpage, excessive moisture or damage of any kind. Lumber shall not be delivered unduly long before it is required in normal progress of the Work and shall be stored off the ground and under waterproof cover until it is used.
 - 1. CONTRACTOR shall verify that all materials herein specified meet the requirements of this Section when delivered to Worksite.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Dimension lumber for roof deck blocking and framing 2 inches thick (nominal) or, thicker shall be "Construction Grade No. 2 or Better", Douglas Fir, West Coast Hemlock, or Southern White Pine. All other nominal 2 inch lumber for studs, joists, rafters, plates, bucks, blocking, nailers, grounds or furring shall be "Standard Grade No. 1", Douglas Fir, West Coast Hemlock, or Southern White Pine.
 - 1. Refer to Drawings for lumber sizes.
- B. Plywood shall be Douglas Fir conforming to the previously cited product standard. All plywood shall carry the APA hallmark and grade stamp. Refer to Drawings for thickness. Plywood shall consist of the following:
 - 1. Plywood for interior walls and partition wainscots shall be PS 1 Grade (APA A-C with exterior glue).
- C. Fire retardant treatment for interior wood framing members and plywood panel backing shall be in accordance with the previously cited AWPA Standard. Treatment shall achieve a flame spread rating of not more than 25 when tested in accordance with UL Test 723, ASTM E84 or NFPA Test 355.
- D. Furnish all fasteners and/or anchoring devices for entire project, which shall include such items as nails, screws, bolts, anchors, joist or stud hangers and devices, shot anchors and similar items. All bolts shall have standard threads and be complete with washers and nuts. Common nails shall be used for all jointing in rough carpentry. Exterior exposed nails and screws shall be hot-dipped galvanized. Fasteners and/or anchoring devices used with treated lumber shall be double-coated galvanized.
 - 1. Anchoring devices shall be of the proper type and size for use intended and shall be of adequate design to achieve substantial and positive anchorage. Nailing into wood plugs is not acceptable for any Work. Unless otherwise indicated, anchoring devices shall consist of the following:
 - a. Structural steel flanges shall have wood nailers anchored direct with minimum 3/8-inch diameter bolts spaced not greater than 48 inches on center. Wood nailers at right angles to steel joists or other structural support members shall be anchored with 3/8-inch diameter bolts at point of each bearing. Metal deck (light gage) surfaces shall have wood nailers anchored direct with 2 rows of 1/4-inch diameter bolts or sheet metal lag type screws spaced not greater than 24 inches on center for each row.
 - b. Wood assemblies, such as wood cants, top nailers and other built-up wood members, shall be anchored with common nails or wood screws having at least 1-1/2 inch anchoring penetration, spaced in 2 staggered rows at 24 inches on center for each row. All other nailing shall be at CONTRACTOR'S discretion for a rigid and secure type installation.

2.2 GRADING AND MOISTURE CONTENT:

- A. Lumber herein referred shall conform to the NBS Standards previously cited with all grading conforming to the rules of the manufacturer's association under whose rules the lumber is produced and lumber shall bear the grade and trade mark of this association. If certain specified lumber is not grade marked as a trade practice, it shall be accompanied by a Certificate of Inspection listing material quantities and grades. Defects or blemishes prohibited by this Specification, even though permissible in the specified grades, will not be accepted in any material used.
- B. Lumber shall be air or kiln dried and average moisture content shall not exceed 19 percent.

2.3 TREATED PLYWOOD AND LUMBER:

- A. All plywood and lumber for cants, curbs, plates, blocking, nailers and similar items concerned with roofing, roof insulation, or roof flashings, shall be preservative treated in accordance with the previously cited AWPA standard.
- B. All lumber and plywood for interior construction shall be fire retardant treated in accordance with the previously cited AWPA standard.
- C. Treated plywood and lumber shall be fabricated insofar as possible before treatment. Lumber, which has been sawn, cut or drilled after treating shall have the cut surfaces well brush coated with the same preservative or retardant as used for the original treatment.
 - 1. Plywood does not require treatment after cutting or drilling.
- D. Treated plywood and lumber shall be air or kiln dried after treatment to a maximum moisture content of 19 percent.

2.4 FABRICATION AND MANUFACTURE:

- A. Lumber shall be sound, thoroughly seasoned, fully dressed and well manufactured. Materials shall be free of warp that cannot be corrected in the normal process of bridging or nailing.

3.0 PART 3 - EXECUTION

3.1 WORKMANSHIP:

- A. All rough carpentry Work shall be accomplished with carpenters thoroughly skilled in the application of specified materials with all workmanship to be of the very best and shall be done in such a manner as to fulfill the requirements of Drawings, this Specification and field conditions.

3.2 INSTALLATION:

- A. Installation or erection of wood framing members, including such items as blocking, wood nailers, wood curbs, built-up wood expansion or contraction members, edge strips, wood cants and similar items, shall consist of nominal 2 by 4 inches or larger where required or as otherwise indicated on Drawings. Installation shall be complete with all plates, bracing and all necessary fastening and/or anchoring devices, including all appurtenances to make a complete job. Wood studs shall be on 16 inch centers, unless otherwise indicated and shall extend full height from floor plate to supporting member where detailed or required. Framing lumber shall be closely fitted and accurately set to the required lines and levels and shall be rigidly and securely fastened into place. All materials, including rafters, studs, headers and beams, shall be set as detailed and all material shall be free from any pronounced defects and shall be sized to give true surfaces for subsequent roofing and/or finish materials. Members shall be framed for the passage of mechanical or electrical devices to prevent the cutting of any structural support. No framing shall be cut or notched without the permission of OWNER and members so affected shall be reinforced as directed. Nailing and spiking shall be done in a thorough manner using nails and spikes of ample size. All bolt ends and nuts shall be recessed flush with exposed surfaces (surfaces to which subsequent roofing and/or finish materials are applied) with all wood members drawn up tight to attached substrate material. Blocking shall be drilled, not "slotted" for bolting. All framing members shall be set 16 inches on center, unless shown otherwise. Special framing shall be as detailed or in accordance with standard practice for quality framing.
 - 1. Lumber, which is sawed, cut or drilled during installation, shall have cut surfaces well brush coated with the same preservative as used for the original treatment.

- B. Substantial blocking, backing or other wood supports shall be provided for all fixtures, appliances, cabinets or other items secured to walls, whether or not such items are in the contract. Appropriate blocking, headers or other necessary carpentry Work shall be provided for all recessed fixtures, openings, mechanical or electrical equipment or other items in wood framing.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 07210

BUILDING INSULATION

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all building insulation as shown on Drawings and herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Gypsum Wallboard Partition Systems: Section 09270
 - 2. Pre-Engineered Prefabricated Metal Buildings: Section 13602

1.2 SUBMITTALS:

- A. Product Data:
 - 1. Submit manufacturer's product data information for OWNER'S approval on all insulation systems herein specified.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver materials to Worksite and store in a safe dry place with all labels intact and legible at time of installation.
- B. Use all means necessary to protect building insulation materials before, during and after installation and to protect the installed Work and materials of all other trades.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Perimeter Foundation Wall or Underslab Insulation:
 - 1. Insulation shall be a closed-cell (extruded), rigid foamed polystyrene plastic type board (48 by 96 inches) with square edges "Styrofoam Square Edge" as manufactured by the Dow Chemical Company, Midland, Michigan (phone: 866/583-2583 website: www.dow.com); "Foamular 250" as manufactured by Owens Corning, Toledo, Ohio (phone: 800/438-7465 website: www.owenscorning.com); "GreenGuard-CM" as manufactured by Pactiv Building Products, Atlanta, Georgia (phone: 888/828-2850 website: www.pactivbuildingproducts.com) or OWNER approved equal. Furnish in thickness indicated on Drawings.
 - a. Adhesive shall be as recommended by the manufacturer.
 - b. Insulation shall conform to ASTM C578, Type IV with an aged "R" value of 5.0 at 75 degrees F., mean temperature per 1 inch of thickness based on ASTM C518.
- B. Blanket Insulation:
 - 1. Blanket insulation shall be 3-1/2 inch thick fiberglass blanket type with an integral foil faced vapor barrier on warm side, having a minimum "R" value of 11.0 and conforming to

ASTM C665, Type III, Class A, "Building Insulation Blankets" as manufactured by the Owens Corning, Toledo, Ohio (phone: 800/438-7465 website: www.owenscorning.com) or OWNER approved equal. Provide batts with one inch nailing flanges each side of vapor barrier facing. Sized to fit 16-inch wood or metal stud spacing.

a. Pressure sensitive backed tape for sealing of insulation shall be "Scotch Brand (No. 425) Aluminum Foil Tape" as manufactured by 3M Company, St. Paul, Minnesota (phone: 800/364-3577; 651/737-6501 website: www.3m.com/products) - no substitution. Provide tape in standard 2-inch width (minimum).

2. Blanket insulation which is used in exposed applications such as above ceilings at exterior walls shall be same as above except, it shall be "Fiberglass Flame Spread 25 (FS-25) Building Insulation Blankets" complete with stick clip type hangers and washers utilizing a minimum of 8 hangers per 8 foot blanket.

C. Acoustical Insulation:

1. Acoustical insulation for interior walls/partitions shall be unfaced friction fit 3-1/2 inch thick fiberglass blanket type "Noise Barrier Batts" as manufactured by the Owens Corning, Toledo, Ohio (phone: 800/438-7465 website: www.owenscorning.com) or OWNER approved equal. Insulation shall conform to ASTM C665 and have a flame fuel and smoke rating of less than 25 per ASTM E84. Sized to fit 16-inch wood/metal stud spacing.

a. Single layer drywall construction shall have a minimum STC rating of 39.0 using 1/2-inch thick gypsum board.

b. Unbalanced drywall (3 layers) construction shall have a minimum STC rating of 49.0 using 1/2-inch thick gypsum board.

c. Double layer drywall (4 layers) construction shall have a minimum STC rating of 56.0 using 1/2-inch thick gypsum board.

D. Loose Insulation:

1. Loose insulation shall be same as specified above for blanket insulation above except it shall be "Friction-Fit" type and without vapor barrier facing.

2. Loose insulation shall be 3-1/2 inch thick fiberglass equal to "Friction-Fit" blanket type without vapor barrier facing as manufactured by Owens Corning, Toledo, Ohio (phone: 800/438-7465 website: www.owenscorning.com) or OWNER approved equal.

E. Vapor Barrier:

1. Vapor barrier shall consist of white or clear sheet or roll polyurethane film type material not less than 0.006 inch thick (6 mil) conforming to AASHTO-M171.

a. Pressure sensitive backed tape for sealing of vapor barrier shall be a polypropylene type "3M Contractor Sheathing Tape (No. 8086)" as manufactured by 3M Company, St. Paul, Minnesota (phone: 800/364-3577; 651/737-6501 website: www.3m.com/products) - No substitution. Provide tape in standard 1-7/8 inch width (minimum).

3.0 PART 3 - EXECUTION

3.1 INSPECTION:

A. Examination of Surfaces:

1. This CONTRACTOR shall inspect all surfaces, which are to receive their materials, and shall notify OWNER of any defects found in same. They shall not start until such defects have been corrected. Starting of any Work by this CONTRACTOR will imply their acceptance of existing conditions.

3.2 INSTALLATION:

- A. Perimeter Foundation Wall or Underslab Insulation:
1. Perimeter foundation wall insulation shall be installed direct to the interior face of exterior walls where indicated on Drawings extending unbroken from underside of floor slab or concrete heat duct as shown to a point not less than 36 inches below finish grade line or to top of footing. Installation shall be in accordance with manufacturer's recommendations using the adhesive method. All penetrations and joints shall be tightly butted. Insulation shall be true and even with all exposed corners and intersections cut square to line.
 2. Perimeter underslab insulation shall be laid directly on grade as indicated on Drawings extending from interior face of foundation wall inwardly a minimum of 48 inches as shown. Insulation shall be laid smooth level and butted tightly.
 - a. CONTRACTOR will be held responsible for holding insulation in place while backfilling is being performed and they shall also protect insulation to prevent tearing or puncturing of insulation until concrete floor slab has been poured.
- B. Blanket Insulation:
1. Blanket insulation shall be installed with the vapor barrier face toward the warm (in winter) side by inset stapling between studs or joists assuring an air space of at least 3/4 inch between vapor barrier facing and face of wood/metal framing. Vapor barrier shall be stretched tight without sag or buckle and shall extend full length and width of insulated spacing with all edges, laps, tears and penetrations completely sealed. Insulation shall fit neatly around and behind all electrical boxes, conduit, piping and similar items with all Work in accordance with manufacturer's latest printed recommendations.
 2. Blanket insulation which is used in exposed applications such as above ceilings or in plenum areas at exterior walls shall be applied same as specified above, except it shall securely attached by stick clip type hangers as recommended by the manufacturer, with all penetrations and or punctures completely sealed.
 3. Vapor barrier (polyethylene film) shall be installed as hereinafter specified.
- C. Acoustical Insulation:
1. Acoustical insulation in interior walls/partitions shall be installed between studs as shown on Drawings without sag or buckle and shall extend full length and width of insulated spacing with all edges and penetrations completely wedged tight. Insulation shall fit neatly around and behind all electrical boxes, conduit, piping and similar items with all Work in accordance with manufacturer's latest printed recommendations.
- D. Loose Insulation:
1. Loose insulation shall be placed in all voids around exterior windows and door frames as well as all miscellaneous voids as shown on Drawings or as they may occur in the construction. Insulation shall be packed tight and where exposed shall be covered and sealed with a vapor barrier material.
 - a. At all open voids or insulation cracks, provide a foil closure strip (vapor barrier) as recommended by the manufacturer.
- E. Vapor Barrier:
1. Vapor barrier material shall be installed where indicated on Drawings in a full and continuous manner with all lapped/folded joints or seams to be taped with 3M sheathing tape as necessary to hold in place and provide an integral barrier.
 - a. At perimeter wall over suspended ceiling, vapor barrier shall extend to structure above and be sealed in an appropriate manner.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 07920

SEALANTS AND CAULKING

PROJECT I.D. 0083940

1.0 PART 1 – GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all sealants and caulking as shown on Drawings and herein specified.
 - 1. Work herein specified shall include, but not be limited to, joint filling and sealant application of following:
 - a. Interior hollow metal frames.
 - b. Exterior hollow metal door and window frame openings.
 - c. Exterior louvers to adjacent material.
 - d. Metal flashing joints (except roofing sheet metal).
 - e. Plumbing fixtures to walls.
 - f. Surfaces of all fast setting cement used to anchor supports in sleeves with exterior sealant.
 - g. Pipes, conduit, ducts and structural members penetrating walls, floors or roof decks.
 - h. Miscellaneous joints where "caulking" or "sealant" is indicated on Drawings.
- C. Related Work Specified Elsewhere:
 - 1. Caulking and/or sealing of concrete floor slabs, sidewalks and other exterior paving, precast concrete, metal panels, roofing sheet metal, metal roofing, thresholds and ceramic tile Work is specified elsewhere and is not a part of Work of this Section.

1.2 QUALITY ASSURANCE:

- A. Applicator Qualifications:
 - 1. All Work included under this Section shall be performed by a Contractor who is recognized and established in this specific type of business and has completed jobs which have weathered and proved satisfactory in every respect for 5 or more years.
 - 2. Application of materials shall be under the supervision and recommendations of the manufacturer's district representative.

1.3 SUBMITTALS:

- A. Color Chart:
 - 1. Submit color chart for selection by OWNER.
- B. Samples:
 - 1. If requested by OWNER, submit samples of proposed material for approval.
- C. Certification:

1. At completion of the project, this CONTRACTOR shall obtain a certification from manufacturer and countersigned by CONTRACTOR stating all materials included herein have been applied in accordance with their Specifications and all workmanship is of the best of the caulking and sealant trades.
2. Submit to OWNER in writing a certification from CONTRACTOR stating that the material or combination of materials herein have been applied and meet all prevailing codes and regulations and are so classified in the UL's Fire Resistance Directory.

2.0 PART 2 – PRODUCTS

2.1 MATERIALS:

- A. Sealant materials for exterior joints shall be as manufactured by the Tremco Manufacturing Company, Beachwood, Ohio (phone: 800/321-7906 website: www.tremcosealants.com) or OWNER approved equal. Color shall be as selected by OWNER. Sealant shall consist of the following:
 1. Sealant material for joints up to and including 1/2 inch wide shall be a 1-part acrylic terpolymer base type "Mono 555" conforming to Federal Specification TT-S-00230.
 2. Sealant material for joints larger than 1/2 inch wide shall be a 2-part polyurethane base type "Dymeric 511" conforming to Federal Specifications TT-S-00227E.
- B. Caulking compound for interior joints not subject to movement shall be acrylic latex type "Tremflex 834" as manufactured by Tremco Manufacturing Company, Beachwood, Ohio (phone: 800/321-7906 website: www.tremcosealants.com); "DAP ALEX" as manufactured by DAP, Inc., Baltimore, Maryland (phone: 800/543-3840 website: www.dap.com) or OWNER approved equal.
 1. Caulking compound shall contain no ingredients, which will stain masonry or corrode metals.
- C. Caulking compound for interior joints subject to slight or moderate movement shall be acrylic latex base type "AC-20+ Silicone" as manufactured by Pecora Corporation, Harleysville, Pennsylvania (phone: 800/523-6688 website: www.pecora.com); "DAP Alex Plus" as manufactured by DAP, Inc., Baltimore, Maryland (phone: 800/543-3840 website: www.dap.com) or OWNER approved equal.
 1. Caulking compound shall contain no ingredients, which will stain masonry or corrode metals.
- D. Sealant material for sealing around plumbing fixtures shall be 1-part white silicone/rubber type sealant "Trademate Tub, Tile & Ceramic Sealant" as manufactured by Dow Corning Corporation, Midland, Michigan (phone: 800/346-9882 website: www.dowcorning.com) or OWNER approved equal.
- E. Sealant or caulking primer including bond breaker tape shall be as recommended by the sealant or caulking manufacturer for the varied joint surfaces. Primer shall be used as it comes from the original container and shall be applied with a brush.
- F. Joint filler and backup for sealant and caulking materials shall be closed cell, expanded polyethylene rod type "Ethafoam SB Sealant Backer Rod" as manufactured by Dow Chemical Company, Midland, Michigan (phone: 800/258-2436 website: www.dow.com) or OWNER approved equal.
 1. Material shall have a diameter of at least 25 percent larger than the opening.

3.0 PART 3 – EXECUTION

3.1 INSPECTION:

A. Examination of Surfaces:

1. Examine joints for construction defects, which would adversely affect the execution of Work. Starting of Work by this CONTRACTOR shall imply their acceptance of the Work of others as satisfactory.

3.2 JOB CONDITIONS:

A. Environmental:

1. Air temperature shall be not less than 40 degrees Fahrenheit, when sealant or caulking materials are applied. Sealant or caulking materials, which require heating prior to use, shall be heated to manufacturer's recommended temperatures.

B. Preparation of Surfaces:

1. Sealing or caulking shall not be started until all masonry cleaning, pointing and similar operations are completed. Rake joints clean, remove dust and then prime all joints in masonry or concrete. All metal surfaces shall be cleaned with a suitable solvent (Xylol) before sealing or caulking. All areas to receive sealant or caulking shall be thoroughly dry, clean and free from any foreign matter, which would adversely affect adhesion of sealant or caulking.

3.3 WORKMANSHIP:

- A. Application of materials, including primers, shall be in strict conformance with manufacturer's printed specifications.
- B. Work shall be of the very best, free from air pockets, foreign embedded matter, ridges, sags and other defects with all Work completely water and airtight and left ready for painting.

3.4 INSTALLATION:

- A. All exterior joints over 1/4 inch deep and all interior joints over 3/4 inch deep shall be hand packed with joint filler or backup material of proper size to within 1/4 inch of finished surfaces using a depth gage to give even uniform depth.
- B. Install bond breaker tape where shown or where required by sealant or caulking manufacturer's instructions. Sealant or caulking compound shall be forced in rabbets under mechanical pressure, utilizing nozzles of proper size to fit joints, filling all voids completely in a neat bead well bonded to both sides and extending full depth of rabbet. Wide joints to be caulked shall be done in 3 passes. Run a bead at each inside corner, and finish with a bead filling in the "vee" formed by the previous 2 beads. All joints shall be masked and struck slightly concave as required for neatness within 10 minutes of sealant or caulking application.

3.5 CLEAN UP:

- A. Exposed surfaces shall be cleaned, free of excess sealant and caulking or other soiling due to sealing operations. Surfaces shall be cleaned as Work progresses and before sealant or caulking begins to set or cure.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 08110

STOCK HOLLOW METAL DOORS AND FRAMES

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all stock hollow metal doors and frames as shown and scheduled on Drawings and herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Sealants and Caulking: Section 07920
 - 2. Finish Door Hardware: Section 08710
 - 3. Glass and Glazing: Section 08800
 - 4. Finish Painting: Section 09900

1.2 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications:
 - 1. All hollow metal doors and frames herein specified shall be the product of a single manufacturer to eliminate any divided responsibility.
- B. Referenced Standards:
 - 1. The current edition of the "Specifications for Door and Frame Preparation for Hardware - ANSI A115", issued by the American National Standards Institute (ANSI), shall govern where applicable, unless otherwise specified.

1.3 SUBMITTALS:

- A. Shop Drawings:
 - 1. Prepare and submit shop drawings for OWNER'S approval, including an itemized listing of all openings, elevations of all frame types and full size details of all frame sections. CONTRACTOR shall verify actual thickness of wall construction before submitting shop drawings.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. All material shall be transported, stored and installed in a manner that will prevent rusting, distortion or damage of any kind. Damaged material shall not be incorporated in the Work or repaired without specific approval of OWNER'S Designated Representative.
 - 1. All doors shall be delivered marked or tagged for their intended location, loss or obscuring of marking shall be sufficient cause for rejection of material. Frame number shall match room number indicated on Drawings.
 - 2. Store doors upright in a protected dry area, at least 1 inch off the ground with at least 1/4 inch air space between individual pieces; protect with suitable waterproof covering, including hardware surfaces as required.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. All stock hollow metal doors and frames shall be "747 Series Doors and M Series Frames" as manufactured by Curries Company, Mason City, Iowa (phone: 641/423-1334 website: www.curries.com); "Medallion Doors and SU Frames" as manufactured by Ceco Door Products, Milan, Tennessee (phone: 731/686-8345 website: www.cecodoor.com); "Series C Seamless Doors and Series F Integral Frames" as manufactured by Pioneer Industries, Hackensack, New Jersey (phone: 201/933-1900 website: www.pioneerindustries.com) or OWNER approved equal.
1. Frames shall be equal to "M Series" type, welded construction. Provide 2 inch high head jambs with all jambs having a 5-3/4 inch width, unless indicated otherwise. Jamb anchors shall be of type(s) to accommodate a metal stud "MS" opening.
 - a. Doorframes shall be equal to "M Series" (single) and "M Series" (pair) design frame types. Other design frame types are indicated on Drawings.
 - b. Borrowed lite frames shall be equal to "M Series" (single lite) and "M Series" (double lite) design frame types.
 2. Doors shall be equal to "Curries Company 747 Series" flush steel panel with steel reinforced (corrugated or rib stiffeners) type construction, complete with insulated cores. Doors shall be "747 Series" (with no glass lite); "747 Series" (with 4 inch by 25 inch glass lite);
- B. Finish hardware is specified in Section 08710 of this Specification and shall be verified with OWNER before fabrication.

2.2 FABRICATION AND MANUFACTURE:

- A. Workmanship:
1. Stock hollow metal doors and frames shall be fabricated at the factory, employing manufacturer's standard fabricating methods to ensure first class hollow metal Work, including all special provisions here specified.
 2. Cutouts and mortises for finish hardware shall be in accordance with previously cited ANSI standard, except as hereinafter modified.
- B. Frame Fabrications:
1. Interior frames shall be fabricated of minimum 16 gage and exterior frames of minimum 14-gage steel with all corners fully mitered including stops and continuously welded reverse side throughout entire miter. Butting of stops or trim and use of tabs or screws will not be permitted. Mullion intersections, faces shall be continuously welded and ground smooth. Frames shall be assembled square and true at factory and shipped in one-piece assembly.
 2. The following components shall be considered minimum: Hinge reinforcements 3/16 inch by 9 inches by 1-1/2 inches; closer and holder 1-3/4 inches by 20 inches by 12 gage; floor clip angle 2 inches by 3-1/2 inches by 12 gage; spreader channel 16 gage. All mortises shall be protected by a fully enclosed cover box. Each frame shall be equipped with two GJ No. 64 rubber bumpers.
 3. Frames shall be finished with one coat of gray oxide primer without runs, smears or bare spots. The underside of all removable stops as well as the area they cover shall be painted.
- C. Door Fabrication:
1. Doors shall be 1-3/4 inch thick, fabricated of minimum 18 gage steel, complete with inner reinforcement and insulation, as recommended by the manufacturer. Doors shall be flat and true with flatness tolerance of 1/16 inch in all directions, including diagonally. Doors shall be furnished with 1/8-inch bevel on edges, complete with fully welded edge seams.
 2. The following components shall be considered minimum: Top and bottom door channel 18 gage. Hinge reinforcement 3/16 by 1-1/2 by 9 inches. Closer reinforcement 12 gage

one piece channel 14 inches long welded to both door faces. At exterior doors, provide 18-gage filler channel to close door top flush.

3. Glass light openings shall have internal moulding with no surface type moulding permitted. Intersection of mouldings shall be welded for tight joints. Removable mould shall be fastened with Phillips oval head type screws.
 - a. Glass and glazing shall be as specified in Section 08800 of this Specification.
4. After fabrication, doors shall be sanded to remove irregularities and to provide bond for paint. All doors shall be provided with 1 coat of baked-on gray oxide primer.

3.0 PART 3 - EXECUTION

3.1 FRAME INSTALLATION:

- A. Hollow metal frames shall be installed in locations as indicated on Drawings. Work shall be plumb and straight to true plane breaks, angles and corners made square with walls. Frame members shall be securely anchored to wall construction as recommended by the frame manufacturer. Use wood spreaders and bracing to hold frame plumb and level until partitions are set.
 1. Doorjamb cavity or voids at masonry wall construction, unless indicated otherwise, shall be filled solid with concrete grout.
 2. Frames in metal stud partitions shall be installed as specified in Section 09270 of this Specification.

3.2 DOOR INSTALLATION:

- A. Hang doors with all screws inserted and hinges properly adjusted so that doors swing free and do not rattle when closed.

3.3 CAULKING:

- A. Joints between frames and wall construction will be caulked on both perimeter sides of frame, complete with backer rod and sealant, as specified under Section 07920 of this Specification.

3.4 FINISH PAINTING:

- A. Finish painting is specified in Section 09900 and is not a part of Work of this Section.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 08360

OVERHEAD (FOAMED INSULATED) SECTIONAL DOORS

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all electric operated overhead (foam insulated) sectional doors as shown on Drawings and herein specified.
 - 1. Electric power shall be brought to a junction box at a point near center or near operator, above opening. From this point CONTRACTOR shall complete the hook-up, including but not limited to the furnishing and installation of rigid conduit, wiring, limit switches, control stations, transformers and similar items for a complete installation.
 - 2. For any overhead door to be installed in a location with a dock leveler, this CONTRACTOR shall provide and install an electric device to be interlocked with the dock leveler by others to prevent the dock leveler from being operated unless the overhead door is open. This device shall have one normally open, electrically isolated contact rated for a minimum of 10 amps at 120 volts AC and shall close when the door is in the open position.
- C. Related Work Specified Elsewhere:
 - 1. Steel Protection Posts or Guards: Section 05500/05505
 - 2. Glass and Glazing: Section 08800
 - 3. Finish Painting: Section 09900

1.2 QUALITY ASSURANCE:

- A. Design Criteria:
 - 1. Doors shall be designed, when in the closed position, to be capable of withstanding a minimum 20 pounds per square foot (psf) wind load with a maximum deflection of 1/120 span.
 - 2. Maximum air leakage per foot of door perimeter (floor, jamb and header) shall be 0.06 cubic feet per minute (CFM) at 15 miles per hour (mph).
 - a. No air leakage shall be detected between joints when tested in accordance with ASTM E283.
 - 3. Door panel section shall have a minimum overall insulated U-value of 0.06 as tested in accordance with ASTM C236.

1.3 SUBMITTALS:

- A. Shop Drawings:
 - 1. Prepare and submit shop drawings for OWNER'S approval. Drawings shall indicate all materials, construction details, brackets, hangers, operators, controls, hardware, wiring diagrams and all other pertinent information.
- B. Operations Manual:
 - 1. CONTRACTOR shall furnish OWNER (Plant Engineer) with an operations manual, complete with approved shop drawings, operations and maintenance instructions,

installation instructions, parts list, name of local factory representative, complete with address and phone number.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. All material shall be transported, stored and installed in a manner that will avoid damage of any kind. No damaged material shall be used in the Work.

1.5 GUARANTEE:

- A. Provide manufacturer's standard guarantee, including a written warranty covering the spring cycle guarantee. Any spring failing before the cycle guarantee has elapsed shall be replaced and installed without cost to OWNER.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Overhead sectional doors shall be electric operated, first grade standard commercial-industrial steel type with foam-in-place insulation equal to "Thermospan 200" as manufactured by Wayne-Dalton Corporation, Mt. Hope, Ohio (phone: 216/674-7015); "Dura-Therm Model ST824" as manufactured by McKee Door Inc., (phone: 800/222-7426); Aurora, Illinois; "Thermacore 591" as manufactured by Overhead Door Corporation, Dallas, Texas (phone: 800/929-3667); "Tri-Core Series TC" as manufactured by Raynor Manufacturing Company, Dixon, Illinois (phone: 800/545-0455), "Insulrite 5255" as manufactured by Rite-Hite Corporation, Milwaukee, Wisconsin (phone: 800/456-0600), or OWNER approved equal.
 - 1. Section door panels shall be approximately 1-3/4 inches thick, consisting of continuous steel coil with a factory standard ribbed flush face profile, minimum 1.25 ounce (G-90) hot-dipped galvanized and incorporates an EPDM thermal-break type (tongue and groove) joint between sections, complete with weatherstripping.
 - a. Sections shall be filled with foam-in-place polyurethane insulation having a minimum U-factor as previously specified.
 - b. End stiles shall be minimum 16 gage steel, securely attached (welded or riveted) to sections.
 - c. Provide factory installed glass lites (as indicated). Lights shall consist of 1/2-inch thick insulated clear glass with 5/16-inch thick air space. Provide glazing strips or stops as required.
 - 2. Track system shall be "Vertical Lift Type, complete with 3 inch track (Graduated Seal), balancing system, support members and all other appropriate devices.
 - 3. Refer to Drawings for size of door opening and overhead clearance requirements.
- B. Electric operator shall be a 1/2 horsepower, roller chain drive, instantly reversing continuous duty jack shaft type "Model J" as manufactured by Link Controls, Ronkonkoma, New York (phone: 800/766-1188) or OWNER approved equal. Furnish complete with hanger support devices, control stations and all other appropriate devices.
 - 1. Operator shall operate on a 480 volt, 60 hertz, and 3 phase electric supply.
 - 2. Provide the following controls with each operator:
 - a. One (1) push button control (wall mounted) single type.
- C. Provide reversing electric door bottom edge, for all doors as required by UL 325-2010 along with bottom weather seal.
- D. Provide door reversing "photo sensing eyes" for each door, as required by UL325, at 6-inches above finished floor. Provide an additional set of photo eyes at 54-inches for forklift travel or

vehicles; and/or one additional set of photo eyes on the opposite side of the door at locations shown on drawings to protect waiting vehicles from having door close on them.

- E. Pneumatic bottom edge sensor devices are not UL325-2010 approved and shall not be provided.

2.2 FABRICATION AND MANUFACTURE:

- A. Overhead door assembly shall be manufactured in accordance with approved shop drawings. Work shall be in accordance with manufacturer's standard practice with all components pre-assembled and finished complete at the factory to ensure first class workmanship.
 - 1. Doors shall be fabricated of multiple sections or panels hinged together one above the other (refer to Drawings for required number of sections). Panels shall be fabricated into a rigid integral type units, complete with tongue and groove type meeting rail for weather-tight closure between sections.
 - a. Ends of panels shall be covered and sealed with appropriate metal end closures.
 - b. Panels shall have manufacturer's standard internal reinforcements to receive hardware, including reinforcement for top panel draw bar connecting arm bracket, end stiles and frames for glazing, all securely anchored in place.
 - c. Finish of exposed section metal surfaces shall consist of manufacturer's factory applied finish coats, color as selected by OWNER from factory standard.
- B. Door assembly shall be complete with torsion spring counterbalancing device, side tracks, track brackets, ball bearing rollers, jamb bolts and all other required hardware and appurtenances. Steel shall be shop primed. Hardware shall be corrosion resistant. Provide perimeter rubber or neoprene type weatherstripping, both at head and jambs of door.
 - 1. Tracks shall be heavy-duty type with continuous vertical angle mounting brackets, complete with rollers and case hardened raceways as recommended by the door manufacturer.
 - 2. Springs shall be heavy-duty low stress torsion type on a continuous ball bearing cross header solid steel shaft. Springs shall be guaranteed 100,000 cycle action and furnished complete with a non-tampering electric counter.
 - a. The full opening and complete closing action of door shall be considered as 1 cycle for above counter.
 - b. Lifting cables shall be galvanized aircraft type with minimum safety factor of 7 to 1.
- C. All hardware shall be heavy duty type and shall consist of the following:
 - 1. Doors shall be fitted with a locking device, which engages track on each side of door by means of bars extending from locking handle to tracks at both sides. Bar shall have protection device to keep from being damaged by bending. Doors shall be locked from the inside only and no cylinder locks will be required.
 - 2. Provide all required brackets and/or ceiling support track hangers, including anchoring devices, of such size and design to securely anchor door system in a rigid and stable manner.
- D. Electric operators shall be equipped with instantly reverse motor, centrifugal clutch, drum with shoe brake, worm gear reduction, thermal overload, necessary switches and release mechanism for manual operation. Operation of motorized unit shall consist of the following:
 - 1. Each exterior door shall have a weather proof key control station which will open or close door when activated.
 - a. Each station shall have door identification and shall be installed at locations as directed by OWNER.
 - b. Doors shall be capable of being stopped and reversed at any point in its travel.

- E. CONTRACTOR shall provide rigid wall conduit (thin wall not accepted), complete with compression type fittings. All electrical materials shall be in accordance with the National Electrical Code.

3.0 PART 3 - EXECUTION

3.1 INSPECTION:

- A. Examine all surfaces to receive overhead sectional door assemblies and notify OWNER in writing of any defect in same. Starting of the Work by CONTRACTOR shall imply their acceptance of the Work of others as satisfactory.

3.2 INSTALLATION:

- A. Overhead door system, including electric operators, shall be installed by, or the installation shall be supervised by, the manufacturer's authorized representative in openings completely prepared by others and shall be done in a first class manner with all Work plumb, in proper alignment and in accordance with approved shop drawings and manufacturer's latest printed instructions.
- B. Door systems shall be installed securely to building structure with all support members, including sway and diagonal bracing, welded and/or bolted in place in a rigid type manner. Electric operator shall be installed in perfect alignment without stress or torque on draw bar assembly. Install and connect all electrical components.
 - 1. All electrical Work shall be done in accordance with the National Electric Code, state and local codes.
- C. Upon completion of the building, the doors shall be lubricated, tested, adjusted for ease of operation and weathertightness and shall be free from imperfections and be left in perfect condition.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 08710

FINISH DOOR HARDWARE

PROJECT ID. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all finish hardware as shown on Drawings and herein specified.
 - 1. Some doors will have the letters "WS" suffixed to group numbers. This is to indicate that doors are to be weather-stripped as specified in Section 08730 of this Specification.
- C. Related Work Specified Elsewhere:
 - 1. Stock Hollow Metal Doors and Frames: Section 08110
 - 2. Toilet Accessories: Section 10800
- D. The hardware supplier shall check the suitability and adaptability of all items specified in the relation of all details and surrounding conditions. OWNER'S attention shall be called to any items not suitable or adaptable, so that corrections may be made before any hardware is furnished.
- E. CONTRACTOR shall visit existing building to determine the type of new finish door hardware required under this Contract. New Work shall match existing in manufacturer, design, size, thickness, profile, finish and type of installation. CONTRACTOR shall notify OWNER in advance of submitting a bid where existing material cannot be replaced with current production run stock.
- F. It is the intent of Drawings and this Specification to schedule a complete hardware installation. Therefore, should items of hardware not definitely specified be required for completion of Work, it shall be the hardware supplier's responsibility to furnish such items in type and quality comparable to adjacent hardware.

1.2 QUALITY ASSURANCE:

- A. Supplier Qualifications:
 - 1. The finish hardware supplier shall have in their employ an AHC member of the American Society of Hardware Consultants who shall be made available for consultation at no additional cost to OWNER during the course of construction.
- B. Codes and Standards:
 - 1. Where required by Drawings or schedules, all finish hardware shall conform to the National Board of Fire Underwriter's Label for the class of opening indicated.
 - 2. All door hardware shall comply with the Americans with Disabilities Act (ADA) requirements, unless indicated otherwise.

1.3 SUBMITTALS:

- A. Hardware Schedule:
 - 1. Prepare and submit typewritten hardware schedules for OWNER'S approval. The schedule shall consist of a complete listing of all hardware under this Section, and no hardware shall be delivered until this listing is approved. Provide schedule with catalog

illustrations of all items listed, complete with descriptions as to their function, location, door number, degree of swing, hand, size, material, finish and all other special conditions.

a. OWNER'S approval of schedule will not relieve hardware supplier of responsibility to furnish hardware in all quantities required and in conformance with this Specification.

B. For each opening with electrical hardware:

1. Prepare and include a riser diagram showing each electrical item in its rough location in relation to the door, all conductor requirements, and the type of back box needed to be supplied by the Electrical Contractor. Each riser diagram shall include a detailed written description of the operation of the opening.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. All hardware items shall be properly and carefully packed to guard against damage in transit and shall be delivered in original unopened boxes, complete with required fastening and adjusting devices. Each item shall be marked with appropriate heading and door number in conformance with approved hardware schedule.

2.0 PART 2 - PRODUCTS

2.1 LOCKSETS AND LATCHSETS:

A. All locksets and latchsets, unless otherwise indicated, shall be of heavy-duty mortise type units, less cylinders. Furnish units complete with reinforced levers, shank assembly, antifriction latches and ASA strike plates. Except as otherwise specified, all locks and latches shall have a 2- 3/4-inch backset. All locksets and latchsets shall be the product of a single manufacturer, which will accommodate a 6 pin "Abloy" mortise cylinder, and shall be: Sargent 8255LC LNL 26D—no substitutions.

Mfr.: SARGENT
Series: 8255LC
Design: LNL

B. All locksets shall be heavy-duty mortise type unit "8255LC LNL 26D Office function" as manufactured by Sargent Manufacturing Company, New Haven, Connecticut (phone: 203/562-2151 website: www.sargentlock.com). Furnish units complete with screwless knob and shank assembly and antifriction latches.

1. For hardware groups designated as "LATCHED" doors:

a. In addition to a Sargent 8255 "Office function" outside front plate, provide a Sargent 8204 "Storeroom function" outside front plate installed to hide the toggle button to obtain a latched condition.

b. Furnish with an Ilco Unican "dummy" cylinder number 7180DC26D.

2.2 ELECTRONIC SECURITY:

A. Electric strikes for mortise locks shall consist of the "8500 Series" as manufactured by HES, Phoenix, Arizona (phone: 623/582-4626 website: www.hesinnovations.com) (part number: 8500-630-851M) or OWNER approved equal.

1. Verify type of strike to accommodate above lockset function specified and door/frame type application.

2. Verify type of signal switch options to assure electronic compatibility with OWNER'S security equipment.

3. Unless otherwise indicated, voltage shall be 24 DC.
 - a. Electrical connections for electric strikes are specified in Division 16 and are not a part of Work of this Section.

2.3 CLOSERS:

- A. Closers, unless otherwise indicated in the groupings, shall be full rack and pinion, exposed surface applied type "7500 Series" as manufactured by the Norton Door Controls, Charlotte, North Carolina (phone: 800/438-1951 website: www.nortondoortcontrols.com) or "4040 Series" with standard cover as manufactured by LCN Closers, Princeton, Illinois (phone: 800/526-2400 website: www.lcnclosers.com).
 1. Closers shall be of the proper size for the door as recommended by the closer manufacturer. Supply regular and/or parallel arms, brackets, and drop plates as required to suit conditions. Closers for exterior doors shall be equipped with spring power adjustment of 50 percent. Closers on all corridor doors shall be mounted on room side of door. Where wall conditions permit, all doors shall swing 180 degrees. Closers shall be equipped with forged steel or malleable iron accessories.
 - a. Interior doors requiring handicap accessibility and equipped with closers shall have closers, which comply with previously cited ADA requirements.
 2. All closers shall be equipped with separate adjusting valves for latching speed, closing speed and backcheck features.

2.4 HINGES:

- A. Hinges or butts shall be wrought steel, planished and plated, contract grade, ball-bearing type as manufactured by Hager Companies, St. Louis, Missouri (phone: 800/325-9995 website: www.hagerhinge.com); Stanley Works, New Britain, Connecticut (phone: 800/622-4393 website: www.stanleyworks.com); Lawrence Brothers, Inc., Sterling, Illinois (phone: 815/625-0360 or 800/435-9568); McKinney Manufacturing Company, Scranton, Pennsylvania (phone: 800/346-7707 website: www.mckinneyhinge.com) or OWNER approved equal. Butts shall be to template when used with metal doors and frames.
 1. Doors 101 inches through 126 inches in height shall have 5 (2-1/2 pr.) butts. All exterior doors and doors 90 inches through 100 inches in height shall have 4 (2 pr.) butts. Doors 61 inches through 89 inches in height shall have 3 (1-1/2 pr.) butts. Doors 60 inches in height and under shall have 2 (1 pr.) butts. Add 1 butt for each 12 inches of width over 36 inches to the above.
 2. Extra-heavy ball bearing butts shall be used on all exterior doors and all interior over 38 inches wide. Standard weight plain-bearing butts may be used on doors less than 29 inches wide and equipped without closers. Standard weight ball bearing butts, unless otherwise indicated, shall be used on all other doors.
 3. Size of butts, unless otherwise indicated, shall be 4-1/2 by 4-1/2 inches.
 4. Exterior outswinging and interior secured doors shall have non-removable pins (NRP).
 5. All butts shall have flat button type pins.
 6. All butts shall be fully mortised, unless approved otherwise.
- B. Spring hinges, where indicated in hardware groups, shall be used in conjunction with the above standard type butts and shall be complete with a spring adjustment feature, sized to match adjacent mortise recesses and adjustment tool. Spring hinges shall be "Model 1502" as manufactured by McKinney Manufacturing Company, Scranton, Pennsylvania (phone: 800/346-7707 website: www.mckinneyhinge.com) or OWNER approved equal.
 1. Doors scheduled for 3 standard hinges as previously specified above shall have 1 spring hinge included with the above for a total of 3 hinges. Doors scheduled for 4 standard

hinges as previously specified shall have 2 spring hinges with the above for a total of 4 hinges.

2.5 EXIT DEVICES:

- A. Exit devices, unless otherwise indicated, shall be a mortise lock "99 Series" as manufactured by IR Von Duprin, Indianapolis, Indiana (phone: 800/999-0408 website: www.vonduprin.com).
 - 1. Exit devices where indicated on label doors shall meet the minimum fire retardant time design rating as called for and the safety requirements as listed by the Underwriter's Laboratories, Inc.
 - 2. Dummy trim where indicated shall be Von Duprin's Design No. 990DT.
 - 3. Refer to hardware groupings for exit device series and function.
 - 4. Furnish exit devices with lever handles where indicated by function.
 - 5. Furnish exit devices less cylinders same as locksets.

2.6 FLAT TRIM:

- A. Kickplates and pushplates shall be minimum 18 gage (.050) thick wrought stainless steel with beveled edges as manufactured by Don Jo Manufacturing, Sterling, MA (phone: 800/628-8389, website: www.don-jo.com); Burns Manufacturing Inc., Erie, Pennsylvania (phone: 814/833-7428 or 800/519-2610 website: www.burnsmfg.com) or OWNER approved equal.
 - 1. Pushplates shall be 6 by 16 inches (Don-Jo 72) where possible, otherwise use 3-1/2 by 15 inches (Don-Jo 70). Where cylinders or thumbturns are specified, use a push/pull plate combination (Don-Jo 1866). All push plates shall be factory cut for cylinders or have thumbturns mounted where used with deadlock or latch.
 - 2. Kickplates shall be 10 inches high and full width of the opening less 1-1/2 inches on single-acting doors, less 1 inch on pairs of doors.

2.7 PULLS:

- A. Pulls, unless otherwise indicated in the groupings, shall be "Design Type 38" as manufactured by Don Jo Manufacturing, Sterling, MA (phone: 800/628-8389, website: www.don-jo.com); Burns Manufacturing Inc., Erie, Pennsylvania (phone: 800/519-2610 website: www.burnsmfg.com) or OWNER approved equal.

2.8 STOPS AND HOLDERS:

- A. Stops and holders, except rubber bumper type wall stops, shall be as manufactured by Glynn-Johnson Corporation, Indianapolis, Indiana (phone: 800/525-0336 website: www.glynn-johnson.com) or OWNER approved equal.
 - 1. Rubber bumper wall stops shall be molded urethane type "3M Brand Bumpon No. SJ-5532" as manufactured by 3M Company, St. Paul, Minnesota (phone: 651/737-6501 or 800/364-3577), in color as selected. Where stops are applied to concrete block walls, use "3M Brand Adhesive No. EC 1421".
 - 2. Where wallstops or bumpers (3M series) are not applicable, provide overhead doorstop "GJ 450 Series". Where 2 doors interfere with each other, provide roller bumpers type "GJ-RB 4" or GJ-RB 6 Series". Unless otherwise indicated "GJ-90 Series", overhead holder shall be provided for each exterior door.

2.9 WEATHER-STRIPPING AND THRESHOLDS:

- A. Weather-stripping sets, including thresholds, shall be as manufactured by Reese Enterprises, Inc., Rosemount, Minnesota (phone: 800/824-3348 website: www.reeseusa.com) or OWNER approved equal.
 - 1. Weather-stripping for exterior doors:
 - a. Weather-strip sets, unless otherwise indicated, shall be fully adjustable, screw applied aluminum, anodized clear extrusion with sponge neoprene gasket type, equal to "59C" - UL approved.
 - 2. Weather-stripping for interior doors:
 - a. Weather-strip sets, unless otherwise indicated, shall be direct adhesive applied extruded polypropylene compound type "797B" - UL approved.
 - 3. Thresholds:
 - a. Thresholds for exterior doors, unless otherwise indicated, shall be extruded aluminum similar to "Frost Barrier No. S205A" with vinyl bumper insert.
 - b. Wherever possible, thresholds shall extend full width of door opening, including frame members, complete with returned ends. Provide thresholds with minimum 1/4 inch No. 20 machine screws (Acherman-Johnson) and lead shields.

2.10 FASTENINGS:

- A. Furnish all finish hardware with all necessary screws, toggle bolts, sex bolts, expansion shields and all other fasteners of appropriate size and type as recommended by the hardware manufacturer for a secure and permanent installation. Dull stainless steel (18-8) screws with Phillips heads shall be used to attach all hardware.

2.11 CYLINDERS:

- A. Cylinders shall be UL437 rated or equal.
- B. Hardware groups designated as "LATCHED": shall be furnished with a "dummy" cylinder Ilco No. 7180DC26D.

2.12 MISCELLANEOUS HARDWARE:

- A. All other finish door hardware shall be as indicated in the groupings.

2.13 FINISHES:

- A. All hardware shall be wrought, cast or cold-drop forged as indicated herein by catalog numbers with specified finishes obtained by using "3M Scotch-Brite" products. Finishes shall consist of the following:
 - 1. All lock and latchset trim shall be dull chromium (US26D) finish. Strike plates shall be dull stainless steel (US32D).
 - 2. All butts shall be dull chromium (US26D) finish on wrought steel.
 - 3. All flat trim, such as kick and pushplates shall be dull stainless steel (US32D) finish.
 - 4. Pulls shall be dull stainless steel (US32D) finish.
 - 5. All closers, including arms and brackets, shall have a sprayed aluminum finish to match US28.
 - 6. All miscellaneous hardware shall have a dull chromium (US26D) finish or dull stainless steel (US32D) finish.
 - 7. All glass aluminum doors shall have a sprayed aluminum (US28) or dark bronze (US313) finish to match the doors.
- B. No hardware shall be cut after anodizing or plating, except for holes for cylinders or thumbturns.

3.0 PART 3 - EXECUTION

3.1 METAL DOORS AND FRAMES:

- A. Hardware for metal doors and frames shall be to template as required by the standards of metal door and hardware manufacturers. CONTRACTOR shall furnish template drawings and a complete list of template hardware promptly to the metal frame manufacturers. CONTRACTOR shall deliver to the metal frame manufacturers all hardware required for application as required by the frame manufacturer.
- B. All reinforcements required to adapt hardware to metal frames shall be supplied by metal door supplier.

3.2 MOUNTING HEIGHTS:

- A. Mounting heights of finish hardware, unless otherwise indicated or specified elsewhere, shall consist of the following:
 - 1. Butts and Hinges: Bottom of bottom butt, 10 inches above floor. Top of top butt, 5 inches below head of frame. Others spaced equally.
 - 2. Door Levers: 40 inches including lever of mortise night latch.
 - 3. Exit Device Push Bar: 36 inches up from floor.
 - 4. Door Stops: 3M Rubber wall bumper, to catch knob, pull or closer.

3.3 HARDWARE INSTALLATION:

- A. CONTRACTOR shall safeguard and install all hardware and be responsible for same until completion of the Work, including any costs and expense for labor and material to correct improper installation. Hardware shall be applied in strict conformance to the manufacturer's latest printed instructions at the mounting heights previously specified. All holes and mortises shall fit snugly to provide as much support as possible to the hardware. All cylinders and/or keyway cores shall be installed in such manner that the key enters the keyway with its smooth edge DOWN.
 - 1. All mounting heights of hardware shall match existing Work.
- B. After hardware has been fitted, exposed portions (except those primed for paint finish) shall be removed until final painting has been completed. Hardware shall be reinstalled after painting is completed, properly adjusted, tested and left in perfect working order. Thresholds shall be set in a full bed of mastic and securely anchored in place. Doorknobs and similar hardware shall be kept covered with heavy cloth, tied on, until the building is ready for occupancy.

4.0 PART 4 - RELATED DOCUMENTS

4.1 HARDWARE GROUP SCHEDULE:

- A. The following hardware schedule is furnished for whatever assistance it may afford CONTRACTOR; do not consider as entirely inclusive. Examine Drawings, door schedule and Specifications to determine extent and hardware quality required. Should any particular door or item be omitted in any scheduled hardware group, provide such door or item with hardware same as required for similar purposes.

GROUP 1 – LATCHED DOORS

Each door shall have:

Hinges/butts	26D
1 Lockset, 8255 (Office function) In addition to an 8255 face plate, provide an 8204 face plate to obtain a latched condition.	26D
1 "Dummy" cylinder 7180DC26D.	
1 Stop	26D
Supply for inactive of pair:	
Hinges/butts	26D
1 Set manual flush bolts	26D
1 Stop	26D
GROUP 2 – LOCKED DOORS	
Each door shall have:	
Hinges/butts	26D
1 Lockset, 8255 (Office function)	26D
1 Cylinder by 3M Lock Operations	
1 Stop	26D
Supply for inactive of pair:	
Hinges/butts	26D
1 Set manual flush bolts	26 D
1 Stop	26 D
GROUP 3 - LABEL DOORS, LATCHED	
Each door shall have:	
Hinges/butts	26D
1 Lockset, 8255 (Office function) In addition to an 8255 face plate, provide an 8204 face plate to obtain a latched condition.	26D
1 "Dummy" cylinder 7180DC26D.	
1 Closer, no holder arm; provide closer with holder arm ([smoke release detection type] [electromagnetic door opener]) on pairs of doors.	SBL
1 Kickplate	32D
1 Set of weather-stripping	
1 Stop	26D
Supply for inactive of pair:	
Hinges/butts	26D
1 Set automatic flush bolts	26D
1 Closer, with holder arm (electromagnetic door opener)	SBL
1 Coordinator	Prime
1 Set of weather-stripping, same as above	
1 Stop	26D
Note: Astragal to be provided by door manufacturer.	
GROUP 4 - LABEL DOORS, LOCKED	
Each door shall have:	
Hinges/butts	26D
1 Lockset, 8255 (Office function)	26D
1 Closer, no holder arm; provide closer with holder arm ([smoke release detection type] [electromagnetic door opener]) on pairs of doors.	SBL
1 Kickplate	32D
1 Set of weather-stripping	
1 Stop	26D
Supply for inactive of pair:	
Hinges/butts	26D

1 Set automatic flush bolts	26D
1 Closer, with holder arm (smoke release detection type)	SBL
1 Coordinator	26D
1 Set of weather-stripping, same as above	
1 Stop	26D
Note: Astragal to be provided by door manufacturer.	

GROUP 5 – ENTRANCE DOORS

Each door shall have:

Hinges/butts	26D
1 Exit device, IR Von Duprin “99 Series”	Alum.
1 Electric strike, [HES “9400 Series” Rim Device] [HES “8500 Series” Mortise Device]	
1 Closer	SBL
1 Kickplate	32D
1 Door holder	26D
1 Set weather-stripping	
1 Threshold	Alum.
Note: Electrical connections for electric strike are specified in Division 16 and are not a part of Work of this section.	

GROUP 6 – LATCHED DOORS WITH CLOSER

Each door shall have:

Hinges/butts	26D
1 Lockset, 8255 (Office function) In addition to an 8255 face plate, provide an 8215 face plate to obtain a latched condition.	26D
1 “Dummy” cylinder 7180DC26D.	
1 Closer, with holder arm	SBL
1 Kickplate	32D
1 Stop	26D

Supply for inactive of pair:

Hinges/butts	26D
1 Set automatic flush bolts	26D
1 Closer, with holder arm	SBL
1 Coordinator	26D
1 Kickplate	32D
1 Stop	26D

GROUP 7 – LOCKED DOORS WITH CLOSER

Each door shall have:

Hinges/butts	26D
1 Lockset, 8255 (Office function)	26D
1 Cylinder by 3M Lock Operations	
1 Closer, with holder arm	SBL
1 Kickplate	32D
1 Stop	26D

Supply for inactive of pair:

Hinges/butts	26D
1 Set manual flush bolts	26D
1 Closer, with holder arm	SBL
1 Coordinator	26D
1 Kickplate	32D
1 Stop	26D

GROUP 8 - ROOF ACCESS DOORS

Each door shall have:

Hinges/butts	26D
1 Lockset, 8255 (Office function)	26D
1 Cylinder by 3M Lock Operations	
1 Overhead holder, Glynn-Johnson 90 series	26D
1 Set weather-stripping	
1 Threshold	Alum.

GROUP 9 - EXTERIOR ACCESS DOORS

Each door shall have:

Hinges/butts	26D
1 Lockset, 8255 (Office function)	26D
1 Cylinder by 3M Lock Operations	
1 Closer	SBL
1 Kickplate	32D
1 Door holder	26D
1 Set of weather-stripping	
1 Cast iron threshold	

Supply for inactive of pair:

Hinges/butts	26D
1 Set manual flush bolts	26D

1 Door holder, Glynn-Johnson 90 series	26D
1 Astragal weatherstrip	Alum
1 Threshold, same as above	
1 Set of weather-stripping, same as above	
Note: Astragal to be provided by door manufacturer.	

GROUP 10 – LOCKED INTERIOR EMERGENCY EXIT DOORS

Each door shall have:

Hinges/butts	26D
1 Rim exit device, IR Von Duprin “9900 Series” NL [exit only, no trim on outside]	Alum.
1 Rim exit device, IR Von Duprin 992L x 06 [outside by lever handle - key locks or unlocks lever]	Alum.
1 Rim exit device, IR Von Duprin 992L x 06 [outside lever handle - passage set]	Alum.
2 Cylinders by 3M	
1 Closer, no holder arm	SBL
1 Kickplate	32D
1 Set of weather-stripping	
1 Stop	26D

4.2 KEYING SCHEDULE – NOT USED

SECTION 08800

GLASS AND GLAZING

PROJECT ID 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all glass and glazing as shown on Drawings and herein specified.
 - 1. Glass and glazing for insulated aluminum windows is specified elsewhere and are not a part of Work of this Section.
- C. Related Work Specified Elsewhere:
 - 1. Stock Hollow Metal Doors and Frames: Section 08110
 - 2. Overhead Sectional Doors: Section 08360
 - 3. Stock Size Mirrors: Section 10800

1.2 QUALITY ASSURANCE:

- A. Reference Standards:
 - 1. The current edition of the "Glazing Manual" as published by the Flat Glass Marketing Association (FGMA) shall govern where applicable, unless otherwise specified.
 - 2. The current Federal Specification DD-G-451D entitled "Glass, Float or Plate, Sheet, Figured (Flat for Glazing, Mirrors and Other Uses)" shall govern where applicable, unless otherwise specified.
- B. Regulatory Agencies:
 - 1. All glass and glazing for personnel doors, including side lights and borrowed lights, shall meet or exceed the provisions of the Safety Standard for Architectural Glazing Materials (CFR 1201 CI and CII) issued by the Consumer Products Safety Commission (CPSC) and as defined in state glazing laws or prevailing building codes.

1.3 SUBMITTALS:

- A. Product Data:
 - 1. Prepare and submit product data for OWNER'S approval. Product data shall include manufacturer's recommended installation instructions.
- B. Samples:
 - 1. If requested by OWNER, submit 2 samples of proposed materials for approval. Glass samples shall be minimum 6 inches square.
 - 2. Insulated glass sample shall consist of a corner section with metal edge.
- C. Certification:
 - 1. CONTRACTOR shall submit certification on all glass material for doors, including side lights and borrowed lights herein specified, indicating compliance with the previously cited CPSC Standard, state law or local building code.
 - a. In lieu of certification, glass may be etched with the CPSC verification label of compliance.
 - b. Wire glass does not require certification or verification.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Single flat glass shall be manufactured by Pilkington, Toledo, Ohio (phone: 419/247-3731 website: www.pilkington.com); PPG Industries, Inc., Pittsburgh, Pennsylvania (phone: 800/441-9695 website: www.ppg.com); HGP (Hordis) Industries, Inc., Moorestown, New Jersey (phone: 800/284-6734 website: www.hgp.com); Oldcastle Glass, Dallas, Texas (phone: 866/653-2278 website: www.oldcastleglass.com); Guardian Industries Inc., Carleton, Michigan (phone: 800/521-9040 website: www.guardian.com); Viracon, Inc., Owatonna, Minnesota (phone: 800/533-2080 website: www.viracon.com) or OWNER approved equal. The following glass shall meet the previously cited Federal Specification:
1. Tempered glass shall conform to Type I, Class 1, tempered to 4 times normal strength, 1/4 inch thick, except as otherwise indicated.
- B. Wire glass shall be 1/4 inch thick clear plate with standard welded wire having a diamond type pattern "Mississippi Polished Misco" as manufactured by Oldcastle Glass, Dallas Texas (phone: 866/653-2278 website: www.oldcastleglass.com); HGP (Hordis) Industries, Inc., Moorestown, New Jersey (phone 800/284-6734 website: www.hgp.com) or OWNER approved equal.
1. Use wire glass where indicated on Drawings and in fire-rated personnel doors.
- C. Tempered glass shall be 1/4 inch thick clear float, heat treated as manufactured by PPG Industries, Inc., Pittsburgh, Pennsylvania (phone: 800/441-9695 website: www.ppg.com); Pilkington Company, Toledo, Ohio (phone: 419/247-4721 website: www.pilkington.com); Viracon, Inc., Owatonna, Minnesota (phone: 800/533-2080 website: www.viracon.com) or OWNER approved equal.
1. Use tempered glass where indicated on Drawings and in all non-fire rated personnel doors, including sidelights and borrowed lights as classified under the previously cited CPSC Standard.
- D. Acrylic polymeric sealant shall be "Dap One-Part Acrylic Sealant" as manufactured by Dap, Inc., Dayton, Ohio (phone: 800/634-8382 website: www.dap.com); "60+ Unicrylic" as manufactured by Pecora Chemical Corporation, Philadelphia, Pennsylvania (phone: 800/523-6688 website: www.pecora.com) or OWNER approved equal.
- E. Setting blocks and spacer shims shall be neoprene or vinyl, maximum durometer hardness 40-50 for spacers and 70-80 for setting blocks.
- F. Glazing clips as required.

2.2 FABRICATION AND MANUFACTURE:

- A. All glass herein specified shall be fabricated or manufactured to conform to the requirements of the previously cited Federal Specifications. All glass shall be factory labeled on each pane and labels shall remain on glass until final cleaning. All glass shall be paper packed and shall not be unpacked at Worksite until it is to be used. Sizes of glass shown on Drawings are approximate and are indicated as a guide for estimating purposes only. Actual size shall be determined by measurement of the actual openings and all glass shall be accurately cut to fit these openings.
- B. The glass to be used for each opening is indicated on Drawings. Where no indication is given, clear glass shall be furnished.
1. Generally, other than those glass areas covered under the previously cited CPSC Standard, shall consist of sheet and 1/8 inch thick glass used in openings up to 7 square feet, 3/16 inch thick glass in openings over 7 square feet up to 27 square feet and 1/4 inch thick glass for all openings over 27 square feet.

3.0 PART 3 - EXECUTION

3.1 GLAZING PROCEDURES:

- A. Glazing procedures for setting of glass shall be as recommended by the glass manufacturer with all Work done by experienced glaziers and in strict accordance with procedures recommended in the previously cited FGMA manual, unless specifically excepted hereinafter. All Work shall be performed in a neat and workmanlike manner, with sight lines plumb and true, all connections well-fitted, and with joints weather and water tight.
- B. Glass shall be centered in glazing rabbet and glass exceeding 75 united inches shall have setting blocks at the sills, with spacer shims on both faces of the four edges of glass (as directed by glass manufacturer). Spacer shims shall be used on all operating sash.
- C. Remove and reset glazing beads carefully to avoid marking or defacing any portion of frame, sash, door, bead or screws. Any damage to the Work of others shall be repaired or replaced to the satisfaction of and at no cost to OWNER.
- D. Rabbet surfaces shall be clean and free from dust, foreign matter or protective coatings removed with a xylol wipe. Sash must be dry before glazing and precautions shall be taken to prevent condensation on glass until compound is set. Do not glaze in temperatures less than 40 degrees Fahrenheit.
- E. Secure sash or frames so that they will not be moved or handled until the glazing material is set. Setting blocks in operating sash shall be located where recommended by the window manufacturer.
- F. Cut and set glass with wave or distortion running horizontally rather than vertically. Set figured glass with the smooth surface to the exterior. Set ribbed glass and patterned glass with ribs or pattern running vertically unless otherwise directed. Set obscure glass with the pattern running in the same direction throughout entire job.
- G. Tempered or heat strengthened glass shall be fitted with clean cut edges, with edges free of spalls, impact damage, chips or deep shark teeth. No nipping will be permitted. Tong marks shall be buried within the glazing channel.

3.2 EXTERIOR APPLICATION:

- A. All exterior glass shall be beaded, backed and faced to the extent that the glazing channel is completely filled. No air pockets or voids will be permitted. Glazing material shall be neatly faced on both inside and outside after beads are replaced and finished surface shall be parallel to and in alignment with the surface of the beads. Corners shall be carefully made and all excess glazing material removed.
- B. Glazing material system shall be used in strict accordance with the manufacturer's printed instructions. CONTRACTOR shall arrange with the manufacturer of the glazing material system to have a qualified representative present, to assure proper procedure in their use.
 - 1. Lites less than 75 united inches shall be glazed using an unreinforced glazing tape set flush with outside glass line stop. Toe and heel bead of glazing sealant at bottom of glazing channel shall be installed at prescribed depths to insure complete seal and continuous embedment. After glass has been set in the recommended manner and metal glazing stops applied, CONTRACTOR shall install glazing strips between inside surface of glass and metal stop, ensuring strips are full length (between glass corners) and partial embedment into sealant heel bead as recommended by the manufacturer. Splices in glazing strips, except at glazing corners, will not be allowed.
 - 2. Lites between 75 and 150 united inches shall be same as above, except reinforced glazing tape and glazing gasket shall be used. A heel bead of sealant will not be required.

- C. Glass set in hollow metal doors and frames shall be glazed using a reinforced glazing tape set approximately 1/8 inch below outside glass line stop. A toe bead of glazing sealant at bottom of glazing channel shall be installed under glazing tape to insure complete seal and continuous embedment. After glass has been set in the recommended manner apply spacer shims to glass and install interior metal glazing stops. Spacer shims must be of the correct size to hold glass firmly against the tape. Apply flexible sealant bead between glass and glazing stop and finish in a true even line. Glass shall be set so that there is 1/8 inch of flexible sealant on each side of glass.

3.3 INTERIOR APPLICATION:

- A. All glass set with beads in interior frames shall be set without a putty bead. Back and face putty with acrylic polymeric sealant after setting to seal cracks and prevent vibration.

3.4 CLEAN UP:

- A. After inspection and approval, all labels, paint smears, excess putty, sealants shall be removed and the glass cleaned and washed and left in perfect condition.

3.5 PROTECTION:

- A. Glass shall be adequately protected against damage or breakage. All cracked or damaged glass shall be replaced at CONTRACTOR'S expense before acceptance of building. Any damage to Work of other trades shall be satisfactorily corrected at CONTRACTOR'S expense.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 09270

GYPSUM WALLBOARD PARTITION SYSTEMS

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install gypsum wallboard partition systems as shown on Drawings and herein specified.
 - 1. Work shall include, but not be limited to, the following items:
 - a. Furnishing and installation of all gypsum wallboard.
 - b. Providing all gypsum wallboard finishing.
 - c. Furnishing and installation of non-load bearing metal wall-framing systems.
- C. Related Work Specified Elsewhere:
 - 1. Acoustical Insulation: Section 07210
 - 2. Stock Hollow Metal Work: Section 08110
 - 3. Painting: Section 09900

1.2 QUALITY ASSURANCE:

- A. Workmen Qualifications:
 - 1. For the actual erection of gypsum wallboard partition systems, use only skilled journeymen gypsum wallboard installers who are thoroughly experienced with the materials and methods specified.
- B. Referenced Standards:
 - 1. The current edition of "Recommended Specifications for the Application and Finishing of Gypsum Board" as published by the Gypsum Association shall govern where applicable, unless otherwise specified.
 - 2. The current edition of the following technical data for the installation and application of gypsum wallboard partition systems as published by United States Gypsum Company shall govern where applicable, unless otherwise specified:
 - a. USG Drywall/Steel Framed Systems Folder SA-923.
 - b. USG Gypsum Panels & Accessories Product Folder SA-927
 - 3. The current edition of "Gypsum Construction Guide" as published by National Gypsum Company shall govern where applicable, unless otherwise specified.

1.3 SUBMITTALS:

- A. Shop Drawings:
 - 1. Prepare and submit shop drawings for OWNER'S approval.
- B. Product Data:
 - 1. Prepare and submit product data for OWNER'S approval. Product data shall include manufacturer's recommended installation instructions.
- C. Samples:
 - 1. If requested by OWNER, submit samples of proposed materials for OWNER'S approval.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver materials to Worksite and store in a safe, dry place with all labels intact and legible at time of installation.
- B. Metal wall framing members shall be transported, stored and erected in a manner that will avoid any damage. Bent or deformed members will be rejected and shall be replaced as directed by the OWNER'S Designated Representative. Store clear of ground and in such a manner so as to eliminate excessive handling. Metal goods shall be protected against rusting.
- C. Ready-mixed compounds shall be used as it comes in original container and shall be stored in warm place for at least 24 hours before using. Powder form compounds shall be job-mixed and used in accordance with manufacturer's recommendations.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Metal Wall Framing (Studs) System:
 - 1. Metal wall framing (studs) system shall consist of minimum 20, 22 and 25 gage electro-galvanized roll formed type steel channels 3-5/8 inches and 6 inches wide as required. Studs shall be complete with ceiling and floor runners, stiffeners, headers, extenders, fasteners, bracing and all other required appurtenances for a complete installation. Metal studs shall be manufactured by National Gypsum Company (Gold Bond), Charlotte, North Carolina (phone: 800/628-4662); Unimast Incorporated, Schiller Park, Illinois (phone: 800/654-7883); Clark Steel Framing Systems, Cincinnati, Ohio (phone: 800/543-7140) or OWNER approved equal.
 - 2. Channel stiffeners shall be cold rolled steel 1-1/2 inch channels coated with rust inhibitive paint after forming and shall weigh not less than 475 pounds per 1,000 linear feet.
- B. Gypsum Wallboard:
 - 1. Gypsum wallboard material shall consist of a special gypsum core faced on the sides and long edges with paper specifically manufactured for this purpose and shall conform to ASTM C36. The following materials are the products of United States Gypsum Company, Chicago, Illinois (phone: 800/874-4968). Products of National Gypsum Company (Gold Bond), Charlotte, North Carolina (phone: 800/628-4662) and Georgia-Pacific Company, Atlanta, Georgia (phone: 800/284-5347) may be used in lieu thereof if their properties are equal.
 - a. Gypsum wallboard shall be 5/8 inch thick "Sheetrock-WR (water resistant)" type with square or eased/tapered (SW) edges as required.
- C. Miscellaneous Wallboard Components:
 - 1. Screw type fasteners for applying wallboard to furring strips or studs shall be as recommended by the gypsum wallboard manufacturer.
 - 2. Laminate adhesive shall be as recommended by the gypsum wallboard manufacturer.
 - 3. Trim accessories shall be as recommended by the gypsum wallboard manufacturer.
- D. Joint Treatment System:
 - 1. Joint treatment systems as required to reinforce and conceal all joints and fasteners in gypsum wallboard and shall consist of the United States Gypsum Company's "Joint Treatment System" or OWNER approved equal.
 - a. Perforated tape reinforcement shall be a strong cross-fibered tape with many small random perforations and chambered edges feathered thin equal to "USG Perf-A-Tape".

- b. Embedding type joint compound shall be a ready-mixed product or a powder for job mixing that has good bonding, easy mixing and smooth working qualities equal to "USG Joint Compound-Taping".
 - c. Topping compound for fine finishing of joints after reinforcement tape embedment and for nail head concealment shall be a ready-mixed product or a powder for job mixing that has fine texture, whiteness, easy feathering and superior bonding qualities equal to "USG Joint Compound-Topping".
 - E. Related Materials:
 - 1. Acoustical sealant, where indicated, shall be a non-drying, non-hardening, non-bleeding type "Tremco Acoustical Sealant" as manufactured by Tremco Manufacturing Company, Beachwood, Ohio (phone: 800/321-7906) or OWNER approved equal.
 - 2. Foam tape shall be a urethane type with pressure sensitive adhesive on one side, equal to "3M Brand Foam Tape-Product No. 4289" as distributed by the Brock White Company, St. Paul, Minnesota (phone: 651/647-0123). Furnish in sizes as indicated on Drawings, color white.
- 2.2 MIXING:
- A. All cementitious materials shall be hand or machine mixed in accordance with the manufacturer's latest recommendations.
- 3.0 PART 3 - EXECUTION
- 3.1 INSPECTION:
- A. CONTRACTOR shall thoroughly examine all surfaces, which are to receive their materials and report any defects found in same to OWNER in writing. Starting of any Work will imply acceptance by CONTRACTOR of the Work of others on these surfaces.
- 3.2 JOB CONDITIONS:
- A. Protection:
 - 1. No materials shall be applied until temperature in the building has been held at a minimum of 55 degrees Fahrenheit for 24 hours previous to the installation, and including this temperature shall be maintained during the entire installation and drying/curing period. The use of salamanders or similar smoke-producing heating devices will not be permitted. Adequate ventilation shall be provided when application is completed, either by means of opened windows or temporary circulators.
 - 2. All adjacent surfaces, which may be damaged during the progress of this Work, shall be properly covered and masked to prevent such damage. CONTRACTOR shall be responsible for the repair or replacement of any such damage without additional cost to OWNER.
 - B. Cooperation:
 - 1. This CONTRACTOR shall cooperate as necessary with the mechanical and electrical contractors in the layout of the mechanical suspension system grids, and the installation of their fixtures and equipment within the suspension system. CONTRACTOR to insure an adequate fixture/equipment installation shall provide additional wire hangers on suspension system at each corner of each equipment/fixture to prevent deflection.
- 3.3 WORKMANSHIP:

- A. All Work shall be accomplished with mechanics thoroughly skilled in the application of specified materials with all workmanship to be of the very best and shall be done in such manner as to fulfill the requirements of Drawings and Specifications. Any specific directions furnished by the manufacturer regarding the installation of their materials shall be faithfully followed.

3.4 METAL WALL FRAMING ERECTION PROCEDURES:

- A. Metal wall framing (stud) system shall be installed where shown on Drawings and in accordance with approved shop drawings and manufacturer's latest printed specifications. Floor runners shall be securely attached to abutting structure at maximum of 24 inches on center with approved fastening devices. Studs shall extend in one-piece full height vertically between runners and unless otherwise indicated, be spaced no greater than 16 inches on centers. Studs shall provide solid backing at corners, be properly aligned and braced, and installed plumb and true.
- B. Metal studs shall be located not more than 2 inches from all doors, abutting partitions, partition corners and other construction. Unless detailed otherwise, runner track or stud member shall be used as a runner over doorframes. Studs shall be securely anchored to jamb and head anchor clips of each doorframe by manufacturer's recommended methods.
 - 1. Cold-rolled 1-1/2 inch steel channel stiffeners shall be provided and installed horizontally every 60 inches. Channels shall be inserted through the stud web cut-outs and rotated into a locked position with channel web in a horizontal position.
 - 2. Provide double stud and/or lintel members at all framed openings.
- C. Provision shall be made in studs for rigidly bolting of all blocking and special braces or framing and for attachment and support of electrical outlets, or other equipment indicated to be supported by stud construction.
 - 1. Mechanical and Electrical Contractors shall provide all anchors for all equipment furnished under their Contract.
 - 2. All anchorage shall be in accordance with approved shop drawings and as recommended by the manufacturer.
- D. Metal stud partition 20 feet in length or longer without lateral bracing or partition with no door openings over 36 inches wide shall have every third jamb stud extended to positive anchorage or structural support. All door openings over 36 inches wide shall have jamb studs extended to positive anchorage or structural support.

3.5 ACOUSTICAL INSULATION INSTALLATION PROCEDURES:

- A. Acoustical insulation in interior walls/partitions shall be installed between studs as shown on Drawings without sag or buckle and shall extend full length and width of insulated spacing with all edges and penetrations completely wedged tight. Insulation shall fit neatly around and behind all electrical boxes, conduit, piping and similar items with all Work in accordance with manufacturer's latest printed recommendations.

3.6 APPLICATION OF GYPSUM WALLBOARD:

- A. Single layer wallboard direct to metal studs or metal furring members shall be in accordance with manufacturer's latest printed specifications and United States Gypsum's product bulletin folder reference "SA-923" wherever it may apply.
- B. Wallboard shall be applied face out with long dimension vertical. All abutting ends and edges shall occur over studs. Joints on opposite sides of a partition shall occur on different studs. Screw type fastener shall be spaced 12 inches on center in the field of the board and 8 inches on center staggered along the vertical and horizontal abutting edges.

- C. Installation of gypsum wallboard accessories shall be in accordance with manufacturer's latest printed specifications and United States Gypsum's product bulletin folder reference "SA/927", wherever it may apply.
1. Install metal angle corner bead (Dura-Bead metal corner reinforcement or equivalent) at all external corners in single lengths where practical.
 2. Install metal end trim (No. 200A U.S.G. metal trim or equivalent) at all exposed edges of boards and at other locations where noted.
 3. Install control joint trim (No. 093) at all stress relief areas of boards where:
 - a. Partition or furring abuts structural element (except floor) or dissimilar wall or ceiling.
 - b. Ceiling abuts structural element, dissimilar wall or partition or other vertical penetration.
 - c. Construction changes within plane of partition or ceiling.
 - d. Partition or furring run exceeds 30 feet.
 - e. All other locations where required or indicated. NOTE: Ceiling height doorframes may be used as control joints. At less than ceiling height frames, extend control joints to ceiling from both corners.
 4. Fasteners shall be as specified and shall be driven not less than 3/8 inch from ends or edges of wallboard to provide uniform dimple not over 1/32 inch deep.
- D. Unless otherwise indicated, install gypsum wallboard on both faces of metal stud partition framing above ceilings and in similar concealed spaces.

3.7 JOINT TREATMENT PROCEDURES:

- A. Apply taping compound or embedding compound in a continuous thin uniform layer to all joints and angles to be reinforced. Immediately apply reinforcing tape centered over joint and seated into compound. Compound shall be applied to approximately 1/32 inch thick and must remain under entire surface of tape to provide proper bond. Follow immediately with a thin skim coat embedding all tape, but not to function as a second coat. Fold and embed tape properly in all interior angles to provide a true angle. The tape or embedding coat must be thoroughly dry prior to application of second coat. Apply second coat of joint compound over embedding coat, filling panel taper flush with surface; cover tape and feather out at least 4 inches on either side of tape. Allow second coat to dry thoroughly prior to application of finish coat.
- B. Spread finish coat evenly over and extend slightly beyond second coat on all joints and feather to a smooth uniform even finish. Over tapered edges, do not allow finish joint to protrude beyond plane of the surface. Apply finish coat to cover tape and taping compound at all taped angles and to provide a true angle. Sand between all coats and following the final application of compound to provide a smooth, even surface, free of holes, depressions, sanding marks and other imperfections, ready for decoration.
- C. All screw heads, dimples and depressions shall receive minimum 3 coats of joint compound with last coat to be of finishing compound, allowing each coat to thoroughly dry before application of next coat. Each coat shall be feathered beyond previous coat to give wall a smooth and even finish.
- D. The final coat and subsequent sanding shall leave the gypsum wallboard and treated areas uniformly smooth, level with the plane of the surface.
1. Gypsum wallboard above suspended ceilings in concealed locations, which are not painted, will not require taped or embedded compound surfaces to be sanded.

3.8 CLEAN UP:

- A. Upon completion of the Work, remove all masking tape and protective covering applied to other Work and clean up all excess materials, debris or trash resulting from this Work. Leave completed surfaces clean and free of defects of materials or workmanship.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

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SECTION 09310

CERAMIC TILE

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all ceramic tile Work as shown on Drawings and herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Cast-In-Place Concrete: Section 03300
 - 2. Gypsum Wallboard Partition Systems: Section 09270
 - 3. Toilet Accessories: Section 10800

1.2 QUALITY ASSURANCE:

- A. Source Quality Control:
 - 1. All ceramic tile shall be Standard Grade, conforming to the applicable requirements of the current ANSI A137.1 standard. Submit a grade certificate as hereinafter specified.
- B. Referenced Standards:
 - 1. The current edition of the following "Handbook for Ceramic Tile Installation" as published by the Tile Council of America, Inc., (TCA) shall govern where applicable, unless otherwise specified:
 - a. Floor areas per TCA Method F112-93.
 - b. Walls areas per TCA Method W243-93.
 - c. Standard A108.1A (1992) - Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar.
 - d. Standard A108.1B (1992) - Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar. Resistant Organic Adhesives.
 - e. Standard A108.1C (1992) - Contractors Option: Installation of Ceramic Tile Using A108.1A or A108.1B.
 - f. Standard A108.4 (1992) - Ceramic Tile Installed with Organic Adhesives or Water-Cleanable Tile Setting Epoxy Adhesive.
 - g. Standard A108.5 (1992) - Ceramic Tile Installed with Dry-Set Portland mortar or Latex-Portland Cement Mortar.
 - h. Standard A108.10 (1992) - Installation of Grout in Tilework.
 - i. Standard A118.1 (1992) - Dry-Set Portland Cement Mortar.
 - j. Standard A118.4 (1992) - Latex-Portland Cement Mortar.
 - k. Standard A118.6 (1992) - Ceramic Tile Grouts.
 - l. Standard A136.1 (1992) - Organic Adhesives for Installation of Ceramic Tile.
 - m. Standard A137.1 (1988) - Ceramic Tile.

1.3 SUBMITTALS:

- A. Samples:

1. Prepare and submit samples of all proposed materials for OWNER'S approval. Sample panels of back mounted sheets, ceramic tile shall be 12 inches square (nominal) in size, to clearly show the pattern and color range. Finished Work shall be in accordance with approved samples.
 - B. Certification:
 1. A master grade certificate, in conformance with ASTM A137.1, for all ceramic tile, signed by the manufacturer and CONTRACTOR, shall be submitted to OWNER when tile is shipped and before starting installation.
- 1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:
- A. All tile cartons shall be delivered to Worksite with labels intact and seals unbroken. The labels shall be marked to correspond to marks on the certificate.
- 2.0 PART 2 - PRODUCTS
- 2.1 MATERIALS:
- A. Ceramic tile for floors shall be porcelain or natural clay type with dust pressed cushioned edges, unglazed mosaic tile 1/4 inch thick with maximum absorption of 3 percent. Tile shall be manufactured by United States Ceramic Tile Company, East Sparta, Ohio (phone: 216/866-5531); American Olean Tile Company, Lansdale, Pennsylvania (phone: 215/822-7300) or OWNER approved equal.
 1. Units shall be back mounted into a "Custom Pattern" or "Design Pattern" and shall include up to 30 percent colors from tile in Group 3, and 60 percent in Group 2. Two or more colors shall be required. Units shall be 2 by 2 inches nominal size and laid as a random pattern type design with colors as selected by OWNER.
 2. Furnish all accessory trim units required for a complete installation.
 - B. Ceramic tile (Cer. T.) for walls and wainscots shall be glazed (soft bisquet), approximately 1/4 inch thick, non-vitreous body, glazed surface with satin matte finish. Tile shall be manufactured by United States Ceramic Tile Company, Sparta, Ohio (phone: 216/866-5531); American Olean Tile Company, Lansdale, Pennsylvania (phone: 215/822-7300) or OWNER approved equal.
 1. Units shall be back mounted and shall include up to 30 percent colors from tile in Group 3, and 60 percent in Group 2. Two or more colors shall be required. Units shall be size 4-1/4 by 4-1/4 inches, nominal size with colors as selected by OWNER. Furnish complete with base, stops, returns and any other special shapes required to produce a complete installation.
 2. Accessories occurring in ceramic tile walls shall match wall tile.
 - A. Thresholds shall be either solid plastic or marble which is sound and free from defect of any kind. All exposed surfaces to have a smooth or honed type finish with eased top edges. Units, which are cracked or broken, will be rejected. Thresholds shall consist of one of the following:
 1. Plastic thresholds [and tapered transition strips] shall be solid plastic (acrylic) material "Corian" as manufactured by DuPont Company, Wilmington, Delaware (phone: 800/599-4664) or OWNER approved equal.
 - a. Color shall be as selected by OWNER.
 2. Marble thresholds shall be "Ozark Gray" as produced by the Carthage Marble Corporation, Kansas City, Missouri (phone: 816/561-7020) or OWNER approved equal.
 - B. Dry-set mortar shall conform to previously cited ANSI A118.1 or A118.4 Standards.
 - C. Adhesive shall be water-resistant latex emulsion organic type "Tilematic Hydroment 7001" as manufactured by Bostik Construction Products, Middleton, Maine (phone: 800/726-7845);

"Chapco No. 75" as manufactured by Chicago Adhesive Products Company, Chicago, Illinois (phone: 800/621-0220) or OWNER approved equal.

1. Adhesive shall conform to ANSI A136.1, Type I.
- D. Tile grout shall be a factory prepared portland cement, color pigment, aggregate type material "Hydroment Ceramic Tile Grout" as manufactured by Bostik Construction Products, Middleton, Maine (phone: 800/726-7845) or OWNER approved equal. Grout shall conform to ANSI A118.6. Color shall be as selected by OWNER from manufacturer's "Standard Series".
1. Provide "Hydroment Multi-Purpose Acrylic Latex" as an additional mixing ingredient per manufacturer's printed recommendations.
 2. Provide a water-based acrylic sealer "CeramaSeal" for all floor and wall grouted joint surfaces, applied in accordance with manufacturer's printed recommendations.
- E. Divider strips where ceramic tile meets resilient flooring or concrete floors shall be 18 gage zinc "Standard Strip" as manufactured by Manhattan American Terrazzo Strip Company, Staley, North Carolina (phone: 910/622-4247) or OWNER approved equal.
- F. Edge strips, where ceramic tile meets other adjacent floor finish materials shall be plastic type, approved by the mortar/adhesive and grout manufacturers.

2.2 MIXING:

- A. Portland cement setting bed materials shall be proportioned and mixed in conformance with the recommendations of the TCA Handbook Method Number F112.
- B. All mortar bed, thinset and bond coat materials shall be hand or machine mixed in accordance with the manufacturer's latest recommendations.

3.0 PART 3 - EXECUTION

3.1 INSPECTION:

- A. CONTRACTOR shall thoroughly examine all surfaces, which are to receive their materials and report any defects found in same to OWNER in writing. Starting of any Work will imply acceptance by CONTRACTOR of the Work of others on these surfaces.

3.2 JOB CONDITIONS:

- A. Protection:
 1. Do not start tile Work if finished Work of other trades has not been properly protected by installers of such Work. Protect all parts of tile Work from damage during installation and until Work is turned over to OWNER.
 2. Close rooms to traffic and post suitable notices or make other provisions to warn and prevent anyone from damaging finished tile Work, for a minimum of 3 days to allow tile Work to reach proper set.

3.3 WORKMANSHIP:

- A. All ceramic tile Work shall be accomplished with mechanics thoroughly skilled in the application of specified materials with all workmanship to be of the very best and shall be done in such manner as to fulfill the requirements of Drawings and Specifications. Any specific directions furnished by the manufacturer regarding the installation of their materials shall be faithfully followed.

3.4 INSTALLATION:

- A. Ceramic tile for floors on grade shall be set in a Portland cement setting bed type application and shall be done in strict accordance with previously cited ANSI A108.1A, A108.1B or 108.1C Standard and with previously cited TCA Method F112.
 - 1. Setting bed shall be installed to the thickness indicated on Drawings and finished by tamping, screeding and floated to the proper elevation. Setting bed shall be true and perfectly level and sloped to drains where indicated. Before setting bed has attained a set, apply a bond coat of pure Portland cement paste 1/32 inch thick to the plastic mortar bed; tamp ceramic tile into bed until perfectly level at the required plane or elevation.
- B. Ceramic tile for bases and walls shall be set in a dry-set mortar bed type application and shall be done in strict accordance with previously cited ANSI A108.5 Standard and with previously cited TCA Method W243.
 - 1. Do not use mortar after initial set has occurred. Mortar may be remixed during use, but the addition of water or fresh materials will not be permitted. Surface on which mortar is applied shall be cleaned thoroughly, after which it should be dampened and excessive water removed. Mortar bed shall be applied to a minimum thickness of 3/32 inch, floated evenly in such manner as to completely cover an area no greater than can be covered with tile while the mortar is still plastic. Within 10 minutes before application of tile, comb mortar with notched trowel of type recommended by the manufacturer of the dry-set mortar. Ceramic tile shall then be pressed into mortar bed until perfectly level at the required plane or elevation.
- C. Lay out so that no tile less than half size occurs. Align joints in tile at right angles to each other and parallel to wall. Work shall be laid out in advance and the field located in both directions with respect to borders, bases, floor recesses and similar type applications as to permit the pattern to be laid with a minimum of cut tile. Tile wainscots shall be laid out with full courses to maintain heights not less than indicated on Drawings. Lay out the tile so that a tile joint will occur directly above any floor or wall control joint. Care shall be taken to maintain uniform joint widths. Where tile requires cutting, it shall be done with a proper cutting tool and rough edges shall be rubbed smooth. Ceramic tile shall be laid to straight edges with joints between sheets the same as the joints between tile on the sheets.
 - 1. Grouting of ceramic tile shall be done in strict accordance with manufacturer's latest printed instructions and/or previously cited ANSI A108.10 Standard.
 - a. After the setting bed or adhesive has hardened sufficiently, remove the paper sheets, strings or wedges and fill the joint by troweling grouting mortar over the surface until the joints are completely filled. Remove excess grout from the surface and before grout has set, strike or tool joints flush or concave with face of tile.
 - 2. Wherever ceramic tile abuts a dissimilar material, such as lavatory fixtures, marble, wood, metal or similar items, a joint of sealant material shall be applied and struck smooth to match tile jointing.
- D. Expansion joints and control joints shall be provided at perimeter of ceramic tile, at restraining walls and columns, and at locations noted on Drawings or in accordance with TCA Handbook Standard EJ171-93.

3.5 THRESHOLDS:

- A. Install a tapered, threshold or reducing strip at each juncture of a ceramic tile floor with other floor finishes. Threshold or reducing strip shall be centered directly under door with top surface 1/4 inch above adjacent ceramic tile; both top long edges shall be eased 1/4 inch or flush with or finish each side.

3.6 DIVIDER STRIPS:

- A. Divider strips shall be installed before concrete topping or concrete underbed has reached its initial set. Set all strips to exact floor line and in perfect alignment with all intersections butted tight.

3.7 CLEAN UP:

- A. Upon completion of tile Work, remove all rubbish, unused materials and similar items incidental to tile installation and give finished surface a thorough cleaning in an approved manner. Remove traces of cement and dust accumulation. Protect finished hardware or other metal with Vaseline. In cases where acid solutions are required to clean tile, flush thoroughly with clear water to eliminate acid salts. Do not allow any acid solution to dry on face of tile. Clean tile before turning building over to OWNER.
 - 1. Do not use acid on glazed tile.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 09510

SUSPENDED ACOUSTICAL LAY IN CEILING SYSTEM

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all acoustical ceilings as shown on Drawings and herein specified.
 - 1. Work shall include, but not be limited to, the following items:
 - a. Furnishing and installation of ceiling suspension system herein specified, complete with hanger wires, perimeter mouldings and trim.
 - b. Furnishing and installation of ceiling acoustical panels herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Gypsum Wallboard Partition Systems: Section 09270
- D. Referenced Standards:
 - 1. The current edition of the "Architectural Acoustical Materials" as published by the Acoustical and Insulating Materials Association (AIMA) shall govern where applicable, unless otherwise specified.
- E. Installers Qualifications:
 - 1. For actual installation or erection of integrated acoustical ceiling systems, use only workmen who are thoroughly trained and experienced in the skills required, who are completely familiar with the manufacturer's recommended methods of installation and the requirements of this Section.
- F. Design Criteria for Suspension System:
 - 1. Suspension system materials and connections shall comply with current and local building codes.
 - 2. Fasten all bracing wire with four turns in 1-1/2 inches.
 - 3. Use Phillips Red Head Anchor No. TW1614 for all bracing wires.

1.2 SUBMITTALS:

- A. Shop Drawings:
 - 1. Prepare and submit shop drawings for OWNER approval. Shop drawings shall show complete ceiling system, including details of specific mechanical and electrical fixtures, diffusers and similar items that will be furnished on this project by the respective contractors and installation in ceiling grid.
- B. Product Data:
 - 1. Prepare and submit product data for OWNER'S approval. Product data shall include manufacturer's recommended installation instructions.
- C. Samples:
 - 1. If requested by OWNER, submit samples of proposed materials for approval before shipping to Worksite.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. All material shall be transported, stored and installed in a manner that will prevent distortion or damage of any kind. Damaged material shall not be erected or repaired without specific approval of the OWNER'S Designated Representative. Store clear of the ground and protect with suitable waterproof covering.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Acoustical tile material shall be 24 by 48 inches by 5/8 inch thick mineral fiber lay-in type board with fissured surface design pattern "Minaboard-Fissured (Item No. 755)" as manufactured by Armstrong World Industries, Inc., Lancaster, Pennsylvania (phone: 800/448-1405); "Safetone-Hytone/Fissuretone (Series No. MRF-197)" as manufactured by Celotex Corporation, Tampa, Florida (phone: 813/873-4230) or OWNER approved equal.
 - 1. Units shall meet Federal Specification SS-S-118B, Class A flame spread rating, and minimum light reflectance of 0.75.
- B. Suspension system for acoustical tile shall be a direct hung, exposed metal grid mechanical tee type system equal to "200 or 500 Snap-Grid" as manufactured by Chicago Metallic Corporation, Chicago, Illinois (phone: 800/323-7164) or OWNER approved equal. Suspension systems of equal quality by USG Interiors (Donn) Inc., (phone: 800/950-3839) and Armstrong World Industries, Inc., (phone: 800/448-1405) may be used in lieu thereof.
 - 1. Mechanical system ceiling layout shall consist of main runners spaced at 48 inches on center with 48 inch cross tees spaced at 24 inches on center perpendicular to main runners
 - a. Completed system having a structural classification of "Intermediate Duty" conforming to ASTM C635. Main runners (tees) shall support minimum 12 pounds per lineal foot with deflection not greater than 0.133 inches in 48 inches.
 - b. Main runners and cross tees shall be single or double web sections 0.025 gage steel conforming to ASTM A366. Each tee shall have a painted enamel finish. Provide universal splices, perimeter and trim mouldings of not less than 0.020-inch steel color finish to match tees. Provide all other matching accessories.
- C. Hanger wire shall consist of minimum number 12 gage galvanized of non-coiled type, installed without splices. Tie wire shall be galvanized soft annealed steel wire of proper gage.
- D. Where required, provide and install supplementary carrying members, hanger clips, anchoring devices and all other appurtenances for a complete installation.
- E. Where required, provide and install supplementary carrying members, hanger clips, anchoring devices and all other appurtenances for a complete installation.

3.0 PART 3 - EXECUTION

3.1 INSPECTION:

- A. CONTRACTOR shall thoroughly examine all surfaces, which are to receive their materials and report any defects found in same to OWNER in writing. Starting of any Work will imply acceptance by CONTRACTOR of the Work of others on these surfaces.

3.2 JOB CONDITIONS:

- A. Protection:
 - 1. Acoustical materials shall not be installed when the building is excessively cold and damp or hot and dry. Temperature and humidity conditions closely approximating the interior conditions, which will exist when the building is occupied, shall be maintained before,

during and after installation. All wet Work, such as plastering and concrete Work, should be complete and dry. All windows and doors should be in place and glazed. The heating system should be installed and operating where necessary to maintain proper conditions before, during and after the acoustical Work is in progress.

3.3 WORKMANSHIP:

- A. All Work shall be accomplished with mechanics thoroughly skilled in the application of the specified materials and workmanship shall be the very best. Any specific directions furnished by the manufacturer regarding the installation of their materials shall be faithfully followed. CONTRACTOR shall examine all areas, surfaces and conditions affecting the proper installation of acoustical Work, and shall not proceed until all unsatisfactory conditions have been corrected and shop drawings and material approval has been made.
- B. Acoustical Contractor shall cooperate as necessary with the Mechanical and Electrical Contractors in the layout of the mechanical suspension system grids, and the installation of their fixtures and diffusers within the grid panels. CONTRACTOR to insure an adequate fixture installation shall provide additional wire hangers on suspension system at each corner of each fixture to prevent deflection.
- C. Install wire hangers not exceeding 48 inches on center (both directions) where suspended acoustical ceilings occur.
 - 1. No crimping or bending of wire shall be allowed as means for leveling ceiling. Where ducts occur which are more than 48 inches wide, CONTRACTOR shall provide and install adequate supports for ceiling construction spaced not more than 48 inches on center.
 - 2. Completed suspension system shall be rigid and firm without sways, dips or irregularity of plane. Furnish all necessary yokes, saddles and supports required at light, grilles or other openings in suspension system to keep such openings rigid, even and true in alignment. Proper hanger supports shall be provided for concentrated load conditions.
- D. Main supporting members, as hereinafter specified, shall be installed perfectly level to assure a level ceiling surface. The level shall be checked with a laser level or transit before application of finish materials.

3.4 EXPOSED GRID SUSPENSION SYSTEM:

- A. Main runners or support members of exposed grid suspension system shall be installed true and level with wire hangers spaced 48 inches on center parallel with the long axis of the room and in accordance with manufacturer's latest printed instructions and approved shop drawings. Install angle or channel moulding around entire perimeter of room, columns and similar items at proper level for finished ceiling height. Exposed cross tees of proper length shall then be installed at right angles to the main runners to form a fully exposed grid as indicated on Drawings. All materials shall member with any obstructions or materials encountered.
 - 1. Installation of suspension system shall comply with ASTM C636, unless indicated otherwise. Deflection of any component shall not exceed 1/360 of span.
- B. Install acoustical tile in grid system with tile pattern in direction as indicated on approved shop drawings. Tile units shall fit properly and without irregularity of finished surface. Tile shall fit accurately and neatly around all grilles, diffusers, speakers and similar items. All tile, unless otherwise indicated, shall be freely removable to permit access to space above.
 - 1. Before installing acoustical panels, clean all loose materials from the sides and surfaces of each panel. Use cotton work gloves, soft brush or air hose.
 - 2. The following installation procedures must be met:
 - a. Do not chafe (rub) or break factory cut edges when installing panels. Razor cut odd shaped panels - do not score and break.

3.5 CLEAN UP:

- A. Upon completion of ceiling, CONTRACTOR shall clean all finger marks, or other dirty or discolored spots from the surface of the units in a manner and with materials as recommended by the manufacturer of the ceiling units. Any units, which are damaged or improperly applied, shall be replaced as directed.
- B. CONTRACTOR shall also make sure all debris, rubbish, broken tile, excess and portions of wire and suspension system are removed from top side of suspended ceiling and premises in general, leaving floor area and space above ceiling in neat, clean, undamaged condition.

3.6 EXTRA ACOUSTICAL TILE UNITS:

- A. Upon completion of Work, CONTRACTOR shall deliver a total of 48 square feet (1 carton) of each type of acoustical tile herein specified, fully packaged and labeled for size and pattern of tile specified, for use as replacement purposes. Store extra tile where directed by OWNER'S Designated Representative.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 09650

RESILIENT (VINYL COMPOSITION TILE) FLOORING

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all resilient (vinyl composition tile) flooring (VCT) as shown on Drawings and herein specified.

1.2 QUALITY ASSURANCE:

- A. Referenced Standards:
 - 1. The current edition of the "Recommended Installation Specifications for Vinyl Composition, Solid Vinyl and Asphalt Tile Floorings" as published by the Resilient Floor Covering Institute (RFCI) shall govern where applicable, unless otherwise specified.

1.3 SUBMITTALS:

- A. Product Data:
 - 1. Prepare and submit product data for OWNER'S approval for each type of resilient flooring and accessory.
- B. Samples:
 - 1. If requested by OWNER, submit for approval samples of proposed materials before shipping to Worksite. Samples shall be labeled with manufacturer's name, number and color, project identification and CONTRACTOR'S name.
 - 2. OWNER will select colors and patterns from the manufacturer's full line for all material specified herein unless otherwise noted.
- C. Certification:
 - 1. CONTRACTOR shall submit an affidavit or certification indicating material compliance with this Specification.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. All materials shall be delivered in the original packages, containers, boxes or containers with labels indicating brand names, colors and patterns, with quality designations legible and intact.
- B. All material shall be stored in the room in which it is to be installed for at least 24 hours previous to installation.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Vinyl Composition Tile (VCT):

1. Vinyl composition tile shall be 12 by 12 inches by 1/8 inch thick and shall be manufactured by Armstrong World Industries, Inc., Lancaster, Pennsylvania (phone: 800/233-3823) or OWNER approved equal.
 - a. Tile shall conform to Federal Specifications SS-T-312 Type IV.
 - b. Color and pattern tile shall be as selected by OWNER.
 - c. Composition tile shall have calendared surface, contain no sand or grit, be equal to samples submitted with same factors of ductility, hardness, non-absorbance, resistance to alkalis, acids and water, be free from lumps and unmixed coloring matter. All tile shall be factory prewaxed.
 2. Vinyl composition tile shall be 12 by 12 inches by 1/8 inch thick, "Expressions Collection No. 4511" as manufactured by Tarkett, Inc., Parsippany, New Jersey (800/367-8275) - no substitution.
- B. Vinyl Base (VB):
1. Vinyl base shall be 1/8 inch thick "set-on-top-type" moulded coved base "Standard Vinyl Wall Base" as manufactured by Armstrong World Industries, Inc., Lancaster, Pennsylvania (phone: 800/233-3823); "Kencove Vinyl Wall Base" as manufactured by Kentile Floors Inc., Chicago, Illinois (phone: 312/523-6814); "Standard Vinyl Plastic" as manufactured by Vinyl Plastic, Inc., Sheboygan, Wisconsin (phone: 800/874-4240); "Johnsonite Vinyl Cove Base" as manufactured by Johnsonite Inc., Chagrine, Falls, Ohio (phone: 800/966-2775); "Standard Vinyl Wall Base" as manufactured by Mercer Products Company, Inc., Eustis, Florida (phone: 800/447-8442) or OWNER approved equal.
 - a. Base shall be 4 inches high unless otherwise indicated.
 - b. External and internal corners less than 6 inches in length shall be pre-moulded fittings of the same material.
 - c. Color selection shall be from the manufacturer's full line of colors.
- C. Related Materials:
1. Reducer or transition strips shall be vinyl or rubber of thickness required, minimum 1 inch wide, color as selected by OWNER.
 2. Adhesives for all resilient surface materials shall be as recommended for the purposes by the manufacturer of the floor covering material. All adhesives shall be waterproof type.
 3. Trowel type filler or underlayment shall be a factory prepared cementitious material "Floorstone Underlayment" as manufactured by Tamms Industries, Inc., Mentor, Ohio (phone: 218/974-2399) or OWNER approved equal. Provide additive (Las-Tex) to increase workability and hardness as required.

3.0 PART 3 - EXECUTION

3.1 INSPECTION:

- A. CONTRACTOR shall be responsible for all existing surfaces that are to receive their materials in such manner that these surfaces have been properly conditioned or repaired (filling of cracks, holes or voids; oil, paint, wax, lumps or ridges) to provide a smooth unbroken surface, so that no defects will show through the finished resilient flooring material. All floor conditioning or preparation shall be in accordance with resilient flooring manufacturer's latest printed recommendations.
- B. CONTRACTOR shall inspect all new surfaces, which are to receive their materials, and shall notify OWNER of any defects found in same. Starting of the Work by CONTRACTOR will imply their approval of the Work of others.

3.2 COOPERATION:

- A. It is intended to give the Resilient Flooring Contractor unobstructed use of areas specified for the installation of their Work. They shall cooperate with other trades so as to avoid delaying the completion of the project.

3.3 WORKMANSHIP:

- A. All resilient flooring shall be accomplished with mechanics thoroughly skilled in the application of specified materials with all workmanship to be of the very best and shall be done in such manner as to fulfill the requirements of Drawings and Specifications. Any specific directions furnished by the manufacturer regarding the installation of their materials shall be faithfully followed.
- B. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on the finish material as marked on the subfloor. Use chalk or other non-permanent marking devices.

3.4 INSTALLATION:

- A. General:
 - 1. Installation of resilient flooring material shall meet the applicable requirements of the previously cited "RFCI" referenced standards.
- B. Vinyl Composition Tile:
 - 1. Layout pattern in advance, square with axis of room, such that border tile are greater than one-half tile in width. All resilient flooring material used shall be from the same factory run. Shuffle tile to mix variations in mottling from box to prevent uneven floor color from one area to another. Unmatched materials will be rejected and shall be reinstalled to OWNER'S satisfaction with no additional expense. Lay with uniform tight joints in perfect alignment. Scribe and fit tile carefully and accurately at all obstructions, edging strips or intersections.
 - a. Resilient floor adhesive shall be applied in a thin film and spread evenly with a trowel of the type recommended by tile manufacturer. If a notched trowel is used, notches shall be 1/16 inch deep on 3/16-inch centers and shall be renewed periodically, depending on wear of trowel. Do not use excess cement and immediately remove any surplus, which appears as material is worked into position. Roll all surfaces within one-half hour after laying to remove trapped air and insure equal bonding.
 - b. Resilient flooring material is required under permanently installed base cabinets and similar items. Flooring shall be installed wherever kneeholes and open areas occur under counters and desks.
 - c. Install reducer strips at all exposed edges of tile. Reducer strips at door openings shall be centered directly under door (closed position) bottoms.
- C. Vinyl Base:
 - 1. Base shall be set with tight butt joints and throughout its entire length the base shall have its top and bottom edges in firm contact with the walls and floor. Base shall be adhesive installed on all vertical surfaces scheduled and indicated; continue into all recesses, closets, projections, free standing columns, on toe spaces of equipment or fixed cabinet cabinets and similar items in rooms scheduled to have vinyl base. Use longest lengths as practicable.
 - 2. Field-form all corners, heating and cooling base as necessary to permanently set the shape; notch and miter cove for inside corners; use long lengths to form corners so as to extend beyond corners as far as possible, but not less than 6 inches from corner. Corners less than 6 inches shall have premoulded corners.
 - a. Before application, all traces of packing powder shall be removed from adhesive applied side of base.

3.5 CLEANING AND WAXING:

- A. When, in the opinion of OWNER, resilient flooring material has sufficiently sealed itself to permit cleaning, waxing and polishing, floors shall be thoroughly cleaned in accordance with manufacturer's instructions. Floors shall then be given 1 coat of non-slip wax of a type recommended by the floor manufacturer and approved by OWNER and thoroughly buffed with mechanical buffer.
 - 1. Resilient flooring shall be cleaned using a neutral soap or cleaner approved by the tile manufacturer.

3.6 EXTRA TILE:

- A. Upon completion of tile installation, CONTRACTOR shall leave 1 full carton of color and pattern of tile used on project for use in patching. Store extra tile where directed by OWNER'S Designated Representative.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 09900

PAINTING

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all painting and decorating Work as shown on Drawings and herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Stock Hollow Metal Doors and Frames – Section 08110
 - 2. Gypsum Wallboard Partition Systems: Section 09270
- D. Work to be Included:
 - 1. Painting and finishing of all interior and exterior exposed items and surfaces throughout the project, except as otherwise indicated.
 - 2. Refer to Mechanical (Division 15) and Electrical (Division 16) Specifications for description and extent of painting Work.
 - 3. Finish exterior doors on tops, bottoms and side edges of door or sections of door the same as the exterior faces, unless otherwise indicated.
 - 4. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas. If color or finish is not designated, the OWNER will select these from standard colors available for the materials systems specified.
 - 5. Work shall include all required ladders, scaffolding, drop cloths, scrapers, tools, sandpaper, dusters, cleaning solvents, waste containers and excess materials as required to
- E. Work Not Included:
 - 1. Prefinished items, unless otherwise indicated, do not require painting when factory-finishing or installer finish is indicated; such items as (but not limited to): exterior metal wall panels, finished mechanical and electrical equipment, including light fixtures and distribution cabinets.
 - 2. No painting of metal roof decking, steel bar joists, interior structural steel surfaces, interior concrete block surfaces, fireproofing, ductwork, interior pipes, interior conduit or insulation covered piping and ductwork is required.
 - 3. Finished metal surfaces such as anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished material will not require finish painting, unless otherwise indicated.
 - 4. No painting of ductwork, pipes, conduit or insulation covered piping and ductwork is required in unfinished spaces where concealed by suspended ceilings, tunnels, crawl spaces, in Mechanical or Electrical equipment room spaces, or similar areas of construction; however, painting of such items in finished areas and the walls of such spaces shall be a part of Work of this Section.
 - 5. Do not paint glass, ceramic tile, plastic laminate, vinyl wall covering and similar finish materials. Coordinate with OWNER'S requirements for seal coats or primers that may be required for proper installation of these finishes.
 - 6. Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting unless otherwise indicated.

7. Do not paint over any code-required labels such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.
- F. The term "paint", as used herein includes enamels, paints, sealers, fillers, stains, emulsions and other coatings, whether used as a prime, intermediate, or finish coats.
- G. A color schedule and/or decorating schedule indicating specific colors for each space will be prepared by OWNER for use by Painting Contractor.
 1. There may be instances where two or more colors will be employed on walls of rooms. One wall may be of one color and another wall or portion thereof of the same room may be of another color.

1.2 QUALITY ASSURANCE:

- A. Applicator Qualifications:
 1. For actual application of paint materials, use only painters who are thoroughly trained and experienced in the skills required, who are completely familiar with the manufacturer's recommended methods of application, and who are completely familiar with the painting and decorating requirements of this Section.
- B. Method of Application:
 1. All applied material shall be by the brush or roller method, unless otherwise indicated.
 - a. Permission must be obtained from OWNER'S Designated Representative in writing to substitute spraying in lieu of brushing or rolling. If spraying is substituted the final coat should, in all cases, be brushed on walls. Final coat on ceilings may be sprayed. If additional coats are required by OWNER for acceptable hiding or to cover defects, there will be no increase in cost and OWNER'S decision shall be final.

1.3 SUBMITTALS:

- A. Product Data:
 1. Prepare and submit product data for OWNER'S approval. Product data shall include manufacturer's recommended installation instructions.
 2. Submit manufacturer's "Material Safety Data Sheets (MSDS)" for all solvent-based materials upon OWNER'S request.
- B. Samples:
 1. All colors will be selected by OWNER. If requested by OWNER, submit samples of all painted, varnished, stained, waxed or other specified finishes for approval before starting any Work. Samples shall be submitted in triplicate.
- C. Schedules:
 1. CONTRACTOR shall submit for OWNER'S approval a schedule of the paint and finishes they intend to use, showing manufacture and the trade name for each of the products specified.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. All materials shall be delivered to Worksite in the original containers with labels intact and seals unbroken. No materials other than those specified shall be delivered to the building.
- B. A room or space will be assigned by OWNER for the storage and mixing of paint materials. The floor of this space shall be adequately protected from damage. All paints, varnishes, thinners, solvents and similar materials shall be kept covered at all times and all reasonable safeguards shall

be taken to avoid fire. Oily rags and waste shall be removed from the building every night and not allowed to accumulate.

1. CONTRACTOR shall provide and maintain a 10-pound carbon dioxide fire extinguisher in paint storage room or space at all times.

C. Painting Contractor shall be familiar with the safety requirements of Section 01900 of this Specification in the performance of their Work.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

A. All painting materials, unless otherwise specified in the Schedule of Finishes (refer to Part 4 of this Section), shall be the best products of the following approved manufacturers:

1. Sherwin-Williams Company, Cleveland, Ohio (phone: 800/321-8194 website: www.sherwin-williams.com).
2. Benjamin Moore and Company, Montvale, New Jersey (phone: 800/344-0400 website: www.benjaminmoore.com).
3. ICI-Devoe Coatings, Cleveland, Ohio (phone: 800/654-2616 website: www.icidevoecoatings.com).
4. Hirshfield's Paint Manufacturing Inc., Minneapolis, Minnesota (phone: 612/522-6621 website: www.hirshfields.com).
5. PPG Architectural Finishes, Inc., Pittsburgh, Pennsylvania (phone: 800/441-9695 website: www.pittsburghpaints.com).
6. Pratt and Lambert, Inc., Cleveland, Ohio (phone: 800/289-7728 website: www.prattandlambert.com).

B. All primers, thinners and other related items, unless otherwise specified, shall be the products recommended for the purpose by the manufacturer of the respective finish paint. No intermixing of manufacturers' materials will be permitted on any surface.

2.2 COMPATIBILITY:

A. All paint materials and equipment shall be compatible in use; finish coats shall be compatible with prime coats; prime coats shall be compatible with the surface to be coated; all tools and equipment shall be compatible with the coating to be applied.

B. Thinners, when used, shall be only those thinners recommended for that purpose by the manufacturer of the material to be thinned.

3.0 PART 3 - EXECUTION

3.1 INSPECTION:

A. Painting Contractor shall inspect all surfaces to be finished or painted and shall notify General Contractor and OWNER in writing of any surface not suitable for application of finish or paint. Starting of Work by this CONTRACTOR shall imply their acceptance of the Work of others as satisfactory.

B. All Work where a coat of material has been applied shall at OWNER'S option be inspected prior to application of the next coat. It shall be CONTRACTOR'S responsibility to notify OWNER in writing when inspection may be undertaken.

1. All coats shall be thoroughly dry before applying succeeding coats.

3.2 JOB CONDITIONS:

- A. Painting Contractor shall protect from damage or spotting during painting all materials not requiring a paint finish, such as acoustic tile, finish hardware, weatherstripping, resilient flooring, non-ferrous metals and all items prefinished or finish painted by fabricator before delivery to Worksite.
- B. Lay drop cloths in all areas where painting is being done to protect floors and other Work from damage. Remove all door hardware, electric outlet plates, fixtures, surface hardware and other similar items before painting is begun and replace same after completion. Where it becomes necessary, in order to execute the Work under this Section, to remove the protective covering placed by other trades, CONTRACTOR shall replace same afterward in a proper manner. Any Work of other trades damaged in executing the Work under this Section shall be replaced and restored to the original condition at CONTRACTOR'S expense.
- C. All surfaces to which paint is applied shall be clean and dry. No painting will be permitted on exterior Work in cold, foggy, frosty, damp or dusty weather. No painting will be permitted in dusty rooms, and, if required by OWNER, painter shall sprinkle floor to lay the dust. Painting shall be done on exterior Work only when the temperature is above 50 degrees Fahrenheit and the surfaces are absolutely dry. No Work will be done under conditions of weather or temperature unsuited to good Work.

3.3 WORKMANSHIP:

- A. All painting and decorating Work shall be accomplished with mechanics thoroughly skilled in the application of specified materials with all workmanship to be of the very best and shall be done in such manner as to fulfill the requirements of Drawings and Specifications. Any specific directions furnished by the manufacturer regarding the application of their materials shall be faithfully followed.
- B. Brush application shall consist of the following:
 - 1. Brush-out and work all brush coats onto the surfaces in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable. Neatly draw all glass and color break lines.
 - 2. Brush apply all primer or first coats, unless otherwise permitted to use mechanical applicators.
- C. Mechanical application shall consist of the following:
 - 1. Use mechanical methods for paint application when permitted by OWNER'S Designated Representative. If permitted, limit to only those surfaces impracticable for brush applications.
 - a. Limit roller applications (generally) to interior wall and ceiling finishes for second and third coats. Apply each roller coat to provide the equivalent hiding as brush-applied coats.
 - b. Confine spray application (generally) to metal framework, siding, decking, wire mesh and similar surfaces where hand brush Work would be inferior and other surfaces specifically recommended by paint manufacturer.
 - c. Wherever spray application is used, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of 2 coats in one pass.
- D. The minimum paint coating thickness shall be not less than the manufacturer's recommended spreading rate to provide total dry film thickness as indicated or required.

3.4 PREPARATION OF SURFACES:

- A. All metal surfaces, before priming, shall be thoroughly cleaned of all dirt, oil, rust, mill scale or other foreign materials by the use of sand paper, steel scraper or wire brushes or other methods as necessary.
 - 1. Refer to the most recent versions of joint standards from SSPC/NACE (The Society for Protective Coatings and The National Association of Corrosion Engineers). Follow the paint or coating manufacturer's technical data sheets.
- B. Marks and abrasions in shop coats shall be cleaned and touched up. Surfaces shall be dry, clean, smooth and free from rust, mill scale, grease, grit and frost before application of primer.
- C. Gypsum wallboard surfaces shall be free of all dust.

3.5 PAINT/COATING APPLICATION:

- A. All material shall be applied evenly so as to be free from sags, runs, brush marks or other defects. All coats shall be uniformly flowed on with the proper consistency and well brushed out so as to show the minimum of brush marks. Varnish and enamels shall be uniformly flowed on. All coats shall be thoroughly dry before the succeeding coat is applied, allowing a minimum of 24 hours between coats even under the most favorable conditions. Each coat of paint shall have a slight variation in color to distinguish it from the preceding coat. All paint or enamel undercoats shall be tinted to approximately the shade of the desired finish color. Stain shall be applied uniformly and wiped off if required.
 - 1. Coverage and hide shall be complete. When color, stain, dirt or undercoats show through final coat of paint, the surface shall be covered by additional coats until the paint film is of uniform finish, color, appearance and coverage, at no additional cost to OWNER. Give special attention to ensure that all surfaces, including edges, corners, crevices, welds and exposed fasteners, receive a film thickness equivalent to that of flat surfaces.

3.6 CLEAN UP:

- A. All materials used on the Worksite shall be stored in a single place designated by OWNER. Such storage place shall be kept clean and neat and all damage thereto, or to its surroundings, shall be made good. All oil rags, waste and similar items must be removed from the building every night and every precaution taken to avoid the danger of fire.
- B. On completion of all painting, remove all staging, scaffolding and containers from Worksite. Paint spots, oil or stains on adjacent surfaces shall be removed. Damaged areas shall be touched up and the entire area left clean.

4.0 PART 4 - RELATED DOCUMENTS

4.1 EXTERIOR PAINTING SCHEDULE:

- A. All exposed exterior construction materials indicated on Drawings, unless otherwise noted within this Specification, shall be painted as follows with products as manufactured by Sherwin-Williams Company or OWNER approved equal:
 - 1. All steel pipe, pipe supports, hollow metal doors and frames, and other ferrous metal surfaces shall be given:
 - a. One (1) coat of "Pro-Cryl Universal Water Based Primer B66-310 Series" rust-inhibitive primer (omit if metal is furnished with primer coat).
 - b. Two (2) coats of "Metalatex Semi-Gloss Coating, B42-100 Series".

4.2 INTERIOR PAINTING SCHEDULE:

- A. All exposed interior construction materials indicated on Drawings, unless otherwise noted within this Specification, shall be painted as follows:
1. Gypsum wallboard surfaces in wet areas such as Toilet Rooms and similar areas shall be given:
 - a. One (1) coat of "Preprite 200 Latex Primer, B28W200."
 - b. Two (2) coats of "Eco-Plex Multi-Mil Water Based Epoxy Finish, B71-100 Series/B71V10 Low Luster Hardener."
 2. All other gypsum wallboard surfaces shall be given:
 - a. One (1) coat of "Preprite 200 Latex Primer, B28W200."
 - b. Two (2) coats of "Promar 200 Interior Latex Eg-Shel, B20-200 Series."
 3. All metal surfaces, including but not limited to, hollow metal doors and louvers, hollow metal frames, diffusers, grilles, registers, convactor covers, access panels, unit heaters, and other ferrous metal shall be given:
 - a. One (1) coat of "Pro-Cryl Universal Water Based Primer, B66-310 Series." (omit if previously finished).
 - b. Two (2) coats of "Metalatex Semi-Gloss Coating, B42 Series."
 4. All galvanized metal surfaces in finished areas shall be given:
 - a. One (1) coat of "Galvite HS, B50WZ30" (omit if previously finished).
 - b. Two (2) coats of "Metalatex Semi-Gloss Coating, B42-100 Series."

SECTION 10800

TOILET ACCESSORIES

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all toilet accessories as shown on Drawings and herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Ceramic Tile: Section 09310

1.2 QUALITY ASSURANCE:

- A. Quality of Manufacture:
 - 1. Toilet accessories shall be manufactured and assembled at the factory in accordance with approved product data, to insure a first-class product and that there are no exposed burrs, sharp edges, corners or fastenings that will injure wearing apparel or personnel.

1.3 SUBMITTALS:

- A. Product Data:
 - 1. Prepare and submit product data for each item herein specified for OWNER'S approval.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. All material shall be transported, stored and installed in a manner that will avoid damage of any kind. No damaged material shall be used in the Work.
- B. All items shall be properly and carefully packed to guard against damage in transit. All accessories shall be packed separately and each package shall be clearly marked to show its contents and its intended place in the building.

2.0 PART 2 - PRODUCTS

2.1 TOILET SEAT COVER DISPENSERS:

- A. Toilet seat cover dispensers (TSCD) shall be a surface mounted type designed to accommodate approximate 200 paper covers similar to "Safe-Tex Model No. 804" (Consolidated Cover Company) as distributed by Leslie Paper Company, St. Paul, Minnesota (phone: 612/781-6611); "Model No. B-221" as manufactured by Bobrick Washroom Equipment, Inc., North Hollywood, California (phone: 800/553-1600) or OWNER approved equal.
 - 1. Furnish complete with type 304 stainless (satin) steel finish.
 - 2. Provide a minimum of 2 keys per unit, keys all units alike.

2.2 TOILET PAPER DISPENSERS:

- A. Toilet paper dispensers (TPD) shall be a surface mounted, stainless type 304 satin finish steel, designed as a dual roll type unit similar to "Model No. B-2888" as manufactured by Bobrick Washroom Equipment, Inc., North Hollywood, California (phone: 800/553-1600); "Model No. 5402" as manufactured by Bradley Corporation, Menomonee Falls, Wisconsin (phone: 414/251-6000) or OWNER approved equal.
 - 1. Provide a minimum of 2 keys per unit, keys all units alike.

2.3 SANITARY NAPKIN DISPENSER CABINETS:

- A. Sanitary napkin/tampon dispenser cabinets (SNDC) shall be a surface mounted, dual type "Model No. J6-SS" as distributed by Rochester Midland Corporation, Rochester, New York (phone: 800/553-1600); "Model No. B-2800X2" as manufactured by Bobrick Washroom Equipment, Inc., North Hollywood, California (phone: 800/553-1600) - no substitution.
 - 1. Each unit shall be single coin operated and designed to have a capacity of a minimum of 15 napkins and 21 tampons.
 - 2. Furnish complete with type 304 stainless steel (satin) finish.
 - 3. Provide a minimum of 2 keys per unit, keys all units alike.

2.4 SANITARY NAPKIN DISPOSALS:

- A. Sanitary napkin disposals (SND) shall be a surface mounted type unit and designed to incorporate a removable liner with self-closing cover "Sanisac" as distributed by Rochester Midland Corporation, Rochester, New York (phone: 716/266-2250); "Model No. B-270" as manufactured by Bobrick Washroom Equipment, Inc., North Hollywood, California (phone: 800/553-1600) - no substitution.
 - 1. Furnish complete with type 304 stainless (satin) steel finish.

2.5 PAPER TOWEL DISPENSERS/WASTE RECEPTACLE:

- A. Paper towel dispensers/waste receptacle (PTD/WR) shall be a surface mounted type unit "Model No. B3914" with "B-3949-57 skirt for mounting" as manufactured by Bobrick Washroom Equipment, Inc., North Hollywood, California (phone: 800/553-1600) - no substitution.

2.6 MIRRORS:

- A. Mirrors (MIR), unless indicated otherwise, shall be 16 by 20 inches, surface mounted type units "Model No. B-165 Series" as manufactured by Bobrick Washroom Equipment, Inc., North Hollywood, California (phone: 800/553-1600); "Model No. 700" as manufactured by Bradley Corporation, Menomonee Falls, Wisconsin (phone: 414/251-6000) or OWNER approved equal.
 - 1. Mirrors shall consist of 1/4 inch thick No. 1 quality polished plate glass, heat treated (tempered safety glass) having a coating of copper electroplated over heavy film of silver.
 - a. Mirror shall be guaranteed for minimum of 10 years against silver spoilage.
 - 2. Provide 1 for each lavatory.

2.7 GRAB BARS:

- A. Grab bars (GB) shall be minimum 18 gage (0.048), 1-1/2 inch outside diameter seamless type 304 stainless (304 series) steel tubing equal to "Series B-6806" as manufactured by the Bobrick Washroom Equipment, Inc., North Hollywood, California (phone: 800/553-1600); "812 Series" as manufactured by Bradley Corporation, Menomonee Falls, Wisconsin (phone: 414/251-6000); "Grip Tight" as manufactured by Safe T Bar Inc., Hugo, Minnesota (phone: 651/426-5774) or OWNER approved equal.
 - 1. Provide grab bars with welded stainless steel support posts, snap flanges and stainless steel fastening and anchoring devices, complete with a stainless (satin) finish.

2. Distance between support posts, including returned ends, shall not exceed 48 inches.
3. Furnish in lengths, configurations and sizes for locations indicated on Drawings.
4. All grab bars shall be fabricated and installed in accordance with Article 4.26.3 of ANSI Standard A 117.1-1980.

2.8 SOAP DISPENSER:

- A. Soap dispensers (SD) shall be a surface mounted type unit "Model No. B-4112" as manufactured by Bobrick Washroom Equipment, Inc., North Hollywood, California (phone: 800/553-1600) or OWNER approved equal.

3.0 PART 3 - EXECUTION

3.1 INSTALLATION:

- A. All items shall be installed in strict conformance with the manufacturer's printed instructions and approved product data at the mounting heights designated by OWNER. Accessories shall be securely mounted with anchor devices of type as previously specified. Fasten securely, true, plumb and level. Before application of accessory items, all painting and wall covering Work shall have been completed.

3.2 CLEAN UP:

- A. After installation has been completed, CONTRACTOR shall protect all items from damage of any kind and before final completion, they shall thoroughly clean and polish all items. Any Work that is damaged or defective will be replaced with new without cost to OWNER.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 11162

DOCK LEVELERS/VEHICLE RESTRAINT DEVICES

PROJECT ID 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all dock levelers and vehicle restraint devices as shown on Drawings and herein specified.
 - 1. Electric power shall be brought to a point near the motors for the levelers, restraint devices, control buttons, disconnect switches and signal components. From this point(s), CONTRACTOR shall complete the hook-up, including but not limited to the furnishing and installation of rigid conduit, wiring and similar items for a complete installation and be responsible for the total electrical operation of system. Included with this conduit and wiring shall be the connection to a normally open, electrically isolated contact rated at 10 amps, 120 volt AC. This contact is in a device furnished and installed with the overhead door and will be installed so as to close when the door is open. This shall be electrically connected into the dock leveler control circuit by this CONTRACTOR to prevent the operation of the dock leveler unless the door is open.
 - 2. Perimeter angle frame shall be fabricated and installed as a part of Work of Section 05500/05505 of this Specification.
 - a. General Contractor shall be responsible for proper size, clearances and alignment of frame to receive dock leveler.
 - 3. All electrical and hydraulic Work will be factory completed, except for the final electrical connection and the extensions to the control buttons and signal components.
- C. CONTRACTOR shall verify all dimensions and requirements of dock recesses, including electrical rough-in measurements, location of anchorages and all other pertinent information before pouring of concrete.
- D. Related Work Specified Elsewhere:
 - 1. Cast-In-Place Concrete: Section 03300
 - 2. Metal Fabrications: Section 05500
 - 3. Overhead Sectional Doors: Section 08360
 - 4. Dock Shelters: Section 11164
 - 5. Dock Bumpers: Section 11165

1.2 SUBMITTALS:

- A. Shop Drawings:
 - 1. Prepare and submit shop drawings for OWNER'S approval. Drawings shall indicate all materials, construction details, pit dimensions (length, width and depth), anchorage of curb angle and embedded plates, anchoring devices, controls, disconnect panels, all wiring diagrams and all other pertinent information.
- B. Operations Manual:
 - 1. CONTRACTOR shall furnish OWNER (Plant Engineer) with an operations manual complete with approved shop drawings, operations and maintenance instructions,

manufacturer's owner's manual, maintenance manual and master service manual, installation instructions, parts list, name of local factory representative complete with address and phone number. Also, provide manufacturer's maintenance videotape where available.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. All material shall be transported, stored and handled in a manner that will avoid damage of any kind. No damaged material shall be used in the Work.

1.4 WARRANTY

- A. Provide OWNER with dock leveler manufacturer's standard written 10-year structural warranty and a 1-year warranty for parts and labor.
1. This warranty is based on a standard fork lift truck operating procedure. A standard procedure is: no load shall exceed the rated lift capacity of the truck, and no load shall be pre-staged or stacked and pushed or pulled over the dock leveler into or out of the truck.
 2. Dock leveler manufacturer shall provide with his bid a written 10 year money back warranty on dock levelers. Warranty shall be based on the following criteria (specific to this 3M location):
 - a. Gross weight of fork lift – including batteries and attachments – and load shall not exceed 18,000 lbs.
 - b. User's operation shall not exceed 6 full truckloads per 24 hour period over any one dock position. A full truckload is considered to be 22 pallets.
 - c. Lift truck speed shall be no more than 5 mph. Leveler grade shall be no more than the recommended grade as determined by the material handling equipment manufacturer and never more than 7.17%.
 - d. Dock leveler parts covered under the warranty shall include
 - 1) Lip Assembly
 - 2) Front Hinge Assembly
 - 3) Front Hinge and Hinge Pins
 - 4) Platform Assembly
 - 5) Rear Hinges and Hinge Pins
 - 6) Working Range Toeguards
 - 7) Main Lifting Cylinder
 - 8) Lip Cylinder
 - 9) Hydraulic Hoses and Fittings
 - 10) Safety Stop (Velocity) Fuse
 - 11) Subframe Assembly
 - 12) Hydraulic Pump and Motor
 - 13) End Legs
 - 14) Hydraulic Fluid
 - e. Dock leveler parts not covered under the warranty include:
 - 1) Bumpers
 - 2) Limit Switch Assembly
 - 3) Full Range Toeguard
 - 4) Control Box Assembly
 - 5) Weatherseal
 - 6) Hydraulic Valves
 - f. All parts not covered under the 10 Year Structural Warranty will have a 5 year parts, 1 year labor warranty.
 - g. In addition to all other warranties, the manufacturer shall guarantee that the equipment will perform in a manner satisfactory to the Owner for a period of 12 months after date of installation. If Owner is not then satisfied with the

performance of the equipment, the Owner may notify the manufacturer and the manufacturer shall remove the equipment and refund the equipment purchase price to the Owner. This guarantee shall be provided by the manufacturer in writing at the time of bid.

3. Vehicle restraints shall have a manufacturer's warranty that covers defects in materials or workmanship, including all material, labor, tax and freight for a period of 2 years from date of shipment.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

A. General:

1. Dock levelers and vehicle restraint devices shall be as manufactured by Rite-Hite Corporation, Milwaukee, Wisconsin (phone: 414/355-2600 website: www.ritehite.com) and provided by 3M Select Supplier: Pogleasa Company, Inc., Arden Hills, MN (phone: 651) 636-6442. Other units by Kelley Company, Milwaukee, Wisconsin (phone: 800/558-6960 website: www.kelleycompany.com) and Poweramp Systems, Inc., Germantown, Wisconsin (phone: 414/255-1510 www.docksystemsinc.com) may be used subject to compliance with Drawings and this Specification and to OWNER'S written approval. Dock levelers shall be sized by the manufacturer to meet the warranty requirements specified herein.

B. Dock Levelers:

1. Dock levelers shall be an electric hydraulic operated type with a minimum rated capacity of 25,000 pounds equal to Rite-Hite's "Hydraulic Dock Leveler – RHH-4000" with 7'-0" wide x 8'-0" long platform and 20" slotted "Safe-T-Lip" (minimum of 15" lip extension beyond bumpers). Recessed adjustable dock. Levelers shall be "Model HD3187". The up-down action of the platform shall be electrically operated from push button stations and powered hydraulic cylinders. Operating range shall be 12 inches above and 12 inches below the floor slab (dock) level, measured at the face of the leveler.
2. Construction shall be steel and suitable for the design load. Platform shall be checkered plate. The platform shall be designed to compensate for canted truck beds, up to 4 inches. All steel parts shall be cleaned and shall be painted at the factory, standard color.
3. The motor, hydraulic pump and oil reservoir shall be contained in the unit. The motor shall be suitable for the power available, which is 460 volt, three phase. The motor shall be rated at not less than one horsepower. The main hydraulic cylinder shall be not less than 4 inches in diameter. All electrical and hydraulic Work shall be factory completed except for the final electrical connection and the extension to the control button.
4. The platform free-fall shall be limited to 3 inches. Provide full range toe guards. When parked in the level position, the platform shall support cross traffic. When the door is closed at the leveler, the leveler shall not operate and shall also be secure against forced building break-in and/or break-out.
5. The operation of unit when pushing the control button shall allow the operator to extend the lip automatically and stop the upward motion at any time. Releasing the button shall cause the platform to settle onto the truck bed. Operating range shall be 12 inches above and 12 inches below the floor slab (dock) level, measured at the face of the leveler.
6. Dock leveler shall incorporate a slotted "Safe-T-Lip" design so when leveler is in stored position, the leveler lip will provide an integral and automatically-positioned, impact-rated, solid barrier 7" above building floor to help prevent accidental falls from vacant dock positions. Leveler lip must be one-piece, slotted design. Unobstructed end-loading shall be possible from all leveler positions. Overlapping platform barriers or pinch points are not acceptable.
7. Additional features to be provided shall consist of the following:

- a. Grease fittings for lip hinge.
 - b. Infinite hydraulic control.
 - c. Below dock control.
 - d. Weatherseals.
8. Angle frame, including welded stud anchors as fabricated or required by leveler supplier.
- C. Vehicle Restraint Devices:
1. Each dock leveler shall be equipped with an electric operated vehicle restraint device equal to Rite-Hite's model "RHR-600 Dok-Lok". The restraint system shall automatically position itself in relation to an ICC bumper, for hooking to the bumper upon pressing the control button to be located near the jamb of the door. The operator controls shall be mounted in gasketed control panels. The control panels shall be fully operational at all times, and shall contain solid state electronic controls. The hook mechanism electric motors and limit switches shall be totally enclosed in structural steel housings. All wiring shall be contained in flexible or rigid conduit. Electrical components and wiring shall be UL listed, approved or recognized.
 2. Include full-time flashing red and green lights with signs to warn the truck driver when it is safe to back in or pull out. Also include full-time flashing red or green lights with signs that tell the dock attendant when it is safe to perform loading/unloading operations. The inside lights shall be in the opposing mode to the outside lights.
 3. An audible alarm shall warn the dock attendant any time a normal ICC bumper has not been properly secured. The alarm shall provide a positive signal, and shall require no maintenance.
 4. When "Dok-Lok" vehicle restraints are to be provided with dock levelers, Rite-Hite "Dok-Commander" combined control box enclosures shall be used. Control panel to provide for a single connection for the entire system and shall include an internal step down transformer.
 - a. "Dok-Commander" panel to provide the following options:
 - 1) Overhead door push buttons (Open/Close/Stop).
 - 2) Additional components required to provide the desired interconnect and interlock packages for sectional door, leveler and "Dok-Lok".
 - 3) Integral rotary fused disconnect that allows compliance with OSHA lock out/tag out requirements and a protective guard to protect workers from accidental contact with incoming power.
 - 4) Dock light On/Off selector switch.
 - 5) Integral 15 amp duplex outlet.

3.0 PART 3 - EXECUTION

3.1 INSPECTION:

- A. Examine all surfaces to receive dock levelers and vehicle restraint devices and notify OWNER in writing of any defects in same. Commencement of the Work by CONTRACTOR shall imply their acceptance of the Work of others as satisfactory.

3.2 INSTALLATION:

- A. The steel angle perimeter dock recess frame shall be delivered to General Contractor for installation during concrete Work specified under Section 03300 of this Specification. Leveler supplier shall provide all documentation and services required to assure installation of frame in conformance with manufacturer's warranty requirements. CONTRACTOR to coordinate all details and dimensions.

- B. Installation of dock levelers and restraint devices shall be supervised by the manufacturer's authorized representative in recesses/openings completely prepared by others and shall be done in a first-class manner with all Work plumb, in proper alignment and in accordance with approved shop drawings and manufacturer's latest printed instructions. Units shall be securely anchored to building in the appropriate manner.
- C. All electrical Work shall be done in accordance with the National Electric Code, State and local codes. Installer shall be responsible for the wiring of controls, installation of the signal lights and signs, and other Work required to make a complete job.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 11164

DOCK SHELTERS

PROJECT ID 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all dock shelters as shown on Drawings and herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Overhead Sectional Doors: Section 08360
 - 2. Dock Levelers/Vehicle Restraint Devices: Section 11162
 - 3. Dock Bumpers: Section 11165

1.2 SUBMITTALS:

- A. Shop Drawings:
 - 1. Prepare and submit shop drawings for OWNER'S approval.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. All material shall be transported, stored and handled in a manner that will avoid damage of any kind. No damaged material shall be used in the Work.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Shelter/Seal shall be Eliminator II model 610E as manufactured by Rite-Hite/Frommelt Industries, Dubuque IA and supplied by 3M Select Supplier: Pogleasa Company, Inc. Arden Hills, MN (phone: (651) 636-6442)
 - 1. Side curtains shall provide full access to trailer and shall be removable. Removal shall require no tools. Side curtains shall be attached with Touch-N-Hold fastening and furnished with stay stiffeners in fabric panels. Top of side curtain shall have Z-support system.
 - 2. Head curtain shall be constructed with square steel tube front bar, spring steel stabilizers, and stay stiffeners, and have overlapping wear pleats on ends of head curtain face. Head curtain shall be adjustable with pull ropes, curtain splits, and Velcro attachment to seal top of trailer. Height of head curtain shall be 6" below height of normal lowest truck to be serviced.
 - 3. Side frame shall be constructed of impactable foam. Side frame fabric shall be Hypalon. Side curtain and head curtain fabric shall be Hypalon. Optional fabrics are available.
 - 4. Pyramid-shaped bottom pads shall seal the gap between the side curtain and the building wall.

2.2 FABRICATION AND MANUFACTURE:

- A. Dock shelters shall be custom-fabricated closure to fit the exact door opening dimensions shown on Drawings and in accordance with approved shop drawings. Pads shall be suitable for sealing to 8'-0" and 8'-6" wide truck trailers. The pads at the side jambs shall be wedge-shaped or beveled so as to provide good seals to both widths of trailers.
- B. Closure shall have a foam rubber bottom pads mounted on minimum 2 inch thick prepainted solid wood members, and completely enclosed or covered with a double-faced abrasion-resistant heavy-duty nylon fabric coated to resist water, fire, mildew, oils, greases and acids. Provide unit complete with factory installed galvanized hardware, buffer strips at points of wear, armor pleats, painted buffer strips, head curtain and all other required appurtenances.

3.0 PART 3 - EXECUTION

3.1 INSTALLATION:

- A. CONTRACTOR shall thoroughly examine openings and report any defects of same to OWNER in writing. Starting of the installation will imply acceptance of the entire opening by CONTRACTOR.
- B. Wood support members for shelter shall be installed plumb and true to line and shall be securely anchored to structure with use of minimum 3/8 inch diameter cadmium plated steel through or expansion anchor bolts, spaced not to exceed 32 inches on center with all Work in accordance with approved shop drawings.
- C. Installation of shelter shall be by manufacturer or their authorized representative in strict accordance with manufacturer's latest printed specifications. Upon completion of the building, dock shelters shall be free of imperfections.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 11165

DOCK BUMPERS

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all dock bumpers as shown on Drawings and herein specified.
- C. Related Work Specified Elsewhere:
 - 1. Cast-in-Place Concrete: Section 03300
 - 2. Dock Levelers/Vehicle Restraint Devices: Section 11162
 - 3. Dock Shelters: Section 11164

1.2 SUBMITTALS:

- A. Shop Drawings and Product Data:
 - 1. Prepare and submit shop drawings and product data for OWNER'S approval.
 - a. Shop drawings shall show unit dimensions, method of anchorage and details of construction.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. All material shall be transported, stored and handled in a manner that will avoid damage of any kind. No damaged material shall be used in the Work.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Dock bumpers shall be approximately 4-1/2 inches thick pressure laminated, rectangular shaped (24 inches long by 12 inches width) consisting of multiple plies of die cut "tire treads". Bumper plies shall be held together with 2 galvanized support rods securely anchored to galvanized steel angle end plate construction. Dock bumpers shall be "Model B412-24" as manufactured by Durable Corporation, Norwalk, Ohio (phone: 800/537-1603); "Model H1226" as manufactured by Pawling Corporation, Wassaic, New York (phone: 914/373-9300); "Model No. 412-24" as manufactured by Kelly Company, Inc., Milwaukee, Wisconsin (phone: 800/558-2168) or OWNER approved equal.
 - 1. Furnish complete with galvanized or cadmium plated anchor bolts, nuts and washers to suit installation.
 - 2. Two horizontal type are required at each dock door.

3.0 PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Bumpers shall be securely installed in accordance with manufacturer's written instructions and approved shop drawings.
- B. Attach to structure where indicated on Drawings. Verify and coordinate location and size of inserts to which bumpers are shown to be attached. Refer to concrete sections of this Specification for installation of cast-in-place steel inserts and anchors to receive dock bumper attachment.
 - 1. Where welded attachment is indicated, plug weld all anchor holes in contact with steel inserts and fillet weld at all other contacts.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 11166

SWING ARM DOCK LIGHT FIXTURES

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install all swing arm dock light fixtures as shown on Drawings and herein specified.
 - 1. All electrical Work will be factory completed, except for final electrical connections.
- C. Related Work Specified Elsewhere:
 - 1. Dock Levelers/Vehicle Restraint Devices: Section 11162
 - 2. Dock Shelters: Section 11164
 - 3. Dock Bumpers: Section 11165

1.2 SUBMITTALS:

- A. Shop Drawings:
 - 1. Prepare and submit shop drawings for OWNER'S approval.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. All material shall be transported, stored and handled in a manner that will avoid damage of any kind. No damaged material shall be used in the Work.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Swing arm dock light fixture shall be "Model No. DKL-40 VA/HPS" as manufactured by Fostoria Industries, Inc., Fostoria, Ohio (phone: 419/435-9201) or OWNER approved equal.
 - 1. Furnish complete with "HPS" lamp "LG-1" lamp guard, wall anchors and all other required appurtenances.
 - 2. Provide 1 for each dock door, mounted at location as directed by OWNER.

3.0 PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Installation of swing arm dock light fixtures shall be done in a first-class manner with all Work plumb, proper alignment and in accordance with approved shop drawings and manufacturer's latest printed instructions. Units shall be securely anchored to building in the appropriate manner.
- B. All electrical Work shall be done in accordance with the National Electrical Code, State and local codes.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

SECTION 13602

PRE-ENGINEERED PREFABRICATED METAL BUILDING

PROJECT I.D. 0083940

1.0 PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The terms and conditions of the Construction Contract and Division 1 - General Requirements shall apply to the Work specified in this Section.
- B. Furnish and install pre-engineered, prefabricated metal building as shown on Drawings and herein specified.
 - 1. Work shall include anchor rods and horizontal tie bars at the base of rigid frame columns, which shall be designed for the columns loads provided by the metal building fabricator and installed by the General Contractor.
 - 2. Work shall include, but not necessarily limited to: all primary structural framing, secondary roof and wall framing, metal roof and exterior wall covering, skylights (at add alternate 2), door canopies, interior metal liners (at add alternate 3), windows, louvers, insulation, flashings, closures, sealers and caulking, metal trim, fasteners and other necessary components as required for a complete watertight installation.
- C. Related Work Specified Elsewhere:
 - 1. Concrete Foundations and Floor Slabs: Section 03300
 - 2. Stock Hollow Metal Doors and Frames: Section 08110
 - 3. Overhead (Foamed Insulated) Sectional Doors: Section 08360
 - 4. Exterior Louvers: Section 10200
 - 5. Building Grounding: Section 16455
- D. Structural notes indicated on Drawings regarding metal building shall be considered a part of this Specification.
- E. CONTRACTOR shall refer to Bid Form and Section 01110 - Alternates, for description of alternates required under this Section.

1.2 QUALITY ASSURANCE:

- A. Manufacturers/Erector Qualifications:
 - 1. Metal building herein specified shall be the product of a single manufacturer and erected under the manufacturer's direction or authorized representative to eliminate any divided responsibility. Manufacturer shall be a specialist in design and manufacture of metal buildings and shall have adequate and experienced engineering staff, shop facilities and erection capabilities to produce a completed structure in the time required.
- B. Referenced Standards:
 - 1. The current editions of the following American Institute of Steel Construction (AISC) publications shall govern all Work performed hereunder, unless otherwise specified.
 - a. AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
 - b. AISC Code of Standard Practice for Steel Buildings and Bridges.
 - 2. The current edition of "Specification for the Design of Light Gage Cold-Formed Steel Structural Members" as published by the American Iron and Steel Institute (AISI) shall govern where applicable, unless otherwise specified.

3. The current edition of "Metal Building Systems Manual" as published by Metal Building Manufacturers Association (MBMA) shall govern Work performed hereunder, unless otherwise specified.
 4. The current edition of the "Code of Arc and Gas Welding in Building Construction" of the American Welding Society (AWS) shall govern where applicable, unless otherwise specified.
- C. Design Criteria:
1. Design Code:
 - a. Design shall be in accordance to the 2013 Kentucky Building Code (2012 International Building Code (IBC) with amendments).
 - b. Building Risk Category II in accordance to IBC Table 1604.5.
 2. Prefabricated metal building herein specified shall be 180 feet 0 inches in length by 120 feet 0 inches in width, rectangular in design with a gable roof having a pitch of not less than 1 inch to 12 inches and an approximate clear height of 30 feet 0 inches to underside of rigid frame.
 - a. Bay spacing shall be, as shown on Drawings, unless OWNER'S written approval is first obtained.
 - b. Refer to Drawings for Add Alternates. The following Add Alternates are related to the Metal Building:
 - Add Alternate 1 – add 30'-0" bay to east end with 12'-0" wide by 14'-0" high overhead door.
 - Add Alternate 2 – add skylights.
 - Add Alternate 3 – add interior wall liner panels to 10'-0" above finished floor.
 3. Metal building shall be designed by the manufacturer to withstand the following loads:
 - a. Dead Load: The dead load shall be the weight of the Metal Building System.
 - b. Collateral Dead Loads: The collateral dead load shall be 10 psf in addition to the mechanical roof top unit weights as shown on the Drawings. Collateral Loads shall not be applied to roof panels.
 - c. Live Load: The building system shall be capable of supporting a minimum uniform live load of 20 psf, non-reducible.
 - d. Snow Loads: The design ground snow load shall be 15 psf in accordance to IBC Figure 1608.2.
 - e. Wind Loads: The ultimate design wind speed for the metal building system shall be 115 mph in accordance to IBC Figure 1609A, Exposure B.
 - f. Seismic Loads: Seismic loads shall be determined based upon spectral response acceleration factors $S_s = 0.188g$, $S_1 = 0.087g$, Site Class C.
 - g. Rainfall Intensity: Exterior gutters and downspouts shall be designed for rainfall intensity based upon a 5-year recurrence interval for a five-minute duration.
 - h. Load combinations shall be in accordance to IBC Section 1605 and submitted calculations shall clearly indicate load combination being used..
 - 1) Loads and loading diagrams shown on the anchor rod placement plan and building shop drawings shall be in Allowable Stress Design load combinations.
 - i. The base of all columns shall be designed as a simple or pinned connection.
 - j. The deflection criteria for the building and individual members for full dead plus live load in combination with 10-year wind load, shall be as follows;
 - 1) Primary Framing:
 - a) L/180 for roof live load
 - b) H/60 for 10-year wind load.
 - c) H/40 for seismic load.

- 2) Secondary Framing:
 - a) L/150 for roof dead load plus roof live load; but not less than that required to maintain positive drainage for the greater of dead load plus ½ roof live load or dead load plus 5 psf.
 - b) L/120 for 10-year wind load on walls and roof.
 - c) L/180 for roof live load on sheeting.

4. Metal building manufacturer shall design and provide all required anchor rods at the base of rigid frame columns to accommodate for vertical and horizontal forces. Horizontal tie bars will be included in the foundation drawings and will be designed to resist column base loads provided by the Metal Building System provider.
 - a. General Contractor shall install above devices in accordance with approved shop drawings and metal building manufacturer's requirements.

5. All assemblies of metal building shall be designed to conform to the bay spacing, nominal frame span, sidewall height, roof slope, connections of girts and purlins to structural frame supports, door openings and all other required appurtenances shall be manufacturer's standard detail for a building of this size, type and use, except as noted.
 - a. Roof beams shall be fabricated of not more than 2 pieces of tapered plates sections, complete with bolt connections for both splice plates and secondary member attachments.
 - b. All ridge and stiffener plates shall be factory welded steel construction with bolt connections.
 - c. Columns and/or posts shall consist of uniform, welded plate section, complete with base plates, cap plates, stiffener plates, leveling plates, anchor rods and field connection bolts.
 - d. End walls of metal building shall be designed in such manner that all components, except roof support columns, shall be removable to accommodate future expansion.
 - e. Roof beam and column bays shall be provided with adjustable cross bracing members sized in accordance with design criteria in the bays shown on the drawings.
 - f. Purlins, girts and eave struts shall be a zee or channel shaped rolled formed steel with gage and method of attachment determined by design criteria. Splices shall be made at and fully supported by the roof beams/columns.
 - g. Metal roof system shall have a Class 90 UL uplift rating.
 - h. All structural steel shall be shop painted with a rust-inhibitive primer after fabrication. Primer shall be as recommended by building manufacturer.
 - i. All steel structure components and assemblies herein specified shall be shop fabricated and field erected with bolted connections in accordance with the previously cited reference standards, wherever they shall apply.
 - 1) High strength bolts shall conform to ASTM F3125, Grade A325. Bolts shall be minimum ¾ inch in diameter, complete with mating nuts, washers and in lengths as required.
 - 2) Support structural framing for overhead doors, unless otherwise detailed, shall consist of structural steel channels (minimum C8x11.5) conforming to ASTM A36.

6. Metal building design shall incorporate transition flashing across the building to allow for expansion and contraction. Suitable slip joints, slotted holes, flexible clips or other features necessary to properly accommodate all expansion and contraction of the various elements of the assembly may be used in lieu thereof. Such joints shall also be capable of producing a complete weathertight condition within building.

7. Metal rake, eave, rain gutters, downspouts, fascia, closure, corner and ridge trim, including roof, door and sill flashings shall also be shop fabricated of the proper metal, gage and finish. Allow for proper expansion and contraction between members, including the interfacing at existing construction.
8. A complete grounding system for metal building will be furnished and installed by the Electrical Contractor. Refer to Division 16 of this Specification.

1.3 SUBMITTALS:

- A. Anchor Rod Placement Plan:
 1. Submit anchor rod placement plan and column reactions in advance of Shop Drawings.
- B. Shop Drawings:
 1. Prepare and submit shop drawings for OWNER'S approval. Shop drawings shall clearly describe the metal building in complete detail, including door and frame details, canopies, louvers, windows, opening details for overhead doors, ventilation units and all other accessory items being furnished. Shop drawings shall include framing plans indicating sizes, weight and location of all members, with detailed drawings of each member, including connections, type of materials, finishes, assembly methods, design calculations and all other pertinent information.
 2. All drawings shall carry the name, seal and/or registered number of a Professional Engineer or Architect as required by the State of Kentucky. Include all drawings, specifications and calculations as required for State Plan Approval. CONTRACTOR shall pay all fees required by the State of Kentucky for the approvals, permits to start, inspection fee and/or other fees required.
- C. Design Calculations:
 1. Design calculations for metal building shall be submitted with shop drawings for OWNER'S review and acceptance. OWNER'S review or acceptance of the manufacturer's design calculations shall in no way relieve the manufacturer of the full responsibility for the correctness of the calculations or the structural performance of the completed members or sections.
 2. Design calculations for metal building shall be signed and sealed by a registered Professional Engineer licensed in the state of Kentucky.
- D. Product Data
 1. Provide data on profiles, component dimensions, fasteners, and color selections.
- E. Certificate of Compliance:
 1. At completion of fabrication, the Metal Building Supplier shall submit a Certificate of Compliance to the Building Official and 3M stating that the work was done in accordance with the approved construction documents.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. All prefabricated metal building components shall be transported, stored and erected in a manner that will avoid any damage or deformation. Bent or deformed members will be rejected and shall be replaced or repaired as directed by OWNER'S Designated Representative. Store clear of ground and in such a manner so as to eliminate excessive handling.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

- A. This Specification is based upon "Butler Widespan Low Rigid Frame II Structural System" as manufactured by Butler Manufacturing Company, Kansas City, Missouri (phone: 800/998-7663). Metal buildings by Varco-Pruden Buildings, Memphis, Tennessee (phone: 901/767-5910); Inland Buildings, Cullman, Alabama (phone: 800/438-1606); Chief Industries, Inc., Grand Island, Nebraska (phone: 800/247-7167); Gulf States Manufacturing Company, Starkville, Mississippi (phone: 601/323-8021); Ceco Buildings Systems, Columbus, Mississippi (phone: 601/328-6722); Star Building Systems, Oklahoma City, Oklahoma (phone: 800/654-3921) or OWNER approved equal may be used if their properties are equal and shall be subject to compliance with Drawings and design criteria.
1. Roof panel system shall consist of insulated double-lock standing seam "Butler MR-24" design profile of aluminum zinc alloy coated steel (minimum 24 gage).
 - a. Translucent light panels in roof system shall be a factory assembled insulated type equal to "Butler SunLite Strip Self-Curbing Daylighting System" Refer to Drawings for location and quantities.
 - b. Roof curbs in roof system shall be of insulated one-piece metal construction, designed to accommodate and support mechanical ventilation (furnished by others) equipment and shall be complete with base to match roof deck design configuration for a weather and watertight type installation. Finish shall match roof decking. Provide any structural framing as required to support roof deck, curbs and mechanical equipment in the proper manner. Refer to Drawings for location and quantities.
 - c. Pipe penetrations through roof deck system shall be sealed with a one-piece flexible rubber pipe flashing unit, complete with aluminum reinforcing ring for attachment to metal deck. Refer to Drawings for size, quantity and location. Provide for both interior and exterior of roof systems.
 - d. System shall be complete with "Butler TBS Insulation System" or approved equal
 - 1) Maximum U-Value shall be U-0.035.
 2. Wall panel system shall consist of insulated "Butlerrib II" design profile of minimum 26 gage galvanized steel with exterior surfaces having a thermosetting silicone (Butlertone) type finish, color as selected by OWNER from manufacturer's standard palette. Fasteners shall be same as specified for roof system.
 - a. System shall be complete with metal building insulation as provided by the building supplier.
 - 1) Maximum U-Value shall be U-0.052
 - b. Interior metal liner shall consist of zinc coated (minimum 28 gage) steel complete with a factory applied primer (polyester) on exposed surfaces. Liner material may be of manufacturer's (Metal Building) standard product line. Attachment of liner material shall be direct to interior side of girts with gasketed mechanical fasteners. Provide all required closure angles or trim members between liner and adjacent or abutting materials and other miscellaneous items relating thereto.
 3. Gutters and rake trim shall be "Sculptured" design profile complete with downspouts at each end or corner of building. Downspouts and gutters shall be designed and sized in accordance with the national rainfall intensity values and in accordance with local codes. Downspouts to be square or rectangular in design complete with discharge elbows approximately 12 inches above grade. Fabricate gutters downspouts and rake trim of galvanized metal (minimum 26 gage) and finished similar to wall panel system, with color as selected by OWNER from manufacturer's standard palette. Furnish complete with

preformed rubber weather seals, preformed metal wall and corner closures and all other required appurtenances.

4. All flashings, trim, closures, sealants, fasteners, anchors and all other appurtenances not herein specified shall be as recommended by the metal building manufacturer, subject to final approval by OWNER. No openings, voids, open spaces or holes, cracks or tears, cavities, punctures and gaps within any panel system will be permitted. Patching, if permitted, shall be approved by OWNER in writing. All exposed metal Work shall match adjacent finishes.
- B. Windows shall be "Project Out" type of metal building manufacturer's standard design fabricated of heavy extruded aluminum sections and be complete with lever locks (2 per sash), screens on operator, adjustable friction hold open arms, weatherstripping, flashings and satin anodized finish on exposed portions. Inside glazed with minimum double strength B-grade (dsb) clear glass.

2.2 FABRICATION AND MANUFACTURE:

- A. Fabrication and manufacture of prefabricated metal building shall be of the very best quality and shall be performed in a thorough workmanlike manner equal to the best of modern practice using materials of the types covered by this Specification. The Work shall, in all cases, be of high grade and carefully performed to the satisfaction of OWNER.
1. Fabrication of metal building shall meet the applicable requirements of previously cited AISC or AISI Specifications.
 2. All shop welding shall be in accordance with previously cited AWS standard.
- B. Unless otherwise stated, all materials used in the manufacturing of the metal building shall be in accordance with approved shop drawings and of the highest standard commercial quality as normally used for this type of construction, considering strength, durability, best engineering practice, conformance to present building systems and policy, appearance, and the purpose of each particular component in which the material is used. Parts shall be made accurately to a uniform gage where possible so as to facilitate replacement and repair. All external bolts, nuts, screws, rivets, taps, pipes and pipefittings to be furnished hereunder shall conform to United States and American Standards.
- C. Insofar as practicable, fitting and shop assembly of the Work shall be done in the shop. Work that cannot be permanently shop-assembled shall be completed assembled, marked and disassembled before shipment, to insure proper assembly in the field.
1. Field modification of parts shall be in accordance with the best standard procedures and shall be the responsibility of CONTRACTOR. All components and parts of the structural system, including those for foundation Work, shall be clearly marked or identified for erection purposes.
 2. No material shall be fabricated or delivered until shop drawings have been approved.
- D. Metal building shall be fabricated in such manner as to provide a structure that is carefully matched (both exterior and interior) to produce continuity of line and design. All joints in exposed metal Work, unless otherwise shown or specified, shall be accurately fitted, rigidly secured and sealed in a watertight manner.
- E. All Work shall be adequately protected during all phases of the Work, to prevent damages by scratches, stains, discoloration or other causes. All damage caused by CONTRACTOR shall be repaired or replaced to the satisfaction of OWNER without cost to OWNER.

3.0 PART 3 - EXECUTION

3.1 INSPECTION:

- A. Examination of Surfaces:
 - 1. Examine all surfaces to receive metal building components and notify OWNER in writing of any defects in same. Starting of any Work by CONTRACTOR shall imply their acceptance of the Work of others as satisfactory.
- B. Anchor Rods and Horizontal Tie Bars:
 - 1. All anchor rods and horizontal tie bars at the base of all columns shall be properly designed and furnished by the metal building fabricator and to be set by the concrete contractor. They shall be furnished promptly so that they may be built in as the Work progresses because cutting of structural steel members to accommodate errors pertaining to embedded items will not be permitted.

3.2 JOB CONDITIONS:

- A. Protection:
 - 1. Installed Work shall be carefully protected against disfiguration, contamination or damage by mechanical abuse or contact with other harmful materials. Wherever exposure to damage is critical protective cover or barriers shall be provided and installed.
- B. Temporary Bracing:
 - 1. Metal building erector shall provide and maintain all necessary temporary shoring, bracing and guards, including the guying of steel frame to resist safely all wind and construction loads during erection and to assure proper alignment of all parts of the steel frame.
 - 2. All partially erected steel components, including roof and wall panels, shall be secured in an approved manner during interruptions of the Work.
 - 3. In the event that the General Contractor installs structural frame of building before the placement of concrete floor slab, they shall design, furnish and install OWNER approved temporary structural members to resist horizontal forces at the base of columns.

3.3 WORKMANSHIP:

- A. All Work shall be accomplished with mechanics thoroughly skilled in the application of specified materials with all workmanship to be of the very best and shall be done in such manner as to fulfill the requirements of approved shop/erection drawings and this Specification. Any specific directions furnished by the manufacturer regarding the erection of their materials shall be faithfully followed.

3.4 ERECTION/INSTALLATION PROCEDURES:

- A. Prefabricated metal building shall be erected square, plumb, straight and true, accurately fitted and with tight joints and intersections. All field connections in structural Work shall be made with high strength bolts and tightened in accordance with previously cited AISC specification. Base plates and/or bearing plates shall be supported on steel wedges or shims until the supported members have been leveled and plumbed, following which the entire bearing area shall be grouted with non-shrink grout.
 - 1. Erection of metal building shall meet applicable requirements of previously cited AISC Specification.
 - 2. Field welding shall be same as specified for shop welding. Flame cutting of structural steel will not be permitted except with written approval from OWNER.
 - 3. Fabrication errors shall not be corrected by burning. Report such errors to OWNER at once for determination of method of correction to be used. Drift pins may be used only to

- bring together the several parts and they shall not be used in a manner that will deform bolt holes or damage any metal.
4. Erector will be held fully responsible for any corrective Work necessary in subsequent construction operations resulting from steel erection beyond the tolerance permitted by the AISC "Code of Standard Practice".
- B. Metal wall and roof panels, including interior metal wall and roof liner panels, shall be installed at right angles to purlins and girts, symmetrically to all elevations (equally spaced from center of building) and in sequence order with all horizontal joints occurring over girt or purlin. Panels shall be set plumb and true to line, securely fastened to building framing members (purlins, girts, etc.) in a manner recommended by building manufacturer.
1. Where interior liner panels are specified, the structural horizontal girt member shall extend full depth into the web flange of the vertical column structural support member and securely anchored in place.
 - 1) Provide a thermal-break type of separation between liner panel horizontal structural girt system as recommended by building manufacturer.
 2. Base channel or angle member at exterior perimeter walls shall be applied and or anchored directly over a fiberglass sill insulation pad.
 3. All panels shall have laps of sufficient width (minimum 1 full Corrugation) to make Work watertight.
 - a. Provide continuous sealant tape at all lapped joints for wall panels. Panels shall be properly sealed at the base with metal closures and sealant.
 4. Limit the use of exposed fasteners to the extent indicated in manufacturer's data and instructions with all fasteners driven and tightened full depth to head.
 5. Anchor all component parts securely in place, providing for necessary thermal and structural movement.
- C. Metal trim members, flashings, gutters, downspouts and similar accessory items shall be installed straight/plumb, level and true, securely fastened and sealed in place as recommended by building manufacturer. Trim member lengths shall be as long as practical, with joints concealed or located in unobjectionable places.
1. Gutters shall be installed with high points equidistant from downspouts and have a slope of not less than 1/16 inch per foot.
 2. Downspouts shall be installed not less than 1 inch from wall complete with all elbow fittings. Terminate downspouts approximately 12 inches from finish grade.
- D. Insulation shall be installed between wall/roof panels and building framing members as shown on approved shop/erection drawings with vapor barrier face toward the warm side in a secure and non-sagging type manner. Vapor barrier shall have all edges, laps, tears and penetrations completely sealed. Insulation shall extend full length and width of insulated spacing with all Work neatly fitted around and behind all electrical boxes, conduit, piping, duct Work and similar items with all Work in accordance with manufacturer's latest printed recommendations.
1. Tape shall be applied in accordance with manufacturer's instructions.
 2. Pack all perimeter voids for all metal frames with fiberglass insulation.
- E. Miscellaneous manufactured items, such as, personnel doors, ventilation units, overhead doors, windows, louvers and similar items, shall be installed in accordance with approved shop drawings and manufacturer's latest specifications and adjusted for ease of operation.
- F. Sealants shall be installed at all joints and where panels, including all trim and accessories adjoin other Work, as shown or required to achieve a wind and watertight condition with all Work in accordance with manufacturer's recommendations.

1. Caulking by CONTRACTOR shall include head, joint and sill members where panel meets structure. Perimeter caulking shall include such items as door frames, louvers, windows and other penetrations occurring within metal wall or roof system.
2. Lap joints in flashings and trim members shall be made watertight with 2 ribbons of approved sealant.

3.5 CLEAN UP:

- A. After erection/installation of metal building has been completed, CONTRACTOR shall thoroughly clean all metal components interior and exterior exposed surfaces in a manner acceptable to OWNER'S Designated Representative. Cleaning procedures shall be in accordance with metal building manufacturer's recommendations.
 1. Glass or roof light panels shall be cleaned on both sides including the removal of all labels.
- B. Any Work that is damaged or defective will be replaced with new to the satisfaction of the OWNER and without cost to OWNER.

4.0 PART 4 - RELATED DOCUMENTS - NOT APPLICABLE

EQUIPMENT & MATERIAL PROCUREMENT LIST

Panel/Device	Nameplate	Description	Furnished By	Mounted By	Dwg. #	P.O. #
PD-114	Existing	800amp, 480 volt, 3 phase, panelboard with spare spaces for new breaker installation; Square-D. (Note: Electrical contractor to field verify panelboard type and breaker frame type prior to furnishing and installing circuit breaker in the panelboard.)	Existing	Existing	CYNT-001-E-028B CYNT-009-E-327	
Circuit Breaker in PD-114 (Submittal required)		400amp/3P circuit breaker in panelboard PD-114. Circuit breaker shall match the existing.	EC	EC	CYNT-001-E-028B CYNT-009-E-327	
Panelboard 9P-101 (Shop drawings required)	C,D	480/277V volt, 400A, 3 phase, 4 wire, with 400amp main and copper bus (main, neutral and grounding bus) with through-feed lug, and SPD integral onto panelboard chassis; Eaton Type Pow-R-Line 4B. Panelboard to have door in door trim. Provide circuit breakers with padlockable handle lock hasp for field installation.	EC	EC	CYNT-009-E-015 CYNT-009-E-300	
Panelboard 9P-101A (Submittal required)	C,D	480/277V volt, 400A, 3 phase, 4 wire, main lug only and copper bus (main, neutral and grounding bus); Eaton Type Pow-R-Line 4B. Panelboard to have door in door trim. Provide circuit breakers with padlockable handle lock hasp for field installation	EC	EC	CYNT-009-E-015 CYNT-009-E-300	
Panelboard 9LP-101 (Submittal required)	C,D	208Y/120 volt, 225 amp bus, 3phase, 4 wire, 42 circuit panelboard with 125 amp main circuit breaker and copper bus (main, neutral and grounding bus), and SPD integral onto panelboard chassis; Eaton Type Pow-R-Line 1A. Panelboard to have door in door trim. Provide circuit breakers with padlockable handle lock hasp for field installation	EC	EC	CYNT-009-E-015 CYNT-009-E-300	

EQUIPMENT & MATERIAL PROCUREMENT LIST

Panel/Device	Nameplate	Description	Furnished By	Mounted By	Dwg. #	P.O. #
Transformer T-9LP-101 (Submittal required)	B	45kVA, 480-208Y/120 volt, 3 phase dry type transformer with copper windings; Eaton. Ceiling/wall mounting brackets provided with transformer or by electrical contractor.	EC	EC	CYNT-009-E-300	
ELM01	Existing	225amp, 480/277 volt, 3 phase, panelboard with spare spaces for new breaker installation; Square-D type NEHB. Circuit breaker to be provided in the panelboard. See below.	Existing	Existing	CYNT-001-E-036 CYNT-009-E-323	
Circuit Breaker in ELM01 (Submittal required)		20amp/1P circuit breaker in panelboard ELM01. Circuit breaker shall match the existing.	EC	EC	CYNT-001-E-036 CYNT-009-E-323	
M251	B	Air Handing Unit AHU-01 with 208V, 1-phase, 60 Hz, FLA 19.23 amp; Enviro-Tec model # HPP06. (Note: Unit will be controlled by the 3M building management system).	MC	MC	CYNT-009-E-300 CYNT-009-E-400	
M252	B	Air Handing Unit AHU-02 with 480V, 3-phase, 60 Hz, 3 horse power fan motor and with integral VFD. JCI model # XTI-39x51.	MC	MC	CYNT-009-E-300 CYNT-009-E-400	
M253	B	Air Handing Unit AHU-03 with 480V, 3-phase, 60 Hz, 3 horse power fan motor and with integral VFD. JCI model # XTI-39x51.	MC	MC	CYNT-009-E-300 CYNT-009-E-400	
M254	B	Air Handing Unit AHU-04 with 480V, 3-phase, 60 Hz, 3 horse power fan motor and with integral VFD. JCI model # XTI-39x51.	MC	MC	CYNT-009-E-300 CYNT-009-E-400	
M255	B	Air Handing Unit AHU-05 with 480V, 3-phase, 60 Hz, 3 horse power fan motor and with integral VFD. JCI model # XTI-39x51.	MC	MC	CYNT-009-E-300 CYNT-009-E-400	

EQUIPMENT & MATERIAL PROCUREMENT LIST

Panel/Device	Nameplate	Description	Furnished By	Mounted By	Dwg. #	P.O. #
M256	B	Condensing Unit, split system CU-1 with 208V, 1-phase, 60 Hz, 9.6 MCA. York LX series model # YCD18B21S.	MC	MC	CYNT-009-E-300 CYNT-009-E-400	
M257	B	Exhaust Fan EF-01 with 120V, 1-phase, 60 Hz, 1.7 amp; Greenheck model # SP-B150.	MC	MC	CYNT-009-E-300 CYNT-009-E-400	
M258	B	Exhaust Fan EF-02 with 480V, 3-phase, 60 Hz, 2 HP; Twin City# WPD.	MC	MC	CYNT-009-E-300 CYNT-009-E-400	
M259		Roll-Up overhead door operator, 480V, 3-phase, ½ HP. Components include control panel/controller, motor operator, pushbutton station and safety interlock		GC	CYNT-009-E-300 CYNT-009-E-400	
M260		Roll-Up overhead door operator, 480V, 3-phase, ½ HP. Components include control panel/controller, motor operator, pushbutton station and safety interlock		GC	CYNT-009-E-300 CYNT-009-E-400	
M261		Roll-Up overhead door operator, 480V, 3-phase, ½ HP. Components include control panel/controller, motor operator, pushbutton station and safety interlock		GC	CYNT-009-E-300 CYNT-009-E-400	
M262		Roll-Up overhead door operator, 480V, 3-phase, ½ HP. Components include control panel/controller, motor operator, pushbutton station and safety interlock		GC	CYNT-009-E-300 CYNT-009-E-400	
M263		Roll-Up overhead door operator, 480V, 3-phase, ½ HP. Components include control panel/controller, motor operator, pushbutton station and safety interlock		GC	CYNT-009-E-300 CYNT-009-E-400	
M264		Dock leveler 480V, 3-phase, 1 HP; Rite-Hite # RHH4000. Dok Commander combination control panel with fused disconnect switch provided to control dock leveler and overhead door. (EC to wire feeder wiring to Dok Commander control panel)		GC	CYNT-009-E-300 CYNT-009-E-400	

EQUIPMENT & MATERIAL PROCUREMENT LIST

Panel/Device	Nameplate	Description	Furnished By	Mounted By	Dwg. #	P.O. #
M265		Dock leveler 480V, 3-phase, 1 HP; Rite-Hite # RHH4000. Dok Commander combination control panel with fused disconnect switch provided to control dock leveler and overhead door. (EC to wire feeder wiring to Dok Commander control panel)		GC	CYNT-009-E-300 CYNT-009-E-400	
M266		Dock leveler 480V, 3-phase, 1 HP; Rite-Hite # RHH4000. Dok Commander combination control panel with fused disconnect switch provided to control dock leveler and overhead door. (EC to wire feeder wiring to Dok Commander control panel)		GC	CYNT-009-E-300 CYNT-009-E-400	
M267		Dock leveler 480V, 3-phase, 1 HP; Rite-Hite # RHH4000. Dok Commander combination control panel with fused disconnect switch provided to control dock leveler and overhead door. (EC to wire feeder wiring to Dok Commander control panel)		GC	CYNT-009-E-300 CYNT-009-E-400	
M268	B	Exhaust Fan EF-03 with 480 volt, 3-phase, 60 Hz, 2 HP; Twin City# WPD.	MC	MC	CYNT-009-E-300 CYNT-009-E-400	
M269	B	Exhaust Fan EF-04 with 480 volt, 3-phase, 60 Hz, 2 HP; Twin City# WPD.	MC	MC	CYNT-009-E-300 CYNT-009-E-400	
M270	B	Exhaust Fan EF-05 with 480 volt, 3-phase, 60 Hz, 2 HP; Twin City# WPD.	MC	MC	CYNT-009-E-300 CYNT-009-E-400	
M271	B	Exhaust Fan EF-06 with 480 volt, 3-phase, 60 Hz, 2 HP; Twin City# WPD.	MC	MC	CYNT-009-E-300 CYNT-009-E-400	
M272	B	Exhaust Fan EF-07 with 480 volt, 3-phase, 60 Hz, 2 HP; Twin City# WPD.	MC	MC	CYNT-009-E-300 CYNT-009-E-400	
M273		Commercial Gas Tankless water heaters, 120V, 1.48 amp power connection: AOSmith#ATIO-910-AN.	MC	MC	CYNT-009-E-300 CYNT-009-E-400	

EQUIPMENT & MATERIAL PROCUREMENT LIST

Panel/Device	Nameplate	Description	Furnished By	Mounted By	Dwg. #	P.O. #
H100		Dock heater1, 120V, 60 Hz, 1.0 amp: Energy Sales Inc	MC	MC	CYNT-009-E-300 CYNT-009-E-400	
H101		Dock heater1, 120V, 60 Hz, 1.0 amp: Energy Sales Inc	MC	MC	CYNT-009-E-300 CYNT-009-E-400	
DS-250 for Emergency Circuit at Warehouse (Submittal required)	C	Heavy duty, fusible disconnect switch, 600 volt, 30amp, 1 pole, single throw switch in a NEMA 12 enclosure, Eaton DH161FDK. Provide 20amp fuse with the disconnect switch.	EC	EC	CYNT-009-E-300	
DS-251 (Submittal required)	C	Heavy duty, non-fusible disconnect switch, 240 volt, 30amp, 2 pole, single throw switch in a NEMA 12 enclosure, Eaton DH221UDK. Provide with 1 N.O & 1 N.C contacts each rated for 10 amps at 240 VAC.	EC	EC	CYNT-009-E-300	
DS-252 (Submittal required)	C	Heavy duty, fusible disconnect switch, 600 volt, 30 amp, 3 pole, single throw switch with in a NEMA 12 enclosure, Eaton DH361FDK. Provide 20 amp, fast acting type J fuse. Provide with 1 N.O & 1 N.C contacts each rated for 10 amps at 240 VAC.	EC	EC	CYNT-009-E-300	
DS-253 (Submittal required)	C	Heavy duty, fusible disconnect switch, 600 volt, 30 amp, 3 pole, single throw switch in a NEMA 12 enclosure, Eaton DH361FDK. Provide 20 amp, fast acting type J fuse. Provide with 1 N.O & 1 N.C contacts each rated for 10 amps at 240 VAC.	EC	EC	CYNT-009-E-300	
DS-254 (Submittal required)	C	Heavy duty, fusible disconnect switch, 600 volt, 30 amp, 3 pole, single throw switch in a NEMA 12 enclosure, Eaton DH361UDK. Provide 20 amp, fast acting type J fuse. Provide with 1 N.O & 1 N.C contacts each rated for 10 amps at 240 VAC.	EC	EC	CYNT-009-E-300	

EQUIPMENT & MATERIAL PROCUREMENT LIST

Panel/Device	Nameplate	Description	Furnished By	Mounted By	Dwg. #	P.O. #
DS-255 (Submittal required)	C	Heavy duty, fusible disconnect switch, 600 volt, 30 amp, 3 pole, single throw switch in a NEMA 12 enclosure, Eaton DH361UDK. Provide 20 amp, fast acting type J fuse. Provide with 1 N.O & 1 N.C contacts each rated for 10 amps at 240 VAC.	EC	EC	CYNT-009-E-300	
DS-256 (Submittal required)	C	Heavy duty, non-fusible disconnect switch, 240 volt, 30amp, 2 pole, single throw switch in a NEMA 3R enclosure, Eaton DH221URK. Provide with 1 N.O & 1 N.C contacts each rated for 10 amps at 240 VAC.	EC	EC	CYNT-009-E-300	
DS-259 (Submittal required)	C	Heavy duty, non-fusible disconnect switch, 600 volt, 30 amp, 3 pole, single throw switch in a NEMA 12 enclosure, Eaton DH361UD. Provide with 1 N.O & 1 N.C contacts each rated for 10 amps at 240 VAC.	EC	EC	CYNT-009-E-300	
DS-260 (Submittal required)	C	Heavy duty, non-fusible disconnect switch, 600 volt, 30 amp, 3 pole, single throw switch in a NEMA 12 enclosure, Eaton DH361UD. Provide with 1 N.O & 1 N.C contacts each rated for 10 amps at 240 VAC.	EC	EC	CYNT-009-E-300	
DS-261 (Submittal required)	C	Heavy duty, non-fusible disconnect switch, 600 volt, 30 amp, 3 pole, single throw switch in a NEMA 12 enclosure, Eaton DH361UD. Provide with 1 N.O & 1 N.C contacts each rated for 10 amps at 240 VAC.	EC	EC	CYNT-009-E-300	
DS-262 (Submittal required)	C	Heavy duty, non-fusible disconnect switch, 600 volt, 30 amp, 3 pole, single throw switch in a NEMA 12 enclosure, Eaton DH361UD. Provide with 1 N.O & 1 N.C contacts each rated for 10 amps at 240 VAC.	EC	EC	CYNT-009-E-300	
DS-263 (Submittal required)	C	Heavy duty, non-fusible disconnect switch, 600 volt, 30 amp, 3 pole, single throw switch in a NEMA 12 enclosure, Eaton DH361UD. Provide with 1 N.O & 1 N.C contacts each rated for 10 amps at 240 VAC.	EC	EC	CYNT-009-E-300	

EQUIPMENT & MATERIAL PROCUREMENT LIST

Panel/Device	Nameplate	Description	Furnished By	Mounted By	Dwg. #	P.O. #
Disconnect Switch for Battery Charger 1 (Submittal required)		Heavy duty, non-fusible disconnect switch, 600 volt, 30 amp, 3 pole, single throw switch in a NEMA 12 enclosure, Eaton DH361UD. Provide with 1 N.O & 1 N.C contacts each rated for 10 amps at 240 VAC.	EC	EC	CYNT-009-E-300	
Disconnect Switch for Battery Charger 2 (Submittal required)		Heavy duty, non-fusible disconnect switch, 600 volt, 30 amp, 3 pole, single throw switch in a NEMA 12 enclosure, Eaton DH361UD. Provide with 1 N.O & 1 N.C contacts each rated for 10 amps at 240 VAC.	EC	EC	CYNT-009-E-300	
Disconnect Switch for Battery Charger 3 (Submittal required)		Heavy duty, non-fusible disconnect switch, 600 volt, 30 amp, 3 pole, single throw switch in a NEMA 12 enclosure, Eaton DH361UD. Provide with 1 N.O & 1 N.C contacts each rated for 10 amps at 240 VAC.	EC	EC	CYNT-009-E-300	
MS-257 (Submittal required)	C	Manual motor starter switch with overload, 115Vac, single pole in NEMA 12 enclosure; Square-D 2510 FG2P.	EC	EC	CYNT-009-E-300	
CMS258 (Submittal required)	C	Size 1 FVNR combination motor starter with disconnect switch in NEMA12 enclosure suitable for a 480V, three phase, 2 HP motor. Starter shall be provided with 480/120 volt control power transformer with hand/off/auto switch a 'running' LED pilot light on enclosure. Square-D 8538.	EC	EC	CYNT-009-E-300	
CMS268 (Submittal required)	C	Size 1 FVNR combination motor starter with disconnect switch in NEMA12 enclosure suitable for a 480V, three phase, 2 HP motor. Starter shall be provided with 480/120 volt control power transformer with hand/off/auto switch a 'running' LED pilot light on enclosure. Square-D 8538.	EC	EC	CYNT-009-E-300	

EQUIPMENT & MATERIAL PROCUREMENT LIST

Panel/Device	Nameplate	Description	Furnished By	Mounted By	Dwg. #	P.O. #
CMS269 (Submittal required)	C	Size 1 FVNR combination motor starter with disconnect switch in NEMA12 enclosure suitable for a 480V, three phase, 2 HP motor. Starter shall be provided with 480/120 volt control power transformer with hand/off/auto switch a 'running' LED pilot light on enclosure. Square-D 8538.	EC	EC	CYNT-009-E-300	
CMS270 (Submittal required)	C	Size 1 FVNR combination motor starter with disconnect switch in NEMA12 enclosure suitable for a 480V, three phase, 2 HP motor. Starter shall be provided with 480/120 volt control power transformer with hand/off/auto switch a 'running' LED pilot light on enclosure. Square-D 8538.	EC	EC	CYNT-009-E-300	
CMS271 (Submittal required)	C	Size 1 FVNR combination motor starter with disconnect switch in NEMA12 enclosure suitable for a 480V, three phase, 2 HP motor. Starter shall be provided with 480/120 volt control power transformer with hand/off/auto switch a 'running' LED pilot light on enclosure. Square-D 8538.	EC	EC	CYNT-009-E-300	
CMS272 (Submittal required)	C	Size 1 FVNR combination motor starter with disconnect switch in NEMA12 enclosure suitable for a 480V, three phase, 2 HP motor. Starter shall be provided with 480/120 volt control power transformer with hand/off/auto switch a 'running' LED pilot light on enclosure. Square-D 8538.	EC	EC	CYNT-009-E-300	
MS273 (Submittal required)	C	Manual motor starter & switch, 115Vac, single pole in NEMA 12 enclosure; Square-D 2510 F01.	EC	EC	CYNT-009-E-300	
MS100 (for H100) (Submittal required)	C	Manual motor starter switch with overload, 115Vac, single pole in NEMA 12 enclosure; Square-D 2510 FG2P.	EC	EC	CYNT-009-E-300	

EQUIPMENT & MATERIAL PROCUREMENT LIST

Panel/Device	Nameplate	Description	Furnished By	Mounted By	Dwg. #	P.O. #
MS101 (for H101) (Submittal required)	C	Manual motor starter & switch with overload, 115Vac, single pole in NEMA 12 enclosure; Square-D 2510 FG2P.	EC	EC	CYNT-009-E-300	
Lighting Fixture Type "BG5" (Submittal required)		2' X 4', LED troffer, recessed in ceiling, 277 volt, 4400 lumens, 4000K; Metalux # 2AC-LD5-44-UNV-L840-CD1-U.	EC	EC	CYNT-009-E-010 CYNT-009-E-200	
Lighting Fixture Type "CA5" (Submittal required)		1' X 4', LED fixture, surface mounted, 277 volt, 4400 lumens, 4000K; Metalux # BCLED-LD4-44SL-F-UNV-L840-CD1-U.	EC	EC	CYNT-009-E-010 CYNT-009-E-200	
Lighting Fixture Type "FG5" (Submittal required)		2' X 4', LED industrial high-bay with integral occupancy sensor, 277 volt, 30,000 lumens, 4000K, chain Hang, narrow distribution; Metalux # HBLED-LD4-30-N-277-PB40-CD-3-MPMS-U.	EC	EC	CYNT-009-E-010 CYNT-009-E-200	
Lighting Fixture Type "FG6" (Submittal required)		2' X 4', LED industrial high-bay with integral occupancy sensor, 277 volt, 30,000 lumens, 4000K, Wide distribution, chain Hang,; Metalux # HBLED-LD4-30-W-277-PB40-CD-3-MPMS-U.	EC	EC	CYNT-009-E-010 CYNT-009-E-200	
Lighting Fixture Type "WJU" (Submittal required)		Outdoor LED, enclosed and gasketed for wet locations, 277 volt, 44W, 5100 lumens, 4000k, with integral photocell and suitable for wall mounting; McGraw Edison # IST-AF-800-LED-E1-T3-BZ-PER7-MA1254-BZ.	EC	EC	CYNT-009-E-010 CYNT-009-E-200	
Lighting Fixture Type "WJW" (Submittal required)		Outdoor LED, enclosed and gasketed for wet locations, 277 volt, 21W, 2300 lumens, 4000k, with integral photocell and suitable for wall mounting; McGraw Edison # IST-AF-350-LED-E1-T3-BZ-PER7-MA1254-BZ.	EC	EC	CYNT-009-E-010 CYNT-009-E-200	

EQUIPMENT & MATERIAL PROCUREMENT LIST

Panel/Device	Nameplate	Description	Furnished By	Mounted By	Dwg. #	P.O. #
Lighting Fixture Type "ZAU" (Submittal required)		LED exit sign, universal mount (no battery); Sure-Lite #LPX-6.	EC	EC	CYNT-009-E-010 CYNT-009-E-200	
Convenience Receptacle Type "AA2"	C	125 VAC, 2 pole, 3 wire, ground fault circuit interrupter receptacle with 5mA trip lever protecting downstream outlets, NEMA standard WD1-1.10. GF5352-I by Hubbell, 6599 by Leviton or owner approved equal. Mount convenience receptacle in a type FD cast device box.	EC	EC	CYNT-009-E-300	
Single Pole Light Switch		Single pole light switch; Hubbell #1221-I or OWNER approved equal. Surface mounted switches shall be in a cast FS or FD box.	EC	EC	CYNT-009-E-200	
Ceiling Occupancy Sensor (Submittal required)		Ceiling mounted occupancy sensor, dual technology; Legrand # DT-300 series or owner approved equal	EC	EC	CYNT-009-E-200	
Wall Occupancy Sensor Switch (Submittal required)		Wall occupancy sensor switch, 277V, with wall cover plate; Legrand # PW-100 or owner approved equal.	EC	EC	CYNT-009-E-200	

EQUIPMENT & MATERIAL PROCUREMENT LIST

Field Mounted Equipment

Project Title: Warehouse Building Cynthiana, KY / Building 009

Note: Contractor is responsible for quantities of devices per drawings.

Panel	QTY	Description	Furnished By	Mounted By	Drawing #	P.O. #
		Supervised Employee Notification System (Paging System)				
	1	Middle Atlantic DWR series wall mounted rack with lockable front and back covers. Wall rack shall be sized large enough to accommodate all required components.	E.C.	E.C.	CYNT-009-E-580	
	1	Rack mounted UPS sized to maintain for 2 hours.	E.C.	E.C.	CYNT-009-E-580	
	LOT	Rack mounted amplifiers to match existing.	E.C.	E.C.	CYNT-009-E-580	
	LOT	Fiber Optic transwers to connect new paging system with Main Plant paging system.	E.C.	E.C.	CYNT-009-E-580	
	LOT	Network switches as needed.	E.C.	E.C.	CYNT-009-E-580	
	LOT	All required Main Plant & Warehouse components to connect the two systems together.	E.C.	E.C.	CYNT-009-E-580	
	LOT	S6 30W horn speakers.	E.C.	E.C.	CYNT-009-E-580	
	LOT	S2 8" ceiling speakers.	E.C.	E.C.	CYNT-009-E-580	
	LOT	("A" cable) Stranded twisted #16 pair with overall plenum yellow jacket for speaker wiring. (Belden #6200UE).	E.C.	E.C.	CYNT-009-E-580	
		Supervisory System.				
	LOT	Hoffman A242406LP enclosure with back panel.	E.C.	E.C.	CYNT-009-E-580	
	LOT	("A" cable) 2/C #16 solid unshelled FPLP for data (SLC) communication circuit wiring. Red with no stripe (SWC-1621NFP-2).	E.C.	E.C.	CYNT-009-E-580	
	LOT	("B" cable) 2/C #16 solid unshelled FPLP for misc. wiring. Red with white stripe (SWC-1621SFP-2/5).	E.C.	E.C.	CYNT-009-E-580	
	LOT	("E" cable) 2/C #16 stranded unshelled underground FPL PVC cable. (SWC-AQ225-16/27W).	E.C.	E.C.	CYNT-009-E-580	
		Card Access Security System.				
	1	Custom Micro/5 Card Access Panel with UTC/Casi Micro/5 Backplane and Wiring/Cable Organizers.	E.C.	E.C.	CYNT-009-E-800	
	1	Lenel Intelligent System Controller Board (LNL-3300-M5).	E.C.	E.C.	CYNT-009-E-800	
	2	Lenel 8RP Boards (LNL-1380-8RP).	E.C.	E.C.	CYNT-009-E-800	
	1	Lenel 20-DI Input Board (LNL-1100-20DI).	E.C.	E.C.	CYNT-009-E-800	
	1	Lenel 16 DOR Relay Board (LNL-1200-DOR).	E.C.	E.C.	CYNT-009-E-800	
	LOT	Custom 8RP Fuse/Relay Kits.	E.C.	E.C.	CYNT-009-E-800	

EQUIPMENT & MATERIAL PROCUREMENT LIST

Field Mounted Equipment

	1	Sentrol# 3025T Tamper Switch.	E.C.	E.C.	CYNT-009-E-800	
	2	Altronix# AL-600ULX 12/24VDC Power Supplies.	E.C.	E.C.	CYNT-009-E-800	
	3	12VDC, 7.0 AH Batteries.	E.C.	E.C.	CYNT-009-E-800	
	2	Sentrol# 3012 Tamper Switch.	E.C.	E.C.	CYNT-009-E-800	
	1	6"x6"x24" NEMA 1 Wireway.	E.C.	E.C.	CYNT-009-E-800	
	LOT	Hoffman# A-14N126 NEMA 1 Enclosures w/Back Panel.	E.C.	E.C.	CYNT-009-E-800	
	LOT	LNL-R11320-05TB card reader with WIU4.	E.C.	E.C.	CYNT-009-E-800	
	LOT	24VDC fail Secure Electric Strike.	G.C.	G.C.	CYNT-009-E-800	
	LOT	Bosch DS160 REX motion detector.	E.C.	E.C.	CYNT-009-E-800	
	LOT	GE Sentrol 1078BR recessed door contact.	E.C.	E.C.	CYNT-009-E-800	
	LOT	("A" cable) (1) 4 Pair #22 Twisted/Shielded Plenum CL2P Cable for Card Reader Communication Circuit Wiring (ACS-22/4P-7S) No Substitutions.	E.C.	E.C.	CYNT-009-E-800	
	LOT	("B" cable) (1) 2/C #16 Twisted Plenum CL2P Cable for Lock Power/Releasing Circuit Wiring (SWC-1627NPL-8).	E.C.	E.C.	CYNT-009-E-800	
	LOT	("C" cable) (1) 2/C#20 Shielded CL2 Cable for Door Contact Circuit Wiring (SWC-201PR7SPL-8).	E.C.	E.C.	CYNT-009-E-800	
	LOT	("D" cable) (1) 4/C#20 Shielded CL2 Cable for REX Motion Detector Circuit Wiring or Glass Break Detector Circuit Wiring (SWC-201PSH1PNSPL-8).	E.C.	E.C.	CYNT-009-E-800	
	LOT	("E" cable) (1) 2/C #18 CL2 Cable for Alarm Sounder Circuit Wiring (SWC-201PR7SPL-8).	E.C.	E.C.	CYNT-009-E-800	
	1	Aiphone Master intercom system with desk mount and power supply.	E.C.	E.C.	CYNT-009-E-800	
	1	Aiphone door station.	E.C.	E.C.	CYNT-009-E-800	
		CCTV System				
	1	Middle Atlantic DWR series wall mounted rack with lockable front and back covers. Wall rack shall be sized large enough to accommodate all required components.	E.C.	E.C.	CYNT-009-E-820	
	1	3208-20T-R4AL-E ("A" series 32 analog 64 IP channel Linux hybrid NVR, 20Tb storage).	E.C.	E.C.	CYNT-009-E-820	
	1	Rack mounted UPS sized to maintain for 2 hours.	E.C.	E.C.	CYNT-009-E-820	
	LOT	Client workstation software and all required EVES-01 Enterprise Server licenses.	E.C.	E.C.	CYNT-009-E-820	
	LOT	ComNet CWGE2FE8MSPOE 8-port PoE switch.	E.C.	E.C.	CYNT-009-E-820	
	LOT	ComNet CLE(X)UTP network POE extenders.	E.C.	E.C.	CYNT-009-E-820	
	LOT	Plug-in surge power strips.	E.C.	E.C.	CYNT-009-E-820	
	LOT	Lightning/surge protectors.	E.C.	E.C.	CYNT-009-E-820	

EQUIPMENT & MATERIAL PROCUREMENT LIST
Field Mounted Equipment

	LOT	Axis P3224-V MK II Fixed Dome Cameras, 720p, 2.8-10mm varifocal auto iris lens. Wide Dynamic Range.	E.C.	E.C.	CYNT-009-E-820	
	LOT	Axis Q3505-VE MKII, HD, 1080p, color, 2.3MP fixed camera with 3-9mm varifocal lens and clear dome camera.	E.C.	E.C.	CYNT-009-E-820	
	LOT	Axis Camera Mounts.	E.C.	E.C.	CYNT-009-E-820	
	LOT	Hoffman# A-14N126 NEMA 1 Enclosures w/Back Panel.	E.C.	E.C.	CYNT-009-E-820	
	LOT	(Type "A" cable) (1) 23/4PR solid BC CMP CAT6 300V 75C FT6 ROHS unshielded nom O.D. 0.225" plenum jacket (Sterling #CMP-23/4P-1N-6-SWC).	E.C.	E.C.	CYNT-009-E-820	



Geotechnical Engineering Report

**3M Warehouse Building
Cynthiana, Harrison County, Kentucky**

November 3, 2017
Terracon Project No. N3175057

Prepared for:

3M Center
St. Paul, Minnesota

Prepared by:

Terracon Consultants, Inc.
Lexington, Kentucky

terracon.com

The Terracon logo, consisting of the word "Terracon" in a white, bold, sans-serif font, set against a dark red rectangular background.

Environmental



Facilities



Geotechnical



Materials

November 3, 2017

3M Center
Bldg. 275-6W-22
St. Paul, Minnesota 55144



Attn: Mr. Mike Maki – Chief Engineer
P: (651) 733 6802
E: example@client.com

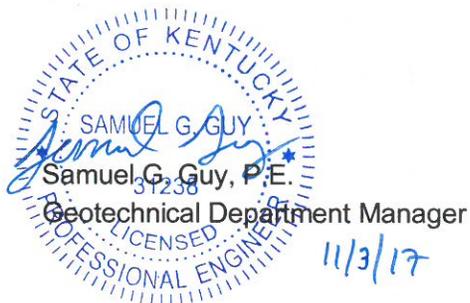
Re: Geotechnical Engineering Report
3M Warehouse Building
1308 New Lair Road
Cynthiana, Harrison County, Kentucky
Terracon Project No. N3175057

Dear Mr. Maki:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with our proposal number PN3175057 dated September 19, 2017. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and floor slabs for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.



Prasad S. Rege
For
Prasad S. Rege, P.E.
Senior Principal

REPORT TOPICS

- REPORT SUMMARY 1**
- INTRODUCTION 1**
- GENERAL COMMENTS 1**
- SITE CONDITIONS 3**
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Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section, and clicking on the logo in the top right corner will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

- EXPLORATION AND TESTING PROCEDURES**
- SITE LOCATION AND EXPLORATION PLAN**
- EXPLORATION RESULTS (Boring Logs and Laboratory Data)**
- SUPPORTING INFORMATION (General Notes)**

Geotechnical Engineering Report

3M Warehouse Building ■ Cynthiana, Harrison County, Kentucky

November 3, 2017 ■ Terracon Project No. N3175057



REPORT SUMMARY

Topic ¹	Overview Statement ²
Project Description	21,000-square foot structure Max. Column loads: 150 kips Up to 3 feet of fill to achieve final grade Minor excavation other than foundation construction
Geotechnical Characterization	Alluvial and fill soils to about 5 feet Residual soils below approximately 5 feet Limestone bedrock below a depth range of about 11 to 17 feet Groundwater not encountered
Earthwork	Recommendation related to moving the current building location such that the closest building corner is at least 30 feet away from the crown portion of an existing fill slope Existing lean clays can be used for engineered fill Clays are sensitive to moisture variation
Shallow Foundations	Shallow foundations will be sufficient Allowable bearing pressure = 2,500 psf Expected settlements: < 1 inch total, < ½ inch differential Detect and remove zones of fill as noted in Earthwork
Below Grade Structures	Proposed sump pit(s)
General Comments	This section contains important information about the limitations of this geotechnical engineering report.

1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by simply clicking on the topic itself.
2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.

Geotechnical Engineering Report
3M Warehouse Building
1308 New Lair Road
Cynthiana, Harrison County, Kentucky
Terracon Project No. N3175057
November 3, 2017

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed 3M Warehouse building to be constructed north of the existing manufacturing facility located at 1308 New Lair Road in Cynthiana, Harrison County, Kentucky. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil (and rock) conditions
- Groundwater conditions
- Site preparation and earthwork
- Frost considerations
- Excavation considerations
- Foundation design and construction
- Floor slab design and construction
- Seismic site classification per IBC
- Lateral earth pressures
- Dewatering considerations

The geotechnical engineering scope of services for this project included the advancement of 5 test borings to depths ranging from approximately 11.5 to 27 feet below existing site grades.

Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan** sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs in the **Exploration Results** section of this report.

GENERAL COMMENTS

Our services are conducted with the understanding of the project as described in the proposal, and will incorporate collaboration with the design team as we complete our services to verify assumptions. Revision of our understanding to reflect actual conditions important to our services will be based on these verifications and will be reflected in the final report. The design team should collaborate with Terracon to confirm these assumptions and to prepare the final design plans and specifications. This facilitates the incorporation of our opinions related to implementation of our geotechnical recommendations. Any information conveyed prior to the final report is for informational purposes only and should not be considered or used for decision-making purposes.

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3M Warehouse Building ■ Cynthiana, Harrison County, Kentucky

November 3, 2017 ■ Terracon Project No. N3175057



Our analysis and opinions are based upon our understanding of the geotechnical conditions in the area, the data obtained from our site exploration and from our understanding of the project. Variations will occur between exploration point locations, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in the final report, to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our scope of services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third party beneficiaries intended. Any third party access to services or correspondence is solely for information purposes only. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project site is located north of the existing manufacturing facility at 1308 New Lair Road in Cynthiana, Kentucky, with approximate site coordinates of 38.373717°, -84.295961°. See Site Location
Existing Improvements	Existing manufacturing plant with buildings, silos, concrete slabs, drive areas, and landscape areas
Current Ground Cover	Grass
Existing Topography	Relatively level
Geology	<p>We have reviewed the Geology of the Shawhan and Cynthiana quadrangles, Kentucky prepared by the United States Geological Survey (USGS) in cooperation with the Kentucky Geological Survey (KGS). The site is located within the Alluvium Formation. The Alluvium Formation, of the Quaternary age, consists of primarily silt, clay, sand, and gravel. Areas north of the project site are located within the Clays Ferry Formation, and the Tanglewood Limestone Member and Millersburg Member of the Lexington Formation.</p> <p>Based on review of the Kentucky Geological Map Information Service, the site is within an area characterized as wide ranging with “non-karst to very high” karst potential. Small mapped sinkholes are located northwest, southwest, and southeast of the 3M campus and specific project site.</p> <p>The Commonwealth of Kentucky maintains a database of permitted surface and deep mines spatially referenced on maps of differing scales. According to available information, there appears to be no commercial-scale deep or surface mining in the project area.</p>

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Our field exploration work included the drilling and sampling of exploratory soil borings consistent with the following:

Geotechnical Engineering Report

3M Warehouse Building ■ Cynthiana, Harrison County, Kentucky

November 3, 2017 ■ Terracon Project No. N3175057



Number of Borings	Boring Depth (feet) ²	Planned Location ¹
5	11.5 to 27 feet	Proposed warehouse building

1. As requested by the client.

2. Exploration depth based on local experience with similar projects in the area.

Locations of soil borings are provided on our [Exploration Plan and Site Plan](#). The locations of field exploration points were established in the field by the exploration team using a hand-held GPS unit to establish boring locations with reference to known points. The accuracy of the exploration points is usually within 20 feet of the noted location.

We advanced the soil borings with a track-mounted drill rig using hollow stem augers. We primarily obtained samples using the split-barrel sampling procedure. In the split-barrel sampling procedure, a standard, 2-inch O.D., split-barrel sampling spoon is driven into the boring with a 140-pound automatic Standard Penetration Test (SPT) hammer falling 30 inches. We recorded the number of blows required to advance the sampling spoon the last 12 inches of an 18-inch sampling interval as the standard penetration resistance value, N. Bedrock was not encountered during the field exploration.

We reported the sampling depths and the standard penetration resistance values on the boring logs. In the field, we placed the samples into containers, sealed them, and returned them to the laboratory for observation, testing and classification.

Our exploration team prepared field boring logs as part of the drilling operations. These field logs include visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in the laboratory.

Laboratory Testing

The project engineer examined soil samples in the laboratory. Based on the material’s texture and plasticity, the field logs were updated to describe and re-classify soil samples in accordance with the Unified Soil Classification System. Various laboratory tests were also assigned to help confirm classifications and better understand the engineering properties of the various soil strata as necessary for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

- ASTM D2216-10 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D4318-10e1 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- Pocket Penetrometer Readings

GEOTECHNICAL CHARACTERIZATION

Subsurface Profile

Subsurface conditions at the boring locations can be generalized as follows:

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description	Consistency/Density
Surface	0.2 to 0.3	Topsoil	N/A
1	2.5 to 5	Fill consisting of lean clay with variable amounts of gravel ¹	N/A
2	11.5 to 17	Cohesive soils (alluvial and residual): silt, lean clay, and fat clay	Stiff to hard
2	Undetermined	Limestone	Strong bedrock hardness rating

1. Fill soils not encountered in boring W-2

2. Boring W-4 terminated within this stratum at a planned depth of approximately 27 feet

Conditions encountered at each boring location are indicated on the individual boring logs shown in the **Exploration Results** section and are attached to this report. Stratification boundaries on the boring logs represent the approximate location of changes in native soil types; in situ, the transition between materials may be gradual.

Groundwater Conditions

The boreholes were observed while drilling and after completion for the presence and level of groundwater. No water was encountered while drilling or observed after drilling operations were completed in the borings.

The absence of observed water in the borings does not necessarily mean the borings terminated above groundwater, or the water levels summarized above are stable groundwater levels. Due to the low permeability of the soils encountered in the borings, a relatively long period may be necessary for a groundwater level to develop and stabilize in a borehole. Long term observations in piezometers or observation wells sealed from the influence of surface water are often required to define groundwater levels in materials of this type.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed in the project planning stage. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Project Description	New warehouse building.
Proposed Structure	One story building Approximate dimensions: 120 feet wide x 180 feet long
Building Construction	Pre-fabricated metal building
Finished Floor Elevation (FFE)	729.50 feet
Maximum Loads	<ul style="list-style-type: none">■ Columns: 150 kips (provided) (Assumes a 40-foot x 40-foot bay)■ Floor Slabs: Assumed fork-lift truck traffic and a racking post load of 15 kips (provided) for a total of 30 kips per racking upright. Paper rolls (which are 52 inches in diameter) will weigh 3,000 pounds each and are proposed to be stacked 6 high. This will be in addition to a general area load of 250 psf. (provided)
Grading/Slopes	Based on provided existing grading information from the client and a provided FFE of 729.50 feet, it is proposed that approximately 3 feet of fill will be required for the building pad and no cuts will be required.

Item	Description
Below Grade Structures	Proposed sump pit(s)

GEOTECHNICAL OVERVIEW

This section describes pertinent geotechnical considerations identified by the exploration and laboratory testing. Site preparation recommendations, including subgrade improvement, fill placement, and excavations are provided in the **Site Preparation** section.

Five (5) borings, designated as W-1 through W-5, were performed in the proposed warehouse building location. The borings were advanced approximately 11.5 to 27 feet below the existing ground surface. Based on the information obtained from our subsurface exploration, the site can be developed for the proposed improvements. The following geotechnical considerations were identified:

- n A site grading plan was not available at the writing of this report. However, a preliminary plan with the building footprint and existing grades was provided by the client. Based on this information, it appears the building is proposed to bear above and adjacent to an existing slope located on the north side of the property. Due to concerns with the building and associated loads promoting slope instability, it is recommended the proposed building footprint be relocated away from the crown of the existing slope, keeping a minimum distance of at least 30 feet between the building perimeter and edge of the slope. If the building cannot be relocated, additional measures will need to be considered.
- n The borings encountered shallow fill soils consisting of lean clays with variable amounts of gravel underlain by alluvial deposits and residual layers of stiff to hard clay and silt overlying strong to very strong limestone. The bedrock was encountered at depths of approximately 11.5 to 17 feet.
- n Conversations with the client indicate the existing fill that was previously stockpiled onsite was spread over the proposed building footprint with a grader and placed in a manner that involved limited control and compaction effort to level out the site. While blow counts, hand penetrometer readings, and visual observation indicate the fill has been paced with some manner of control, based on information provided by the client, the fill must be considered undocumented and uncontrolled.
- n The site appears suitable for the use of shallow foundations for the proposed building, provided that the following construction recommendations are followed. The foundations should penetrate through the existing fill to bear on at least stiff native soils or bear on structural fill or lean concrete extending to suitable native soils.

- n A thickened industrial floor slab is recommended for this site due to the anticipated relatively heavy floor slab loading. The existing fill, when encountered, should be undercut a minimum of two feet (in areas where it extends deeper than two feet) and replaced with properly compacted structural fill meeting low-volume change requirements stated in the **Fill Material Types** section of this report. The thickened slab should be kept independent of the shallow foundations and include a 1-foot thick layer of properly compacted granular structural fill (preferably consisting of dense graded aggregate) below base-of-slab prior to placement of the slab. This will provide for a uniform bearing support across the base of the slab.

- n Close monitoring of the construction operations discussed herein will be critical in achieving the design subgrade support. We therefore recommend that Terracon be retained to monitor this portion of the work.

The borings indicated the presence of high plasticity soils with the potential for expansive behavior. Therefore, as discussed above, a 24-inch thick low volume change layer (12 inches of which would consist of granular structural fill) should be constructed beneath proposed floor slab to reduce exposure to these potentially expansive soils. The low volume change layer can also consist of an 12-inch thick layer of lime stabilized moderate to high plasticity soils lying below the 12-inch layer of granular structural fill bed to be located at the base of the proposed floor slab). Foundations (both exterior and interior) should bear a minimum of 3.5 feet below grade to reduce risks associated with high plasticity soils. The **Shallow Foundations** section addresses support of the building bearing directly on native stiff to hard fat clay or engineered fill. The **Floor Slabs** section addresses slab-on-grade support of the building.

Materials with potential for expansive behavior are present on this site. This report provides recommendations to help mitigate the effects of soil shrinkage and expansion. However, even if these procedures are followed, some movement and (at least minor) cracking in the structure should be anticipated. The severity of cracking and other damage such as uneven floor slabs will probably increase if modification of the site results in excessive wetting or drying of the expansive soils. Eliminating the risk of movement and distress may not be feasible, but it may be possible to further reduce the risk of movement if significantly more expensive measures are used during construction. Some of these options are discussed in this report such as complete replacement of expansive soils or a structural slab.

The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

Earthwork will include clearing and grubbing, excavations and fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria as necessary to render the site in the state considered in our geotechnical engineering evaluation for foundations, floor slabs, and pavements.

Proposed Grading

Existing surface grades surrounding the proposed building additions range from elevations of about 726 feet to 729 feet within the footprint of the proposed warehouse building. Based on the grading plan containing existing and proposed elevation contours provided by the client and a proposed finished floor elevation (FFE) of 729.5 feet, we anticipate no more than two feet of cut and fill will be performed at this site to achieve desired grades and elevations. If offset of the building is to be performed to address concerns with the current slope, it is anticipated that cut and fill will still be no more than 2 feet to reach proposed site grades.

On the following table we have included information related to the anticipated cuts and fills at various boring locations (for borings W-1 through W-5, located in the building expansion and fill areas) and structure areas of the site:

Boring No. ¹	Location	Existing Ground Surface Elev. (feet) ¹	Proposed Subgrade Elevation (feet) ²	Cut (-)/ Fill(+) (feet) ³	Material Anticipated at Subgrade
W-1	SE Building Corner	729	728	-1	Existing Fill
W-2	SW Building Corner	729	728	-1	Native Soil ⁴
W-3	NW Building Corner	726	728	+2	New Structural Fill
W-4	NE Building Corner	726	728	+2	New Structural Fill
W-5	Building Center	728	728	0	Existing Fill ⁵

1. Estimated based on provided existing site grades plan
2. Approx. subgrade elevation based on grading plan and provided FFE of 729.5 feet.
3. All cut/fill values are approximate and rounded to the nearest foot
4. Native silts with a medium stiff to stiff consistency
5. Existing fill consisting of lean clay with trace amounts of gravel

Encountered Conditions

Existing Fill Slope

The existing site grading plan provided by the client indicates that the building's north wall will run near the crest of an existing fill slope. A portion of the warehouse building is proposed to bear on or within this slope. Site grading plans that indicate how this portion of the site will be developed are not yet available for review at the writing of this report. Review of aerial imagery also indicates a small creek or other drainage feature lies adjacent to and at the base of the existing slope.

It is our opinion that crown loading of the slope due to area loads associated with the building in addition to potential undermining of the existing slope at its toe by the existing drainage feature could result in slope instability and eventual slope failure. Because of these concerns and the potential for other remediation measures to be more cost prohibitive, Terracon recommends that strong consideration be given to relocate the proposed warehouse building further south and west along the property site and away from the existing slope on the property's north and east side, removing the need for reconstruction of the slope or design and construction of a retaining wall. If relocation is considered, the building should rest a minimum of 30 feet away from the crest of the slope.

If it is determined that relocation of the building is not feasible, additional geotechnical exploration and analysis should be performed to determine suitable remediation measures for the existing fill slope prior to development of the site.

Existing Fill and Subgrade Soils

Shallow fill soils consisting mostly of lean clay with variable amounts of rock and sand were encountered at depths varying from about 2.5 to 5 feet. These soils were underlain by mostly stiff to hard native cohesive soils consisting of silts, lean clays and fat clays with limestone fragments. Bedrock was encountered at depths varying from 11.5 to 17 feet of depth.

The encountered fill soils appeared to be placed with some compactive effort. However, conversations with the client indicate that these soils were not placed in a controlled manner and, therefore, must be considered undocumented and uncontrolled.

Moderate to High Plasticity, Potentially Expansive Soils

Atterberg limit test results revealed mostly lean and silty clays near the ground surface in the boring logs. Based on visual classification, moderate to high-plasticity lean clays (CL) and fat clays (CH) were encountered in some of the borings at deeper depths. It is possible that moderate to high plasticity soils will be found near the foundation and floor slab elevations in areas not proposed to receive any structural fill. Moderate to high plasticity soils are potentially expansive and could adversely affect lightly loaded structures, such as foundations, floor slabs, and pavements. If these soils are encountered locally at pavement bearing elevations, an 18-inch undercut of these

soils and replacement with a layer of low volume change (LVC) soils be performed. A minimum 18-inch granular structural fill bed should be placed directly beneath all floor slabs.

Expansive soils are present on this site. This report provides recommendations to help mitigate the effects of soil shrinkage and expansion. However, even if these procedures are followed, some movement and cracking in the structure should be anticipated. The severity of cracking and other damage such as uneven slabs will probably increase if any modification of the site results in excessive wetting or drying of the expansive soils. Eliminating the risk of movement and distress may not be feasible, but it may be possible to further reduce the risk of movement if significantly more expensive measures are used during construction. Some of these options include replacement of expansive soils to deeper depths or post tensioned floor slabs with anchors, etc. are incorporated into the design. We would be pleased to discuss other construction alternatives with you upon request.

Karst Susceptible Rock

Karst features, including clay seams (as indicated by our subsurface exploration); caverns; sinkholes; and highly irregular rock surfaces, are common features within carbonate rocks like those encountered in this exploration. As earlier indicated under **Site Conditions**, the initial limited desktop study performed for this report found that the site is within an Alluvium formation with “non-karst” potential. Adjacent limestone and Clays Ferry formations are characterized by “low” to “very high” karst potential. While multiple karst features (including sinkholes) are mapped to the west and south of the 3M facility, no karstic features have been mapped within the project site.

The scope of services for this geotechnical engineering report did not include exploration for the presence of underground voids or solution cavities that are known to occur within this type of geology. To determine the likelihood of karst activity at the site, additional studies would need to be undertaken. Further assessment of specific, unusual features may include additional exploration and/or geophysical analysis (i.e., resistivity study) to better understand the risk and to aid in generating informed decisions. Because this project lies in a commercially developed area, it is possible that documentation exists regarding the extent of existing depressions and sink holes in the surrounding area and the risk these depressions pose to present infrastructure within the vicinity of the project area. If this documentation is available, it should be provided to Terracon so that we may reassess and revise our recommendations, if necessary.

It should be noted that any construction in karst topography is accompanied by some degree of risk for future internal soil erosion and ground subsidence that could affect the stability of structures situated above the karst features. Proper surface water control during and after construction is recommended so as not to activate old karst features that may be present beneath the site

Site Preparation

Site Preparation: General Recommendations

The following presents general recommendations for site preparation, excavation, and fill placement. Special considerations will be needed where site grading may expose unstable soils. Our recommendations presented for design and construction of earth supported elements (i.e. foundations, slabs, etc.) are contingent upon following the recommendations outlined in this section. All earthwork activities on the project should be observed and evaluated by Terracon.

Vegetation and otherwise unstable materials should be stripped from the site prior to grading operations. Topsoil or other loose, soft or otherwise unsuitable material should be removed from the entire construction area and any sources of on-site borrow material should be stockpiled outside of the construction area.

Removal and/or relocation of any “to be abandoned” utilities should also be performed prior to rough site grading activities. We would anticipate removal and relocation, or re-routing, of any existing utilities which currently exist within the footprint of the proposed development area that would interfere with new construction. Any abandoned underground pipes, left in place, should be fully grouted. Excavations created due to utility relocations or demolition activities should be backfilled with structural fill material, placed and compacted in accordance with the recommendations provided in the following paragraphs or with lean concrete or flowable fill. If lean concrete is used as backfill, the contractor should refer to all of the new build Mechanical-Electrical-Plumbing (MEP) and foundation drawings to confirm that the concrete backfill materials will not conflict with any new item installations or construction.

For the floor slab and any areas to receive structural fill, once any required undercutting is complete and prior to placement of structural fill, the exposed subgrade soils should be carefully proof-rolled under close observation by geotechnical personnel. Due to the presence of moderately to highly plastic soils at various locations through the site, this proof rolling program is very important with respect to evaluating structural fill and floor slab support areas. Proof rolling should be accomplished using a pneumatic-tired, fully-loaded minimum 20 ton tandem-axle dump truck. Soft or yielding areas should be undercut. The proof rolling program should consist of a minimum of 3 passes by the proof rolling equipment.

Based on the boring information stiff to very stiff native soils are anticipated at most locations where native soils are expected to be exposed. However, if undocumented fill soils and/or soft to medium stiff soils are encountered, undercut and/or stabilization may be required. Actual undercut/stabilization depths should be determined based on the results of the proofrolling and testing during construction. If groundwater is encountered during the undercutting process, measures should be implemented to control it during and after construction. Lime stabilization can also be considered in lieu of the undercut to stabilize soft to medium stiff or highly plastic soils. In

this case it will likely be necessary to undercut to a certain depth then lime stabilize the subgrade, as the maximum lime stabilization depths are generally limited to 18 inches for single layer applications. If this option is selected, laboratory testing should be performed to determine the optimum percentage of lime that would be required for stabilization.

After proof rolling and prior to the placement of structural fill in areas below design grade, the subgrade should be scarified, moisture conditioned and recompacted to the density recommended in the **Fill Compaction Requirements** section below. This process will further help to delineate soft or disturbed areas. Unstable areas identified during scarification and recompaction should be undercut to expose stable material.

Fill Material Types

Fill required to achieve design grade should be classified as structural fill and general fill. Structural fill is material used below, or within 10 feet of structures, pavements or constructed slopes. General fill is material used to achieve grade outside of these areas. Earthen materials used for structural and general fill should meet the following material property requirements:

Soil Type ¹	USCS Classification	Acceptable Location for Placement
Low Plasticity Cohesive	CL, CL-ML ML (LL<50)	> 12 inches below building finished grade
High Plasticity Cohesive	CH, MH (LL>50)	> 24 inches below building finished grade
Well graded granular (low-volume change material) ²	GW, GP, GM, GC, SW, SP, SM, SC	All locations and elevations
On-Site Soils	ML, CL, CH	Onsite soils generally appear suitable for reuse as engineered fill, pending further testing. Highly plastic soils should be placed a minimum of 24 inches below floor slab elevation. Low-plasticity cohesive soils should be placed a minimum of 12 inches below floor slab elevation. Moisture conditioning of the on-site native soils may be required to achieve optimum moisture conditions for placement as engineered fill.

1. Compacted structural fill should consist of approved materials that are free of organic matter and debris. Maximum particle size should be 4 inches in any direction. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the geotechnical engineer for evaluation.
2. Similar to KYTC's Dense Graded Aggregate or crushed limestone aggregate. If frost heave is not a concern, limestone screenings or granular material such as sand, gravel or crushed stone may also be used. Material should be approved by the geotechnical engineer.

Fill Compaction Requirements

Structural and general fill should meet the following compaction requirements.

Item	Structural Fill	General Fill
Maximum Lift Thickness	8 inches or less in loose thickness when heavy, self-propelled compaction equipment is used 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used	Same as Structural fill
Minimum Compaction Requirements ^{1, 2, 3}	At least 98% of the material's standard Proctor maximum dry density (ASTM D 698)	At least 95% of the material's standard Proctor maximum dry density (provided long-term plans do not include a structure in these areas)
Water Content Range ¹	Low plasticity cohesive: -1% to +2% of optimum High plasticity cohesive: 0 to +4% of optimum Granular: -3% to +3% of optimum	As required to achieve minimum compaction requirements

1. Maximum density and optimum water content as determined by the standard Proctor test (ASTM D 698).
2. High plasticity cohesive fill should not be compacted to more than 100 percent of standard Proctor maximum dry density.
3. If the granular material is a coarse sand or gravel, or of a uniform size, or has a low fines content, compaction comparison to relative density may be more appropriate. In this case, granular materials should be compacted to at least 70% relative density (ASTM D 4253 and D 4254).

Utility Trench Backfill

All trench excavations should be made with sufficient working space to permit construction including backfill placement and compaction. If utility trenches are backfilled with relatively clean granular material, they should be capped with at least 18 inches of cohesive soil to reduce the infiltration and conveyance of surface water through the trench backfill. Backfill placed in utility trenches below pavements should consist of well graded granular materials.

Utility trenches are a common source of water infiltration and migration. All utility trenches that penetrate beneath the foundation should be effectively sealed to restrict water intrusion and flow through the trenches that could migrate below the foundation with a clay plug. The plug material should consist of clay compacted at a water content at or above the soils optimum water content. The clay fill should be placed to completely surround the utility line and be compacted in accordance with recommendations in this report.

Grading and Drainage

Adequate drainage during and after construction will be necessary to control and divert stormwater runoff away from the site. Construction activities should be performed during dryer weather. Some

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subgrade instability should be anticipated if construction is planned during wet weather that may require undercutting and/or stabilization.

The design of this project should incorporate a drainage system that minimizes the potential for surface water runoff to collect on the site, especially in isolated areas near the building. Allowing water to pond on the property may cause soil piping to occur within weathered joints which could result in future collapse. This drainage system will require the use of collection basins in the parking lots that should be tied into a stormwater sewer system to carry the water off the property. Additionally, all roof drains should be tied into this system to minimize the added groundwater influx.

Final surrounding grades should be sloped away from the structure(s) on all sides to prevent ponding of water. Gutters and downspouts that drain water a minimum of 5 feet beyond the footprint of the proposed structure(s) are recommended. This can be accomplished through the use of splash-blocks, downspout extensions, and flexible pipes that are designed to attach to the end of the downspout. Flexible pipe should only be used if it is daylighted in such a manner that it gravity-drains collected water. Splash-blocks should also be considered below hose bibs and water spigots.

Earthwork Construction Considerations

Shallow excavations, for the proposed structure, are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of floor slabs. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over, or adjacent to, construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted, prior to floor slab construction.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

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Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of vegetation and top soil, proof-rolling and mitigation of areas delineated by the proof-roll to require mitigation.

Each lift of compacted fill should be tested, evaluated, and reworked as necessary until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas. One density and water content test for every 50 linear feet of compacted utility trench backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. In the event unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

SHALLOW FOUNDATIONS

Structural loading and foundation plans have not been confirmed at this time. Anticipated loads are based on discussions with the client and experience with similar projects. The anticipated loading conditions provided in this report should be confirmed by the project Structural Engineer. If loading conditions vary from those stated above, Terracon should be retained to review the recommendations in this report.

The foundations can be dimensioned for a net allowable soil bearing pressure of 2,500 psf for isolated spread footings and continuous walls, following the recommendations in this report and maximum structural loads of 150 kips or less. Please notify us if structural loading conditions differ from this assumption so we can revise our recommendations accordingly.

The proposed structure can be supported by spread footings penetrating through existing fill and bearing on at least stiff native soils, or engineered fill or lean concrete placed directly on at least stiff native soils. Any undercut and replacement of unsuitable soils should be replaced with new engineered fill meeting the requirements of the Material Types in the **Site Preparation** section of this report.

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations.

Design Parameters – Compressive Loads

Item	Description
Maximum Net Allowable Bearing pressure ^{1, 2}	2,500 psf
Required Bearing Stratum ³	At least stiff native lean clay, engineered fill or lean concrete extending to bedrock or at least stiff lean clay
Minimum Foundation Dimensions	Columns: 24 inches Continuous: 18 inches
Ultimate coefficient of sliding friction	0.35
Minimum Embedment below Finished Grade ⁶	24 inches (42 inches if bearing on native soils)
Estimated Total Settlement from Structural Loads ²	Less than about 1.5 inches
Estimated Differential Settlement ^{2, 7}	About 2/3 of total settlement

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied. These bearing pressures can be increased by 1/3 for transient loads unless those loads have been factored to account for transient conditions. Values assume that exterior grades are no steeper than 20% within 10 feet of structure.
2. Values provided are for maximum loads noted in **Project Description**.
3. Unsuitable or soft soils should be over-excavated and replaced according to the recommendations presented in the **Earthwork**.
4. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed and compacted structural fill be placed against the vertical footing face.
5. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions.
6. Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure. Any footings bearing on low-volume change structural fill or lean concrete extending to bedrock should have a minimum embedment below finished grade of 24 inches. To provide additional protection against seasonal shrink/swell and to reduce risk of differential settlement due to non-uniform bearing materials, any footings bearing on native soils should be deepened to extend at least 42 inches below finished exterior and interior grade.
7. Differential settlements are as measured over a span of 50 feet.

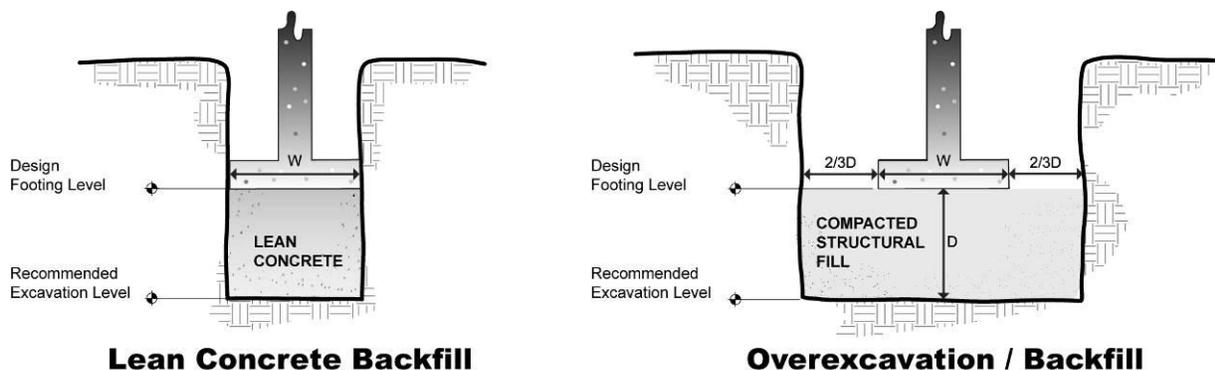
Foundation Construction Considerations

As noted in **Earthwork**, the footing excavations should be evaluated under the direction of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing

soil disturbance. Should the soils at bearing level become excessively dry, disturbed or saturated, or frozen, the affected soil should be removed prior to placing concrete. Place a lean concrete mud-mat over the bearing soils if the excavations must remain open over night or for an extended period of time. It is recommended that the geotechnical engineer be retained to observe and test the soil foundation bearing materials.

If unsuitable bearing soils are encountered in footing excavations, the excavations should be extended deeper to suitable soils and the footings could bear directly on these soils at the lower level or on lean concrete backfill (with a minimum strength of 1,000 psi) placed in the excavations. The footings could also bear on properly compacted structural backfill extending down to the suitable soils.

Overexcavation for structural fill placement below footings should extend laterally beyond all edges of the footings at least 8 inches per foot of overexcavation depth below footing base elevation. The overexcavation should then be backfilled up to the footing base elevation with engineered fill as described in the **Earthwork** section placed in lifts of 8 inches or less in loose thickness and compacted to at least 98 percent of the material's maximum dry density as defined by the Standard Proctor (ASTM D 698). If lean concrete is used as a backfill material, the footing excavation would not need to be widened laterally as would be required for structural fill soils. The overexcavation and backfill procedure is illustrated in the following figures for lean concrete or lean clay material backfill.



NOTE: Excavations in sketches shown vertical for convenience. Excavations should be sloped as necessary for safety.

SEISMIC CONSIDERATIONS

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7-10.

Description	Value
2012 International Building Code Site Classification (IBC) ¹	C ²
<ol style="list-style-type: none"> 1. Seismic site classification in general accordance with the 2012 <i>International Building Code</i>, which refers to ASCE 7-10. 2. The 2012 International Building Code (IBC) uses a site profile extending to a depth of 100 feet for seismic site classification. Borings at this site were extended to a maximum depth of 27 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth. 	

FLOOR SLABS

Client-provided information indicates that the proposed floor slab is going to support racking and paper rolls with estimated point loads of about 30,000 pounds per racking upright. Area loads are anticipated to reach 250psf.

Because it is anticipated there will be moderately-loaded floor slab areas (up to 250psf floor slab area load) and heavy point loads such as those provided above, we recommend the use of an industrial floor slab foundation (or thickened, heavily reinforced slab). It is anticipated that the thickened floor slab will bear at least stiff native soils, on structural fill extending to suitable native soils or on a minimum 2-foot thick structural fill buffer. We recommend that after completion of the site grading program the area directly beneath the slab footprint have at least a 1-foot thick buffer of granular structural fill beneath the bottom of mat/slab foundation level to provide for a uniform bearing material directly beneath the slab.

The majority of existing native soils near the ground surface and underlying the existing fill consisted of lean clays and silts. The clay soils tended to increase in plasticity with depth. High plasticity clays exhibit the potential to swell with increased water content. Construction of the floor slab, combined with revising site drainage creates the potential for gradual increased water contents within the clays. Increases in water content can cause the clays to swell and damage the floor slab. To reduce the swell potential to less than about 1 inch, at least the upper 24 inches of subgrade soils below the floor slab (excluding the floor slab support course) should be an approved Low Volume Change (LVC) material consisting of lean clays, with the upper 12 inches below base of floor slab consisting of the above-mentioned granular structural fill bed.

Due to the potential for significant moisture fluctuations of subgrade material beneath floor slabs supported at-grade, the Geotechnical Engineer should evaluate the material within 18 inches of the bottom of the LVC zone immediately prior to placement of additional fill or floor slabs. Soils below the specified water contents within this zone should be moisture conditioned or replaced with structural fill as stated in our **Earthwork** section.

Design parameters for floor slabs assume the requirements for **Earthwork** have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the aggregate base beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Floor Slab Support ¹	Minimum 6 inches of free-draining (less than 6% passing the U.S. No. 200 sieve) crushed aggregate compacted to at least 95% of ASTM D 698 ^{2, 4} At least 12 inches of granular structural fill meeting requirements in the Earthwork section of this report At least 18 inches of low plasticity cohesive or granular soils with at least 18% passing the U.S. No. 200 sieve material should be present below floor slabs where lean to fat clay or fat clay soils are present
Estimated Modulus of Subgrade Reaction – Point Loads ²	100 pounds per square inch per inch (psi/in) for point loads
Estimated Modulus of Subgrade Reaction – Area Loads ³	8 pounds per square inch per inch (psi/in) for uniformly distributed loads (or area loads)

1. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.
2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in **Earthwork**, and the floor slab support as noted in this table. It is provided for point loads.
3. For large area loads the modulus of subgrade reaction would be lower. Based on an assumed 250 psf contact stress and anticipated settlement of 0.2 inch.
4. Free-draining granular material should have less than 5 percent fines (material passing the #200 sieve). Other design considerations such as cold temperatures and condensation development could warrant more extensive design provisions.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual. Joints or cracks should be sealed with a water-proof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Floor Slab Construction Considerations

Finished subgrade within and for at least 10 feet beyond the floor slab should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

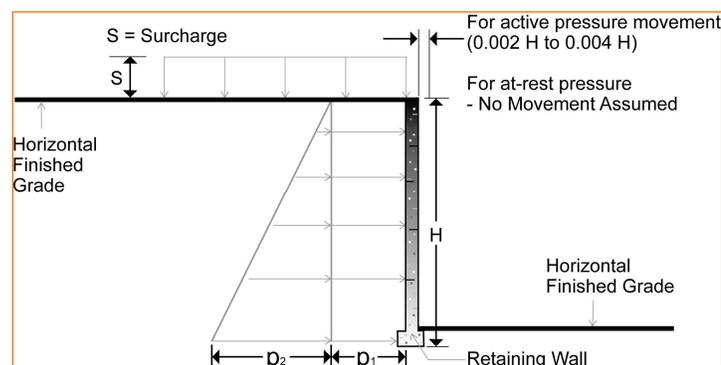
The Geotechnical Engineer should approve the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

LATERAL EARTH PRESSURES

Information provided by the client indicates below-grade separation (or basement) retaining walls will be required for the proposed warehouse building sump pit.

Design Parameters

Structures with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to values indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Two wall restraint conditions are shown. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The "at-rest" condition assumes no wall movement and is commonly used for basement walls, loading dock walls, or other walls restrained at the top. The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls



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(unless stated). The lateral earth pressure design parameters in the table below are based on the assumed bulk unit weight of 120 pcf for granular backfill and friction angle of 32 degrees for granular backfill.

Lateral Earth Pressure Design Parameters				
Earth Pressure Condition ¹	Coefficient for Backfill Type ²	Surcharge Pressure ^{3, 4, 5} p_1 (psf)	Effective Fluid Pressures (psf) ^{2, 4, 5}	
			Unsaturated ⁶	Submerged ⁶
Active (K_a)	Granular - 0.31	(0.31)S	(40)H	(80)H
At-Rest (K_o)	Granular - 0.47	(0.47)S	(55)H	(90)H
Passive (K_p)	Granular - 3.25	--	(390)H	(250)H

1. For active earth pressure, wall must rotate about base, with top lateral movements 0.002 H to 0.004 H, where H is wall height. For passive earth pressure, wall must move horizontally to mobilize resistance.
2. Uniform, horizontal backfill, compacted to at least 95 percent of the ASTM D 698 maximum dry density, rendering a maximum unit weight of 120 pcf.
3. Uniform surcharge, where S is surcharge pressure.
4. Loading from heavy compaction equipment is not included.
5. No safety factor is included in these values.
6. In order to achieve "Unsaturated" conditions, follow guidelines in **Subsurface Drainage for Below Grade Walls** below. "Submerged" conditions are recommended when drainage behind walls is not incorporated into the design.

Backfill placed against structures should consist of granular soils. For the granular values to be valid, the granular backfill must extend out and up from the base of the wall at an angle of at least 45 and 60 degrees from vertical for the active and passive cases, respectively.

Subsurface Drainage for Below Grade Walls

A perforated rigid plastic drain line installed behind the base of walls and extends below adjacent grade is recommended to prevent hydrostatic loading on the walls. The invert of a drain line around a below-grade building area or exterior retaining wall should be placed near foundation bearing level. The drain line should be sloped to provide positive gravity drainage to daylight or to a sump pit and pump. The drain line should be surrounded by clean, free-draining granular material having less than 5 percent passing the No. 200 sieve, such as No. 57 aggregate. The free-draining aggregate should be encapsulated in a filter fabric. The granular fill should extend to within 2 feet of final grade, where it should be capped with compacted cohesive fill to reduce infiltration of surface water into the drain system.

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As an alternative to free-draining granular fill, a pre-fabricated drainage structure may be used. A pre-fabricated drainage structure is a plastic drainage core or mesh which is covered with filter fabric to prevent soil intrusion, and is fastened to the wall prior to placing backfill.

FROST CONSIDERATIONS

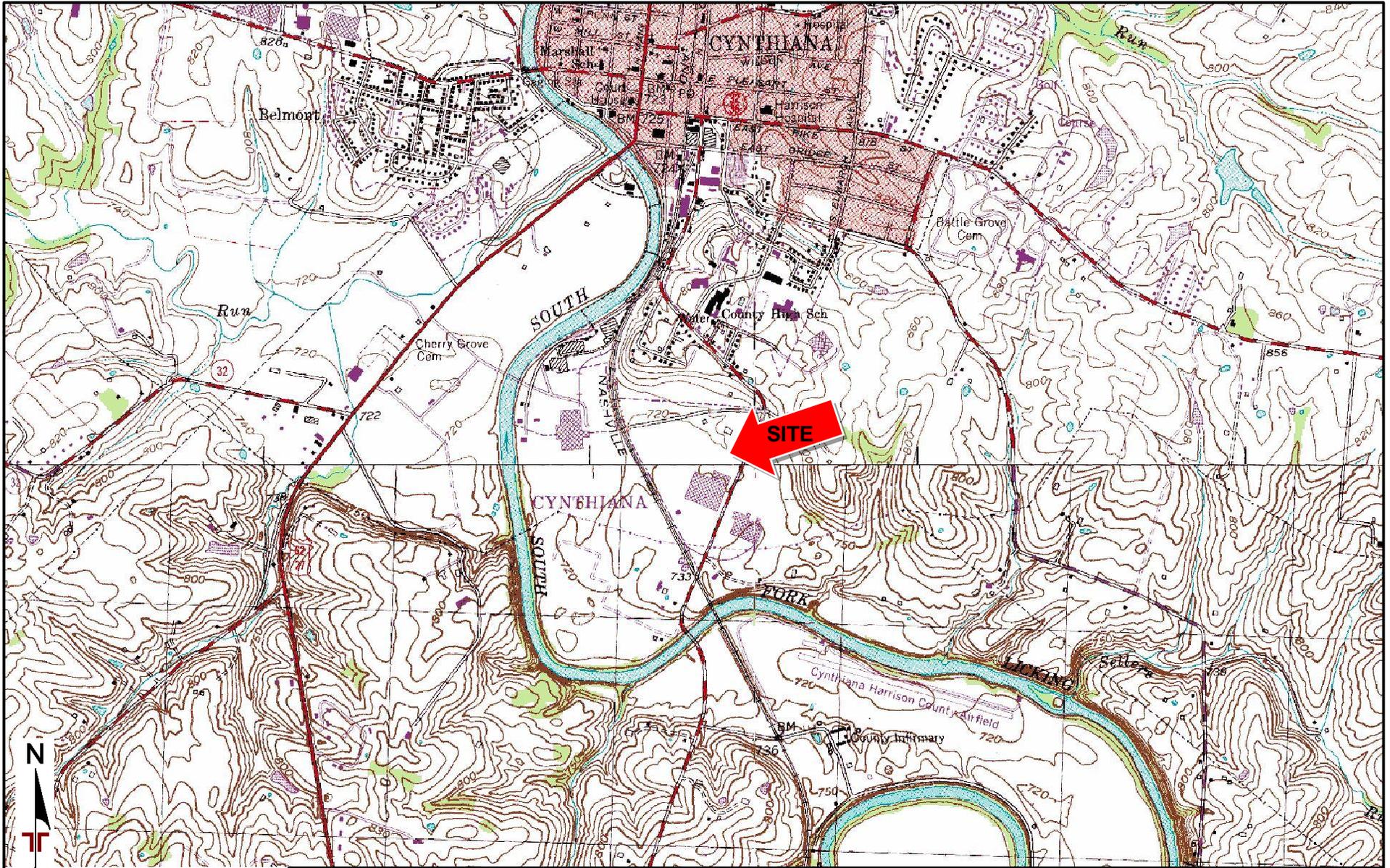
The soils on this site are frost susceptible, and small amounts of water can affect the performance of the slabs on-grade and sidewalks. Exterior slabs should be anticipated to heave during winter months. If frost action needs to be eliminated in critical areas, we recommend the use of non-frost susceptible (NFS) fill or structural slabs (for instance, structural stoops in front of building doors). Placement of NFS material in large areas may not be feasible; however, the following recommendations are provided to help reduce potential frost heave:

- Provide surface drainage away from the building and slabs, and toward the site storm drainage system
- Install drains around the perimeter of the building, stoops, and below exterior slabs, and connect them to the storm drainage system
- Grade clayey subgrades, so groundwater potentially perched in overlying more permeable subgrades, such as sand or aggregate base, slope toward a site drainage system
- Place NFS fill as backfill beneath slabs critical to the project
- Place a 3 horizontal to 1 vertical (3H:1V) transition zone between NFS fill, and other soils
- Place NFS materials in critical sidewalk areas

As an alternative to extending NFS fill to the full frost depth, consideration can be made to placing extruded polystyrene or cellular concrete under a buffer of at least 2 feet of NFS material.

ATTACHMENTS

SITE LOCATION AND EXPLORATION PLANS



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY
 QUADRANGLES INCLUDE: CYNTHIANA, KY (1/1/1978) and SHAWHAN, KY (1/1/1978).

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager: SGG	Project No. N3175057
Drawn by: JNW	Scale: 1"=2,000'
Checked by: SGG	File Name: Exhibit 1 & 2
Approved by: PSR	Date: 10-18-2017

Terracon
 2460 Palumbo Drive
 Lexington, KY 40509-1117

SITE LOCATION
3M Warehouse Building - Cynthiana 1308 New Lair Road Cynthiana, KY

Exhibit
A-1



bing

250 feet

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AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager: SGG
 Drawn by: JNW
 Checked by: SGG
 Approved by: PSR

Project No. N3175057
 Scale: AS SHOWN
 File Name: Exhibit 1 & 2
 Date: 10-18-2017

Terracon
 2460 Palumbo Drive
 Lexington, KY 40509-1117

EXPLORATION PLAN

3M Warehouse Building - Cynthiana
 1308 New Lair Road
 Cynthiana, KY

Exhibit

A-2

EXPLORATION RESULTS

BORING LOG NO. W-1

PROJECT: 3M Warehouse Building - Cynthiana

CLIENT: 3M Facilities Engineering
St. Paul, MN

SITE: 1308 New Lair Road
Cynthiana, KY

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 38.3762° Longitude: -84.2945°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	RQD(%)	LABORATORY HP (tsf)	UNCONFINED COMPRESSIVE STRENGTH (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS
											LL-PL-PI
0.3	TOPSOIL										
	FILL - LEAN CLAY (CL) , trace gravel, gray to brown, noted plant roots			X	14	3-6-8 N=14					
2.5	LEAN CLAY (CL) , medium to high plasticity, brown to black, stiff to very stiff, lower portion elastic silt like			X	16	6-7-7 N=14		3.5 (HP)		21	
		5		X	16	4-5-6 N=11		2.25 (HP)			
				X	18	4-5-8 N=13		2.75 (HP)		26	
		10		X	18	4-6-7 N=13		2.5 (HP)			49-27-22
14.7	Auger Refusal at 14.7 Feet				0	50/0"					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" HSA

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed



Boring Started: 10-04-2017

Boring Completed: 10-04-2017

Drill Rig: Track

Driller: Steele

Project No.: N3175057

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. N3175057 3M WAREHOUSE BUIL.GPJ TERRACON_DATATEMPLATE.GDT 11/3/17

BORING LOG NO. W-2

PROJECT: 3M Warehouse Building - Cynthiana

CLIENT: 3M Facilities Engineering
St. Paul, MN

SITE: 1308 New Lair Road
Cynthiana, KY

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. N3175057 3M WAREHOUSE BUIL.GPJ TERRACON_DATATEMPLATE.GDT 11/3/17

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 38.3764° Longitude: -84.2951°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	RQD(%)	LABORATORY HP (tsf)	UNCONFINED COMPRESSIVE STRENGTH (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS
											LL-PL-PI
DEPTH											
0.3	TOPSOIL										
2.0	SILT (ML) , brown, medium stiff to stiff, noted plant roots, partly lean clay to silt				12	1-3-5 N=8					
6.0	LEAN CLAY WITH ROCK FRAGMENTS (CL) , medium to high plasticity, brown, stiff to very stiff	5						4.25 (HP)		24	
9.5	SILT WITH GRAVEL (ML) , brown, stiff to very stiff, mottled black				14	4-6-6 N=12		2.5 (HP)		26	
11.5	SANDY FAT CLAY WITH GRAVEL (CH) , brown to black, stiff	10				5-6-7 N=13					
11.5	Auger Refusal at 11.5 Feet				14	5-7-7 N=14				23	
					0	50/0"					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed



Boring Started: 10-04-2017

Boring Completed: 10-04-2017

Drill Rig: Track

Driller: Steele

Project No.: N3175057

BORING LOG NO. W-3

PROJECT: 3M Warehouse Building - Cynthiana

CLIENT: 3M Facilities Engineering
St. Paul, MN

SITE: 1308 New Lair Road
Cynthiana, KY

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. N3175057 3M WAREHOUSE BUIL.GPJ TERRACON.DATATEMPLATE.GDT 11/3/17

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 38.3767° Longitude: -84.295°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	RQD(%)	LABORATORY HP (tsf)	UNCONFINED COMPRESSIVE STRENGTH (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS
											LL-PL-PI
0.2	TOPSOIL										
	FILL - LEAN CLAY (CL) , trace gravel, gray, noted plant roots, partly silty clay			X	14	2-4-6 N=10					
5.0	LEAN CLAY WITH ROCK FRAGMENTS (CL) , medium to high plasticity, brown, very stiff to hard, mottled black	5		X	18	5-8-10 N=18				15	
7.0	GRAVELLY LEAN CLAY (CL) , medium to high plasticity, brown, very stiff			X	18	5-7-9 N=16		4.5+ (HP)			
9.5	FAT CLAY (CH) , brown to black, stiff to very stiff			X	14	6-9-11 N=20				24	
12.0	FAT CLAY (CH) , brown to black, stiff to very stiff	10		X	18	4-5-7 N=12		3.0 (HP)			50-27-23
	Auger Refusal at 12 Feet				0	50/0"					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

<p>Advancement Method:</p> <p>Abandonment Method:</p>	<p>See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (if any).</p> <p>See Supporting Information for explanation of symbols and abbreviations.</p>	<p>Notes:</p>
<p>WATER LEVEL OBSERVATIONS</p> <p><i>No free water observed</i></p>	<p>2460 Palumbo Dr Lexington, KY</p>	
	<p>Boring Started: 10-04-2017</p> <p>Drill Rig: Track</p> <p>Project No.: N3175057</p>	<p>Boring Completed: 10-04-2017</p> <p>Driller: Steele</p>

BORING LOG NO. W-4

PROJECT: 3M Warehouse Building - Cynthiana

CLIENT: 3M Facilities Engineering
St. Paul, MN

SITE: 1308 New Lair Road
Cynthiana, KY

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_N3175057_3M WAREHOUSE BUIL.GPJ TERRACON_DATATEMPLATE.GDT 11/3/17

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 38.3765° Longitude: -84.2944°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	RQD(%)	LABORATORY HP (tsf)	UNCONFINED COMPRESSIVE STRENGTH (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS
											LL-PL-PI
0.2	TOPSOIL										
2.5	FILL - LEAN CLAY (CL) , trace gravel, gray to brown				16	1-4-6 N=10					
5.8	LEAN CLAY WITH SAND (CL) , gray to brown, stiff to very stiff, lean clay to silt	5			16	7-8-7 N=15					
10.5	SILT (ML) , gray to dark gray, stiff to very stiff				12	4-4-5 N=9		2.0 (HP)			
13.0	LEAN CLAY (CL) , gray to brown, stiff to very stiff				14	3-4-6 N=10		2.0 (HP)			37-26-11
17.0	LEAN CLAY WITH ROCK FRAGMENTS (CL) , brown, stiff to very stiff, residual soil				18	4-7-7 N=14		2.75 (HP)			
27.0	LIMESTONE , gray, extremely close fracture spacing, laminated to very thinly bedded, unweathered to slightly weathered, strong to very strong rock, moderately weathered from 17 to 19.2 feet, noted multiple residual soil seams from 17 to 19.2 feet, partly shaly				17	4-4-50/5"		1.25 (HP)			43-24-19
27.0	Boring Terminated at 27 Feet				47		54				
					59		64	840.52			
					12		38				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

<p>Advancement Method:</p> <p>Abandonment Method:</p>	<p>See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (if any).</p> <p>See Supporting Information for explanation of symbols and abbreviations.</p>	<p>Notes:</p>
<p>WATER LEVEL OBSERVATIONS</p> <p>No free water observed</p>	<p>2460 Palumbo Dr Lexington, KY</p>	
	<p>Boring Started: 10-04-2017</p> <p>Drill Rig: Track</p> <p>Project No.: N3175057</p>	<p>Boring Completed: 10-04-2017</p> <p>Driller: Steele</p>

BORING LOG NO. W-5

PROJECT: 3M Warehouse Building - Cynthiana

CLIENT: 3M Facilities Engineering
St. Paul, MN

SITE: 1308 New Lair Road
Cynthiana, KY

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 38.3764° Longitude: -84.2948°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	RQD(%)	LABORATORY HP (tsf)	UNCONFINED COMPRESSIVE STRENGTH (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS
											LL-PL-PI
0.3	TOPSOIL										
	FILL - LEAN CLAY (CL) , trace gravel, gray to brown, noted plant roots			X	13	3-6-8 N=14					
				X	18	7-8-9 N=17					
5.0	LEAN CLAY WITH ROCK FRAGMENTS (CL) , brown to gray, stiff to hard	5		X	18	3-6-8 N=14		2.5 (HP)		23	
				X	18	4-7-8 N=15		4.5+ (HP)			30-22-8
		10		X	16	3-6-6 N=12		3.5 (HP)		24	
13.5	Auger Refusal at 13.5 Feet				0	50/0"					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed



2460 Palumbo Dr
Lexington, KY

Boring Started: 10-04-2017

Boring Completed: 10-04-2017

Drill Rig: Track

Driller: Steele

Project No.: N3175057

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. N3175057 3M WAREHOUSE BUIL.GPJ TERRACON_DATATEMPLATE.GDT 11/3/17

SUPPORTING INFORMATION

UNIFIED SOIL CLASSIFICATION SYSTEM

3M Warehouse Building ■ Cynthiana, Harrison County, Kentucky

November 3, 2017 ■ Terracon Project No. N3175057



Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification			
				Group Symbol	Group Name ^B		
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	Cu ³ 4 and 1 ≤ Cc ≤ 3 ^E	GW	Well-graded gravel ^F		
		Gravels with Fines: More than 12% fines ^C	Cu < 4 and/or 1 > Cc > 3 ^E	GP	Poorly graded gravel ^F		
		Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	Fines classify as ML or MH	GM	Silty gravel ^{F,G,H}	
			Sands with Fines: More than 12% fines ^D	Fines classify as CL or CH	GC	Clayey gravel ^{F,G,H}	
	Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	PI > 7 and plots on or above "A" line	CL	Lean clay ^{K,L,M}	
				PI < 4 or plots below "A" line ^J	ML	Silt ^{K,L,M}	
			Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay ^{K,L,M,N}
				Liquid limit - not dried			Organic silt ^{K,L,M,O}
Silts and Clays: Liquid limit 50 or more		Inorganic:	PI plots on or above "A" line	CH	Fat clay ^{K,L,M}		
			PI plots below "A" line	MH	Elastic Silt ^{K,L,M}		
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay ^{K,L,M,P}	
			Liquid limit - not dried			Organic silt ^{K,L,M,Q}	
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat		

^A Based on the material passing the 3-inch (75-mm) sieve

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

$$E \text{ Cu} = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains ³ 15% sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains ³ 15% gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains ³ 30% plus No. 200 predominantly sand, add "sandy" to group name.

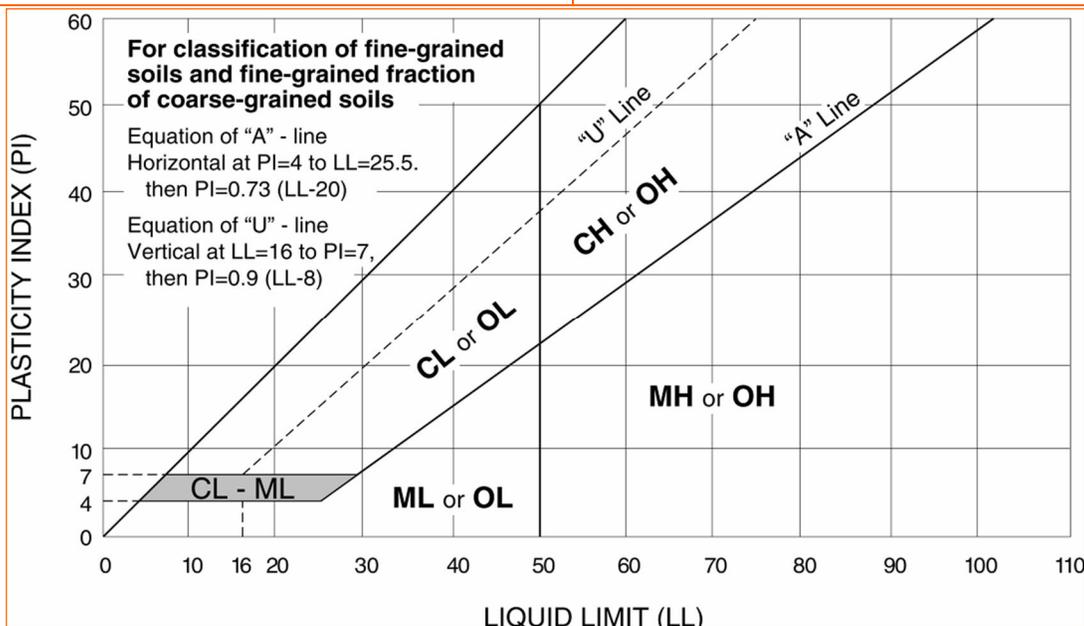
^M If soil contains ³ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

^N PI ³ 4 and plots on or above "A" line.

^O PI < 4 or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



DESCRIPTION OF ROCK PROPERTIES

3M Warehouse Building ■ Cynthiana, Harrison County, Kentucky

November 3, 2017 ■ Terracon Project No. N3175057



WEATHERING	
Fresh	Rock fresh, crystals bright, few joints may show slight staining. Rock rings under hammer if crystalline.
Very Slight	Rock generally fresh, joints stained, some joints may show thin clay coatings, crystals in broken face show bright. Rock rings under hammer if crystalline.
Slight	Rock generally fresh, joints stained, and discoloration extends into rock up to 1 in. Joints may contain clay. In granitoid rocks some occasional feldspar crystals are dull and discolored. Crystalline rocks ring under hammer.
Moderate	Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some show clayey. Rock has dull sound under hammer and shows significant loss of strength as compared with fresh rock.
Moderately Severe	All rock except quartz discolored or stained. In granitoid rocks, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick.
Severe	All rock except quartz discolored or stained. Rock "fabric" clear and evident, but reduced in strength to strong soil. In granitoid rocks, all feldspars kaolinized to some extent. Some fragments of strong rock usually left.
Very Severe	All rock except quartz discolored or stained. Rock "fabric" discernible, but mass effectively reduced to "soil" with only fragments of strong rock remaining.
Complete	Rock reduced to "soil". Rock "fabric" no discernible or discernible only in small, scattered locations. Quartz may be present as dikes or stringers.

HARDNESS (for engineering description of rock – not to be confused with Moh's scale for minerals)	
Very Hard	Cannot be scratched with knife or sharp pick. Breaking of hand specimens requires several hard blows of geologist's pick.
Hard	Can be scratched with knife or pick only with difficulty. Hard blow of hammer required to detach hand specimen.
Moderately Hard	Can be scratched with knife or pick. Gouges or grooves to ¼ in. deep can be excavated by hard blow of point of a geologist's pick. Hand specimens can be detached by moderate blow.
Medium	Can be grooved or gouged 1/16 in. deep by firm pressure on knife or pick point. Can be excavated in small chips to pieces about 1-in. maximum size by hard blows of the point of a geologist's pick.
Soft	Can be gouged or grooved readily with knife or pick point. Can be excavated in chips to pieces several inches in size by moderate blows of a pick point. Small thin pieces can be broken by finger pressure.
Very Soft	Can be carved with knife. Can be excavated readily with point of pick. Pieces 1-in. or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.

Joint, Bedding, and Foliation Spacing in Rock ¹		
Spacing	Joints	Bedding/Foliation
Less than 2 in.	Very close	Very thin
2 in. – 1 ft.	Close	Thin
1 ft. – 3 ft.	Moderately close	Medium
3 ft. – 10 ft.	Wide	Thick
More than 10 ft.	Very wide	Very thick

1. Spacing refers to the distance normal to the planes, of the described feature, which are parallel to each other or nearly so.

Rock Quality Designator (RQD) ¹		Joint Openness Descriptors	
RQD, as a percentage	Diagnostic description	Openness	Descriptor
Exceeding 90	Excellent	No Visible Separation	Tight
90 – 75	Good	Less than 1/32 in.	Slightly Open
75 – 50	Fair	1/32 to 1/8 in.	Moderately Open
50 – 25	Poor	1/8 to 3/8 in.	Open
Less than 25	Very poor	3/8 in. to 0.1 ft.	Moderately Wide
		Greater than 0.1 ft.	Wide

1. RQD (given as a percentage) = length of core in pieces 4 inches and longer / length of run

References: American Society of Civil Engineers. Manuals and Reports on Engineering Practice - No. 56. Subsurface Investigation for Design and Construction of Foundations of Buildings. New York: American Society of Civil Engineers, 1976. U.S. Department of the Interior, Bureau of Reclamation, Engineering Geology Field Manual.



December 4, 2017

3M Center
Bldg. 275-6W-22
St. Paul, Minnesota 55144

Attn: Mr. Mike Maki – Chief Engineer
P: [615] 733-6802
E: mgmaki@mmm.com

Re: 3M Warehouse Building – Addendum Letter Report
Pavements and Slope Evaluation
Cynthiana, Kentucky
Terracon Project No. N3175057

Dear Mr. Maki:

We are pleased to present this follow-up letter report of geotechnical engineering services associated with the 3M Warehouse Building project located in Cynthiana, Kentucky.

This report presents our recommendations with regard to addressing concerns related to the existing slope located in close proximity to the proposed building location. In addition, per your request, we have developed pavement design and construction related geotechnical engineering recommendations in this addendum letter report.

EXISTING FILL SLOPE – FOLLOW-UP RECOMMENDATIONS

It was explained to Terracon through conversation with the 3M representative that consideration has been given to using a below-grade foundation wall with lateral load support capability to allow for the proposed building to keep its current footprint location and minimize the risk to the proposed structure and its foundation system due to possible future existing slope instability.

As indicated by the client, two options are currently under consideration to address concerns related to crown loading of an existing slope, based on the building's currently-proposed location. Option 1 (the preferred option of the client) includes utilizing a below-grade foundation wall in conjunction with a structural floor slab (floor slab tied into the foundations) that would transmit foundation and floor slab area loads down to suitable bearing soils. Option 2 includes offsetting the building a minimum distance of 30 feet away from the crown of the slope, as recommended in the geotechnical report.

Terracon Consultants, Inc. 2460 Palumbo Drive Lexington, Kentucky 40509
P [859] 303 9000 F [859] 303 9001 terracon.com

Environmental



Facilities



Geotechnical



Materials

If Option 1 is chosen, the north foundation wall should be constructed as a retaining wall and the bottom of foundation for this wall should be lowered to match approximate elevation 720 feet (elevation of the toe of the adjacent existing slope). The bottom of foundation level for the approximately 10 feet section of the east foundation wall and the west foundation wall located near the northeast and the northwest corner of the building, respectively, should also be lowered to match the north wall bottom of foundation level (at approximate elevation 720 feet). The bottom of foundation level for the east and the west walls could then be stepped up gradually, (step-up of about 5 feet in elevation for every 10-foot laterally) for the wall sections further south of the northeast and the northwest corners, respectively.

The top of the north below-grade foundation wall should be connected with the floor slab to increase the rigidity and minimize rotation of the wall (outwards) near the top. The cast-in-place reinforced concrete foundation wall should be designed to resist lateral earth pressures. Details are presented below for your consideration.

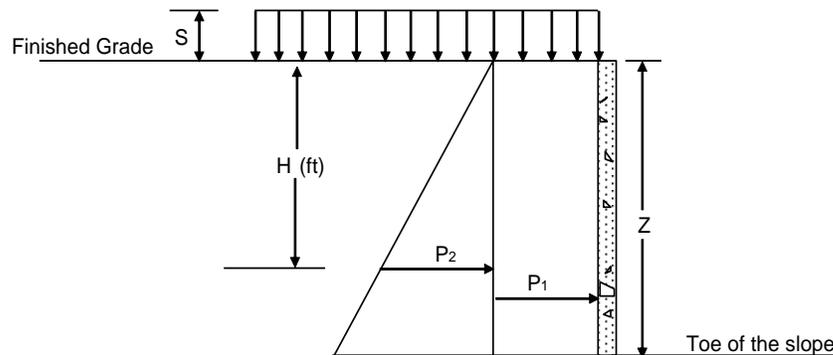
**AT-REST EARTH PRESSURE ON 1-FOOT WIDE VERTICAL STRIP
(MINIMAL WALL ROTATION)**

S = Uniform surcharge at grade, load in psf

Z = Wall Height (feet)

$P_1 = (0.58) S$ = Effect of uniform surface surcharge (Cohesive Retained Soil)

$P_2 = (70) H$ = Earth Pressure (Cohesive Retained Soil, drained condition)



Applicable Conditions to the above include:

- Coefficient of at-rest earth pressure = 0.58 (Lean Clay)
- Units of P_1 , P_2 in psf
- Horizontal Backfill

- In-situ soil weight for the retained cohesive soil = 120 pcf
- No safety factor included
- Uniform surcharge, where S is surcharge pressure
- Negligible wall friction
- No ground water acting on wall **
- Loading from heavy compaction equipment not included
- No dynamic loading
- No wall rotation

** To control hydrostatic pressure behind the wall we recommend that a drain be installed at the foundation wall with a collection pipe leading to a reliable discharge. If this is not possible, then combined hydrostatic and lateral earth pressures should be calculated for the retained cohesive retained fill using an equivalent fluid weighing 100 pcf.

PAVEMENTS

Aggregate Pavements

The existing fill soils generally appear suitable for direct support of the proposed aggregate pavements. We recommend that the exposed pavement soil subgrade be evaluated and thoroughly proofrolled within two days prior to commencement of placement of aggregate pavement. Areas which fail the proofrolling process should be moisture conditioned and recompacted. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with properly compacted fills. If a significant precipitation event occurs after the evaluation or if the surface becomes disturbed, the subgrade should be reviewed by qualified personnel. The subgrade should be in its finished form at the time of the final review.

It is essential that the final subgrade for the areas to receive pavement be free of water or any wet or water-softened soils. If the subgrade becomes wet due to rain or any other causes, all water should be removed and any wet or water-softened soils be stripped to expose drier soils. Qualified geotechnical personnel should confirm the fulfillment of this requirement.

Provided the existing soils and/or new engineered fill are tested, evaluated and prepared in accordance with the recommendations provided in this report, these materials should provide suitable subgrade support for aggregate pavement. The subgrade materials within the proposed pavement areas are anticipated to consist of mostly cohesive soils with some granular soils.

Based on anticipated traffic types, a minimum aggregate pavement thickness of 12 inches is recommended. Designated heavy traffic areas and drive lanes might warrant a thicker layer of the aggregate pavement thickness in the range of 18 to 24-inch thickness.

Sub-drainage should be a primary consideration in the proposed pavement areas to prevent water from accumulating within the aggregate base course and causing softening of the subgrade, shrink/swell volume change, frost heave, or infiltration into existing fill. Subgrade surfaces should be fine graded so that water seepage under the aggregate materials will flow to suitable drainage outlets. Establishing subgrade slopes during site grading to promote rapid surface and aggregate base course drainage away from the park and drive areas will extend its useful life. Edge drains could be considered.

Please note that a maintenance program including periodic grading and addition of additional wearing course stone will be required to maintain the aggregate pavement area.

Support of pavements on or above existing fill is discussed in this report. However, even with the recommended testing services, there is an inherent risk for the owner that compressible fill or unsuitable material within or buried by the fill will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill, but can be reduced by performing additional field testing (test pits) and/or evaluation.

Dolly Pad

A dolly pad strip has been proposed to be used in areas where semi-trailers will be parked. The pavement section listed on the following table is the recommended minimum thickness:

Pavement Section Thickness						
Traffic Area	Alternative	Asphalt Concrete Wearing Course	Asphalt Concrete Base Course	Portland Cement Concrete ¹	Aggregate Base Course ²	Total Thickness
Dolly Pad	PCC			7.0	6.0	13.0
	ACC	--	--	--	--	--

1. 4,000 psi at 28 days. PCC pavements are recommended for the dolly pad strip and in any other areas subjected to heavy wheel loads and/or turning traffic.
2. Crushed limestone base material

Rigid PCC pavements will perform better than other pavement types in areas where short-radii turning and braking are expected (i.e. entrance/exit aprons) due to better resistance to rutting and shoving. In addition, PCC pavements will perform better in areas subject to large or

sustained loads. An adequate number of longitudinal and transverse control joints should be placed in the rigid pavement in accordance with ACI requirements. Expansion (isolation) joints must be full depth and should only be used to isolate fixed objects abutting or within the paved area.

We recommend all Portland cement concrete pavement details for joint spacing, joint reinforcement, and joint sealing be prepared in accordance with American Concrete Institute (ACE 330R-01 and ACI 325R.9.91). Portland cement concrete pavements should be provided with mechanically reinforced joints (doweled or keyed) in accordance with ACI 330R-01.

Aggregate base course or pavement materials should not be placed when the surface is wet. Surface drainage should be provided away from the edge of paved areas to minimize lateral moisture transmission into the subgrade.

Related civil design factors such as subgrade drainage, surface elevations and environmental factors which will significantly affect the service life must be included in the preparation of the construction drawings and specifications. Normal periodic maintenance will be required.

Long-term pavement performance will be dependent upon several factors, including maintaining subgrade moisture levels and providing for preventative maintenance.

The pavement section provided in this report represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore, preventive maintenance should be planned and provided for through an on-going pavement management program. Preventive maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Preventive maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing), where appropriate. Preventive maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements. Prior to implementing any maintenance, additional engineering observation is recommended to determine the type and extent of preventive maintenance. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required.

CLOSING

We appreciate the opportunity to be of service to you on this project. Please contact us concerning any questions that may arise during review of this report, or if you require additional information as you proceed through the final design and construction stage of this project.

Sincerely,

Terracon Consultants, Inc.

Samuel G. Guy, P.E.
Geotechnical Department Manager

For
Prasad S. Rege, P.E.
Senior Principal



(1) AA3000HM model sized for 2,500 CFM at 1.25" w.c. external static (3.05" w.c. total static) ETL Certified to the ANSI Z83.18b-2008.

- Horizontal configuration
- Installed Indoors
- Suspended mount
- The discharge direction for the unit (as installed) is End
- The controls enclosure will be located on the Left side (when facing the O.A. inlet)
- 3.00 HP, Prem-Eff ODP (IMP) Motor, 440-480/3/60
- 0.50" FM/ETL Direct Spark Ignition Manifold w/FDR (NG)
- 193 MBH Aluminum Cast Burner - Direct Gas Fired, Low emissions style with stainless steel baffles.
- Gas pressure requirement at the unit is 2.9" w.c. minimum and 14.0" w.c. maximum
- Fuel: Natural Gas

Features Included with this Equipment are as follows:

Cooling Coil Section (blow-thru)

This aluminized steel cabinet contains space for a future DX cooling coil (by others), and includes a 16 gauge 304 SS sloped condensate pan. Includes a hinged access door, transition section, and perforated steel air diffuser. Also includes a discharge plenum for drain pan access. Includes 1" double wall insulation with 20 ga. aluminized steel liner.

DX Cooling Coil

A DX cooling coil will be provided and installed by others in the future. An additional 0.50" w.c. of static pressure has been assumed and included in the fan and motor selection. **All refrigeration coils, valves, controls, compressors , condensers, etc., are by others.**

M-Option Unit Operation

A fixed amount of burner air (OA) is mixed with a variable amount of outside and return air. The burner air damper is a 2-position type and is open when the fan is running. All dampers are 16-gauge parallel blade and work as an outside air inlet damper, closing off outside air when the unit shuts down.

High and Low Gas Pressure Switches

Safety switches are furnished that will disable the main gas valve if gas pressure is above or below user selectable set points.

Regulator, 250 - 1000 MBH, 0.5 - 25 psi Inlet

This regulator (with internal relief) will reduce the inlet gas pressure to the required pressure for this unit.

Low Leak Inlet & Return Air Dampers

The dampers included with this return air model unit are 16 gauge parallel blade dampers and are positioned by direct drive actuators. The burner air damper is a 2-position style damper and includes an end switch. The return air and outside air dampers adjust according to the control option selected. Includes extruded-vinyl blade edge seals, and spring stainless steel side seals.

Building Management System Providing 0-10 Vdc Signal

A 0-10 Vdc signal is provided BY OTHERS to determine the amount of outside air delivered by the unit.

Filtered Mix Box

A Filter Mix Box Section is used in conjunction with the M, B, or F - Style recirculation options. This housing filters the incoming outside air and building return air. It is mounted on the outdoor air inlet end of the unit. Adequate access to the filters is provided. Filter media is positioned in a V-bank arrangement of welded channels. The location of the return air opening is 90 degrees to the controls side of the unit. Also included are filters of 2" thick fabric media with a beverage board frame. Includes a 1" x 2" wire screen downstream of the filter media. This filter is 25 to 30% efficient on ASHRAE standard 52.1, and is U.L. Class 2 rated. Aluminized interior paneling is separated from the exterior shell by a 1" thick, 1.5# density, neoprene coated fiberglass insulation. Complies with NFPA 90 and SMACNA. A differential pressure switch is installed to sense the pressure drop across the filters. Pressure drop adjustment range is 0.2" W.C. to 1.0" W.C. When the pressure switch set point is exceeded, a CLOGGED FILTER light is illuminated at the remote control panel (typically).

Base Unit Insulation, Complete

The base unit will be insulated from its inlet to its discharge. Aluminized interior paneling is separated from the exterior shell by a 1" thick, 1.5# density, neoprene coated fiberglass insulation. Complies with NFPA 90 and SMACNA.

Internal Vibration Isolation (rubber in shear)

Consists of (4) neoprene-in-shear isolators, sized for the weight of the fan / motor sub assembly. Factory installed between the unit base and the fan / motor assembly to reduce vibration in the heater cabinet. A flexible duct connection is installed between the fan housing and the discharge opening of the unit.

Belt Guard

Protects service personnel from moving drive components while inside the fan cabinet. Painted OSHA yellow. Includes provision for measuring rpm with the fan running.

Industrial Siloxane Epoxy, Light Gray (exterior)

All exterior walls, roof and floor of the base unit cabinet are cleaned and painted with PPG PSX700 Polysiloxane epoxy industrial paint (5,500 hour salt spray rated).

Digital SPACE Temperature Control w/BMS Interface (signal by others)

A 0-10 Vdc or 4-20 mA input signal needs to be supplied by others to indicate the SPACE temperature set point. The DFM44 system will control the gas valve to maintain space temperature. This will be done using space, return air, outside air, and discharge air temperature sensors, as well as feedback from the OA/RA dampers indicating the percentage of outside air being provided by the unit. The system will also report back the space temperature with a 0-10 Vdc or 4-20 mA output signal.

Standard, 4 Light Remote Panel (NEMA 1, 2, 5)

This NEMA 1, 2, and 5 metal enclosure includes a hinged cover, three position summer-off-winter switch, and (4) circuit analyzer lights. The remote control panel is to be interconnected to the unit in the field (by others).

Non Fused Disconnect Switch

The disconnect switch is NEMA 3R rated and is located on the side of the main electrical control panel.

Low Temperature Limit Switch

This solid-state sensor is used to sense the discharge air temperature. If the temperature falls below 40 degrees F (field adjustable) for a period of 5 minutes (field adjustable), the unit will shut down; And, if applicable, the outside air dampers will close. The switch is located in the main control panel. The switch can be reset by turning the Summer-Off-Winter switch at the remote panel to the off position and then back on. If a remote panel and/or Summer-Off-Winter Switch is not provided, the low temperature limit switch can be reset by cycling the power to the unit off and then back on.

NEMA 3R Main Panel with Drop-out Door

The main control panel is located in a NEMA 3R metal enclosure. This panel can be accessed with the removal of a latching drop-out door. Also meets NEMA 1, 2, 3, 3S, 4, 5 and 12 requirements.

Heavy Duty Fan

A double-width, double inlet (DWDI), angle framed blower with heavy duty greaseable pillow block bearings is provided in lieu of a blower with sleeve bearings.

Extended Fan Bearing Lubrication Ports

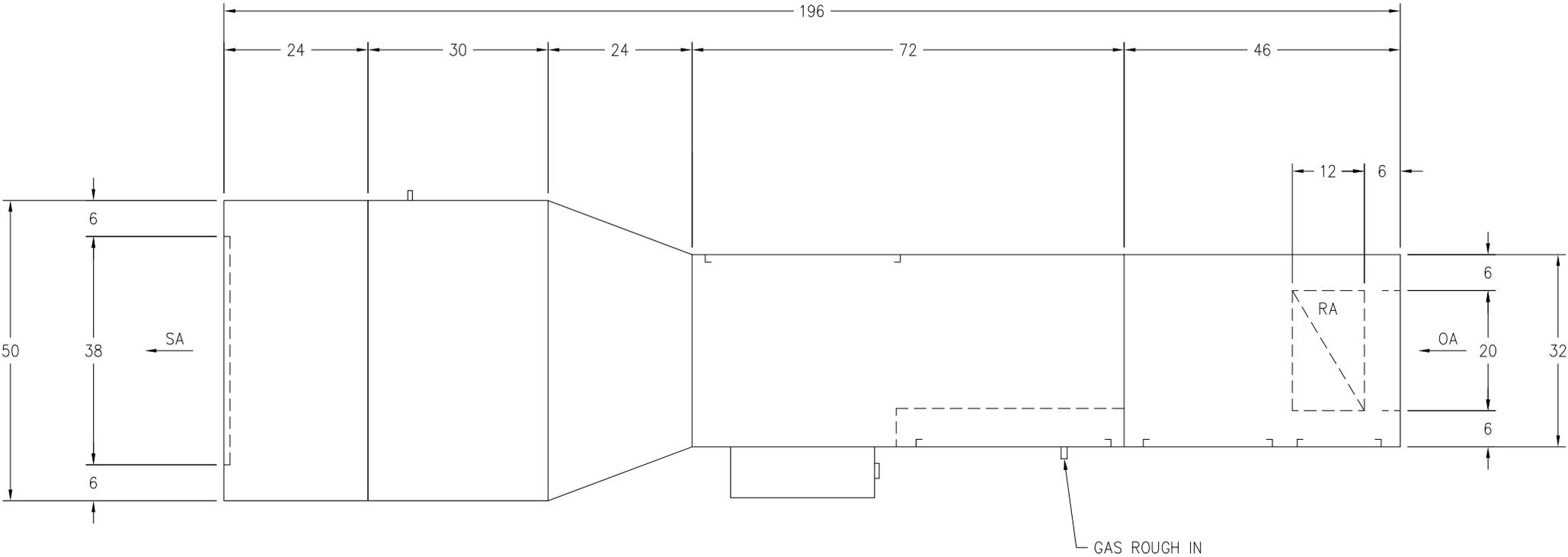
Grease lines are extended from the fan bearings to the cabinet exterior to allow for ease of fan bearing relubrication.

These Standard Features are also included on the above AbsolutAire AA ETL Series Model:

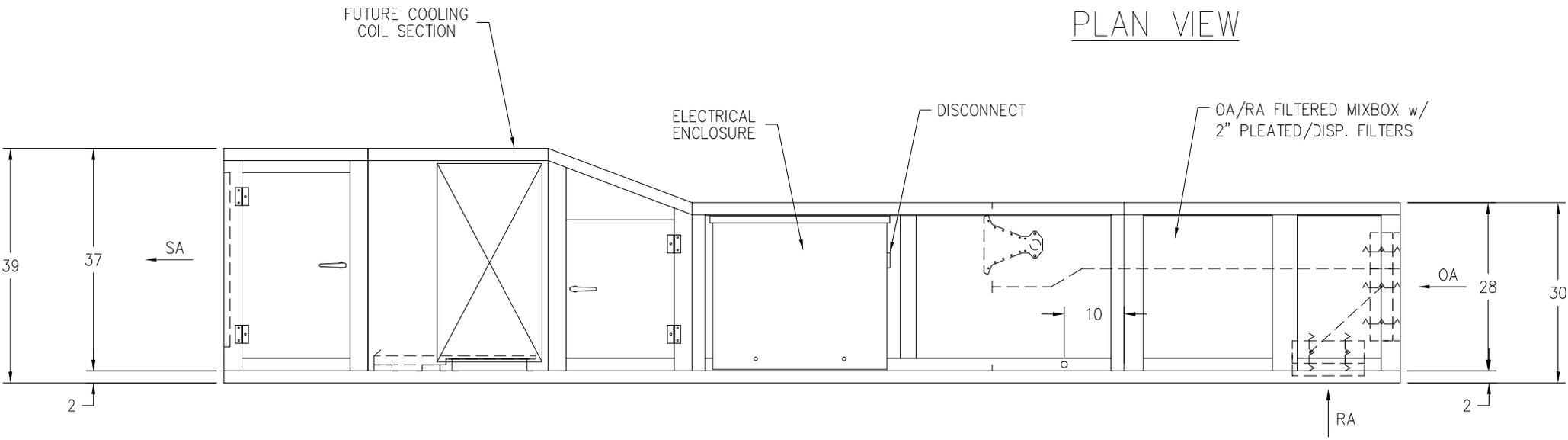
100,000 Hour L-10 Life Fan Bearings
Solid State Flame Safeguard System
Gas Connection Roughed to Outside of Cabinet
Weather-Tight Lift-Out Access Panels
Gray-Oxide primed Structural Steel Frame

Single-Point Electrical Connection
30:1 Turndown Capability on the Direct Fired Burner
Auto-Profiler Gas Burner Adjustment System
Welded Construction
Heavy Gauge Aluminized Steel Construction

Two-Year Parts & Workmanship, 90-Day Labor - Limited Warranty



PLAN VIEW



U:\HTR-SUBM\AA\78000\78890
 ** PRELIMINARY DRAWING ONLY – SUBJECT TO CHANGE **
 AA3000-HMXDX
 APPROXIMATE OVERALL WEIGHT (1" DOUBLE WALL) – 1,975 LBS.



Project Name: 3M Cynthiana Warehouse- Office ETI Contract No: Contract #
 Location: Coil Version: 7.05b
 Consultant/Engineer: Printed Date: 1/9/2018 2:59:36 PM
 Contractor: Selection Date: 1/9/2018 2:55:37 PM
 Sold To: Last Revision Date: 1/9/2018 2:56:25 PM
 P.O. No: PO

Performance Data Sheet

Unit Tag	Qty	Model	Air Flow	Total Duty	Sensible Duty
	1	HPP06	400 CFM	16,385 Btuh	11,205 Btuh

Unit Data

Model Size : 06	(Fans) Speed : (1) Medium	Filter	: 2" 30% Pleated (MERV 8)	Coil Tube Dia. [in.] 1/2
Type : Horizontal High Performance	(Motors) HP : (1) 1/6	Filter (Qty) Size	: (1) 16x16	Tube Wall [in.] 0.016
	Motor FLA : 1.00	Filter Face Area [ft²]	: 1.62	Coil Face Area [ft²] 1.56
	Motor Type : PSC	Inlet Direction	: Rear	Weight* [lb] 148
	Capacity : Std. Capacity			

Output Data

Altitude [Ft.]	0
Air Flow Rate [CFM]	400
ESP [in.wg]	0.54
Cooling Data	
EAT DB/WB [°F]	80.0/ 67.0
LAT DB/WB [°F]	54.8/ 53.5
Total Capacity [Btuh]	16,385
Sensible Capacity [Btuh]	11,205
Refrig Type	R-410
Liquid Temp [°F]	110.0
SST [°F]	45.0
Super Ht [°F]	10.0
Rows / FPI	4 Row / 10 FPI
Suction Conn Size: [in.]	0.625
Liquid Connection Size: [in.]	0.625

Heating Data	
EAT DB [°F]	-
LAT DB [°F]	-
Sensible Capacity [Btuh]	-
Rows / FPI / Circuits	- / - / -
Electric Heat Data	
V/P/Hz	208/1/60
KW	4
Steps	1-Stage
Temp Rise [°F]	31.6
Amp Draw	19.23

Options

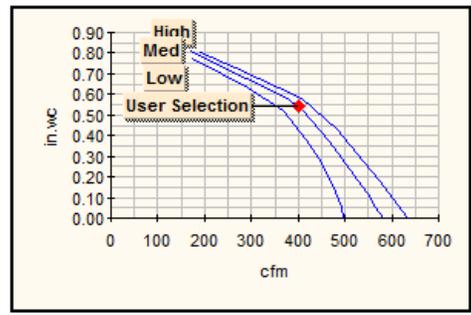
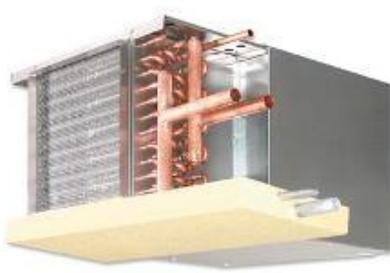
- BC03 24V, Unit S/S Relay / Fan Op. Relay & Transformer
- Coil Casing- Galvanized Casing
- Control Enclosure Handing- Same as Coil 1
- Filter Bottom Access
- Foil Faced Insulation
- Inlet Option- Mixing Box with Linkage
- Mixing Box Damper Location- Top and Rear Inlet
- OC011 Drain Pan Float Switch
- OC013 Non-Fused Door Interlocking Disconnect Switch - 40 Amps
- Stainless Steel Unit Drain Pan
- Thermostat- No Thermostat
- Electric Coil: Right Hand

Special Quote (SQ)#	Special Quote (SQ)#	Special Quote (SQ)#	Special Quote (SQ)#
---------------------	---------------------	---------------------	---------------------

Electrical Data	
V/P/Hz	: 208/1/60
Total Full Load Amps	: 20.23
MCA / MSCP	: 25.29 / 30.00
Fan Power Input	[Watts] 233

- * Unit weight includes unit with wet coil(s) as selected. (Does not include accessories)
- DX coils require a metering device (TXV, nozzle, or orifice) to meet the required performance.
 - o Metering devices are field provided and installed.
 - o Dual circuit DX coils are supplied with a distributor body only.
- Unit pressure drop and air flow based upon dry coil as required by AHRI-440.
- HPP Sound data supplied for casing radiated, ducted supply, and ducted return. Total sound power level data based on Horizontal Concealed Plenum Return Model with fan CFM at corresponding motor tap with 115/1/60 volt PSC motor, 4 row coil, 1" throwaway filter, unit standard insulation, 0.25" external static pressure and standard rated internal pressure losses.
- Scheduled motor information is for Fan Input Power at High Speed.
- For 0' altitude the coil selection has been made at Standard Conditions.

Sound Data at Medium Fan Speed							
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Total	63	57	55	52	47	40	36



Unit Size	A	B	C	D	F	G	H	I
06	23 1/8	20	12 5/8	14	20	23 1/16	24 31/46	33 3/4
	[587]	[508]	[321]	[356]	[508]	[586]	[627]	[857]
08	28 1/8	25	16 5/8	19	25	28 1/16	29 31/46	38 3/4
	[714]	[635]	[422]	[483]	[635]	[713]	[754]	[984]
10	32 1/8	29	20 5/8	23	29	32 1/16	33 31/46	42 3/4
	[816]	[737]	[524]	[584]	[737]	[814]	[855]	[1086]
12	37 1/8	34	24 5/8	28	34	37 1/16	38 31/46	47 3/4
	[943]	[864]	[625]	[711]	[864]	[941]	[982]	[1213]
14	42 1/8	39	28 5/8	33	39	42 1/16	43 31/46	52 3/4
	[1070]	[991]	[727]	[838]	[991]	[1068]	[1109]	[1340]
16	47 1/8	44	32 5/8	38	44	47 1/16	48 31/46	57 3/4
	[1197]	[1118]	[829]	[965]	[1118]	[1195]	[1236]	[1467]
18	52 1/8	49	36 5/8	43	49	52 1/16	53 31/46	62 3/4
	[1324]	[1245]	[930]	[1092]	[1245]	[1322]	[1363]	[1594]
20	56 1/8	53	40 5/8	47	53	56 1/16	57 31/46	66 3/4
	[1426]	[1346]	[1032]	[1194]	[1346]	[1424]	[1465]	[1695]

NOTES:

1. ALL DIMENSIONS ARE IN INCHES [mm] AND ARE +/- 1/8"
2. SEE HPP SUBMITTAL FOR ADDITIONAL HP SERIES PRODUCT DIMENSIONS NOT SHOWN
3. THE MIXING BOX IS FIELD REVERSIBLE FROM BOTTOM & REAR TO TOP & REAR RETURN
4. PROVIDE ACCESS CLEARANCE FOR ELECTRICAL ENCLOSURE PER LOCAL AND NATIONAL ELECTRICAL CODE REQUIREMENTS.
5. IT IS RECOMMENDED TO PROVIDE 3' ACCESS ON PIPE CONNECTION SIDE.



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TITLE:

**MODEL "HPM" FAN COIL UNIT
EXTERNAL SPACE REQUIREMENTS**

DATE

07/20/17

SHEET

PAGE 2 OF 2

DRAWING NO

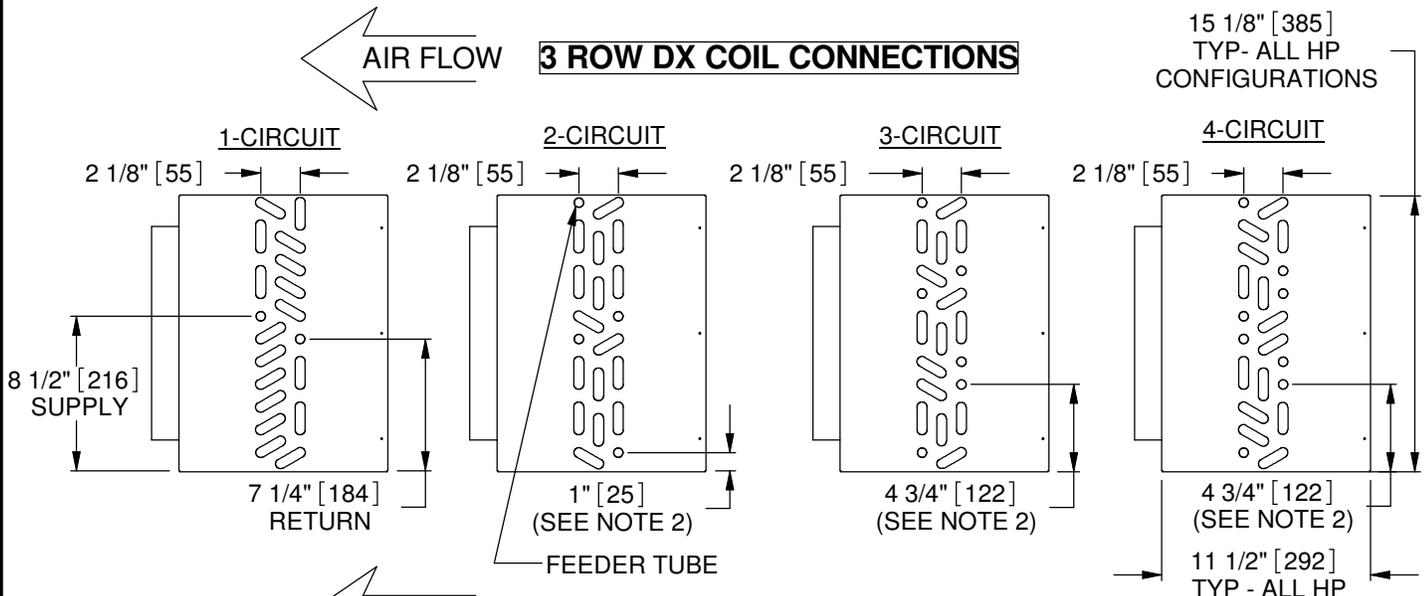
82-80006

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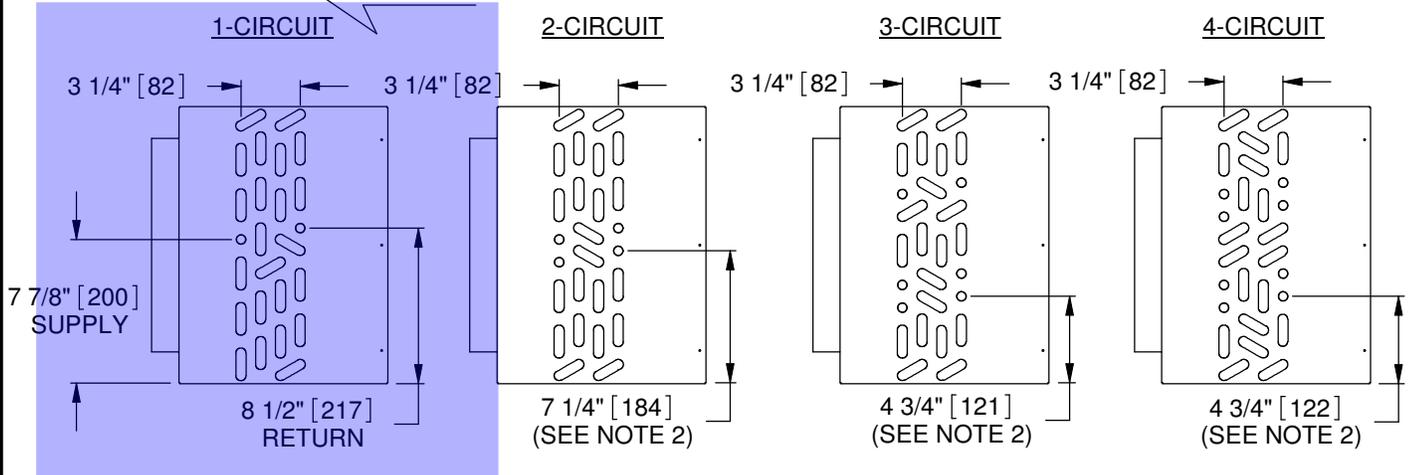
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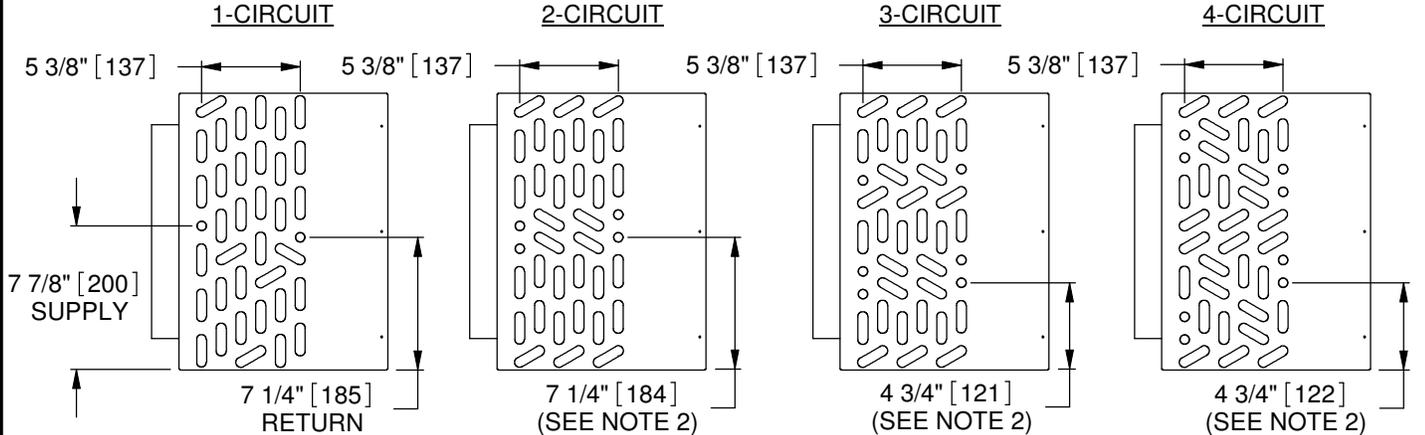
3 ROW DX COIL CONNECTIONS



4 ROW DX COIL CONNECTIONS



6 ROW DX COIL CONNECTIONS



NOTES:

1. Connection diameters are based on selection criteria, see selection software for dimensions.
2. Suction header connections on multi-circuit DX coils are 1/2" below the bottom feeder tube on the entering air side of coil.
3. Multi-circuit DX coils include soft copper supply distributor tubes with distributors..
4. Horizontal coil connection dimensions based upon total rows.
5. Left hand unit shown, circuit layouts may be inverted based on total rows and/or coil handing.



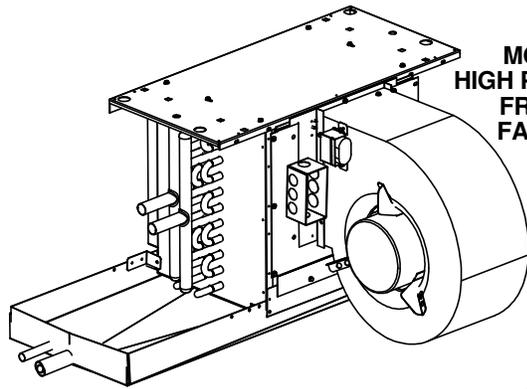
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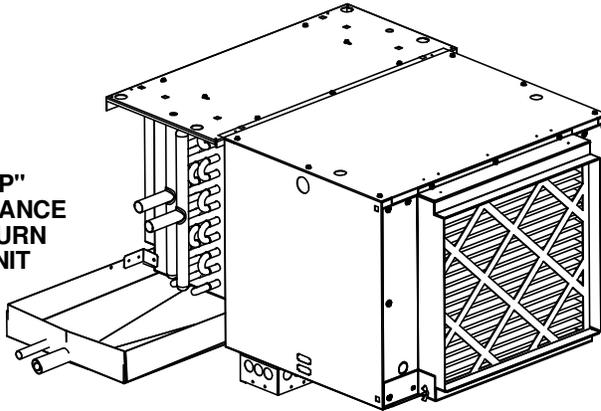
DO NOT SCALE DRAWING
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED

TITLE: **DX COIL CONNECTIONS**
HP SUBMITTAL

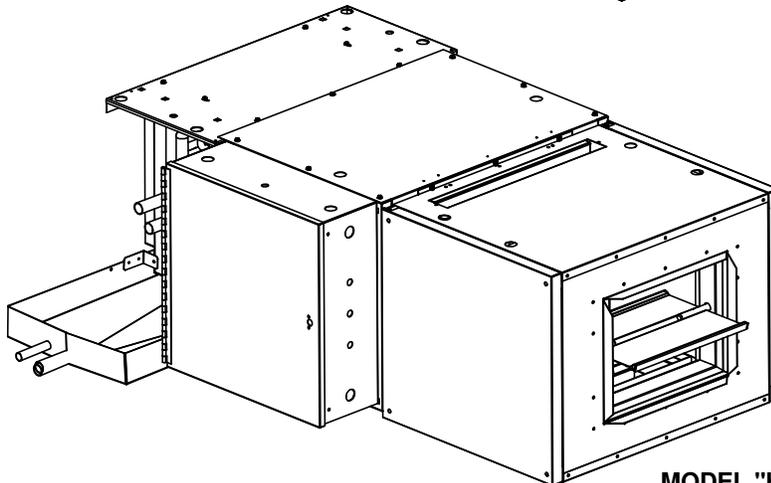
DATE	SHEET	DRAWING NO	REV
10/28/09	PAGE 1 OF 1	82-80013-04	01



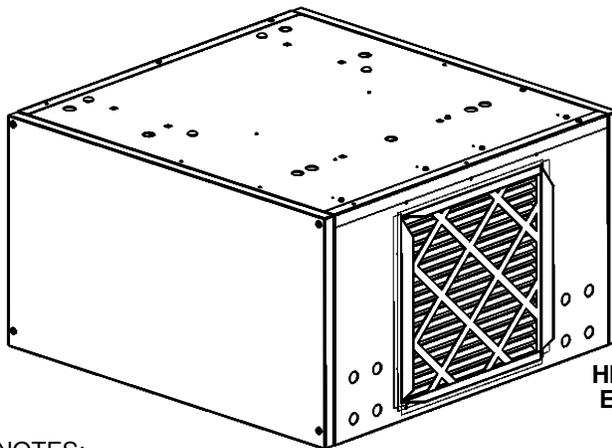
**MODEL "HPF"
HIGH PERFORMANCE
FREE RETURN
FAN COIL UNIT**



**MODEL "HPP"
HIGH PERFORMANCE
PLENUM RETURN
FAN COIL UNIT**



**MODEL "HPM"
HIGH PERFORMANCE
MIXING BOX
FAN COIL UNIT**



**MODEL "HPE"
HIGH PERFORMANCE
ENCLOSED CABINET
FAN COIL UNIT**

NOTES:

1. THE LIQUID LINES ARE ALL 5/8" SAE WITH THE EXCEPTION OF THE HP SIZE 18 AND 20 SIX ROW FOUR CIRCUIT COILS THAT ARE ABOVE 75,000 BTUs WHICH HAVE 7/8" ODM CONNECTIONS.

DX COIL CONNECTION SIZES

Unit Size	Number of Rows	Number of Circuits	Conn. Size (OD)
06	3	1	5/8
06	4	1	5/8
06	6	1	5/8
08	3	1	5/8
08	4	1	5/8
08	4	2	5/8
08	6	1	5/8
08	6	2	5/8
10	3	1	5/8
10	4	1	5/8
10	4	2	5/8
10	6	1	5/8
10	6	2	5/8
12	3	1	5/8
12	3	2	5/8
12	4	1	5/8
12	4	2	5/8
12	6	2	5/8
12	6	3	7/8
14	3	1	5/8
14	3	2	5/8
14	4	2	5/8
14	4	3	7/8
14	6	2	5/8
14	6	3	7/8
16	3	2	5/8
16	3	3	7/8
16	4	2	5/8
16	4	3	7/8
16	6	2	5/8
16	6	3	7/8
18	3	2	5/8
18	3	3	7/8
18	4	2	5/8
18	4	3	7/8
18	6	3	7/8
18	6	4	7/8
20	3	2	5/8
20	3	3	7/8
20	4	2	5/8
20	4	3	7/8
20	6	3	7/8
20	6	4	7/8



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+/- .18 (3) UNLESS OTHERWISE NOTED

TITLE: **HP SERIES FAN COIL UNIT
DX COIL PIPING CONNECTIONS**

DATE	SHEET	DRAWING NO	REV
07/20/17	PAGE 2 OF 2	82-80003	08

Project Name: **Loring Way Condos condensers - 091317**

Unit Model #: **YCD18B21S**

Quantity: **1**

System: **YCD18B21S**

Cooling Performance	
Total gross capacity	16.5 MBH
Sensible gross capacity	11.6 MBH
Ambient DB temp.	95.0 °F
Power input	1.52 kW
Refrigerant	
Refrigerant type	U-nkno
Electrical Data	
Power supply	208/230-1-60
Unit min circuit ampacity	9.6 Amps
Unit max over-current protection	15 Amps
Dimensions & Weight	
Hgt	23.5 in.
Len	24 in.
Wth	24 in.
Weight with factory installed options	125 lbs.



Note: Please refer to the tech guide for listed maximum static pressures



1.5 Ton

Unit Features

- 13 SEER / 1-Stage
- Environmentally Friendly - CFC-free R-410A refrigerant delivers environmentally friendly performance with zero ozone depletion.
- Unit Cabinet Constructed of Pre-Painted Steel
- Fully Exposed Refrigerant Connections and a Single Panel Covering the Electrical Controls Make for Easy Servicing of the Unit
- Reciprocating Compressor
- Each Compressor is Protected Against Abnormal Pressures by an Internal Pressure Relief Valve and Factory Installed High Pressure Switch
- Liquid Line Filter Drier
- Quality Coils - Enhanced aluminum fins are mechanically bonded to copper tubing.
- Secured Re-Usable Service Valves are Provided on Both the Liquid and Vapor Sweat Connections for Ease of Evacuating and Charging
- Internally Protected Condenser Fan Motor

Warranty

- Five (5) Year Limited Parts Warranty
- Ten (10) Year Limited Compressor Warranty
- Extended Ten (10) Year Limited Parts Warranty when Product is Registered Online Within 90 Days of Purchase for Replacement or Closing for New Home Construction



Project Name: **Loring Way Condos condensers - 091317**

Unit Model #: **YCD18B21S**

Quantity: **1**

System: **YCD18B21S**

Factory Installed Options

YCD18B21S

Product Category:	Y	York Brand
Type:	C	Air Conditioner
SEER:	D	13 SEER / 1-Stage
Nominal Cooling Capacity:	18	1.5 Ton
Refrigerant:	B	R-410A Refrigerant
Voltage:	2	208/230-1-60
Product Generation:	1	
Factory-Installed Options:	S	

Field Installed Accessories

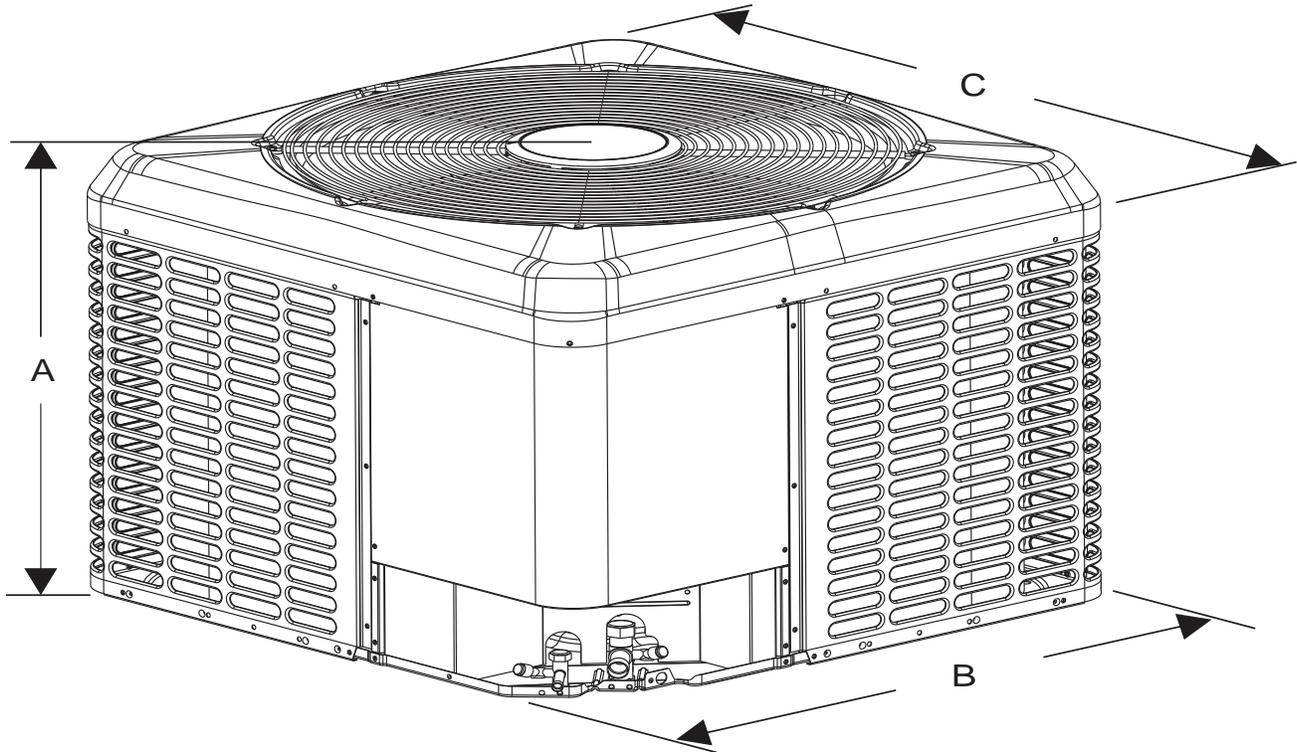
Project Name: **Loring Way Condos condensers - 091317**

Unit Model #: **YCD18B21S**

Quantity: **1**

System: **YCD18B21S**

Unit Dimensions



DIMENSIONS

Unit Model	Dimensions (Inches)			Refrigerant Connection Service Valve Size	
	A	B	C	Liquid	Vapor
YCD18B21(H,S)	23-1/2	24	24	3/8	3/4
YCD24B21(H,S)	26-3/4	24	24		
YCD30B21(H,S)	30	24	24		
YCD36B21(H,S)	33-1/4	24	24		7/8
YCD42B21(H,S)	26-3/4	29-1/4	29-1/4		
YCD48B21S	30	29-1/4	29-1/4		
YCD60B21S	36-1/4	29-1/4	29-1/4		

‡ Adapter fitting must be field installed for the required 1-1/8" line set.
 All dimensions are in inches and are subject to change without notice.
 Overall height is from bottom of base pan to top of fan guard.
 Overall length and width include screw heads.

FAN DETAILS

Job Name: 3M Cynthiana Warehouse



Tag: N/A
Customer: 3M Company
Job ID: DT-011918
Date: January 19, 2018

Description

Quantity 7
 Model WPB
 Size 30E4
 Blade Angle 30
 Arrangement 9
 Class N/A
 Discharge E
 Motor position --
 Propeller Diameter (in) 30

Performance

Volumetric Flow CFM 12,000
 Operating SP (in WC) 0.500
 Standard SP (in WC) 0.500
 TP (in WC) 0.854
 RPM 1250
 Tip Speed (FPM) 9817
 Oper. Power BHP 2.62
 Standard Power BHP 2.62
 Outlet area (sq.ft) 5.03
 Outlet Velocity (FPM) 2386
 Max RPM for Class 1565
 Static Efficiency 36.08%
 Total Efficiency 61.64%
 FEI 1.07
 FEP (KW) 2.35
 System FEI N/A
 System FEP (KW) N/A

Air/Gas Properties

Altitude above sea level (ft) 0
 Inlet Pressure (in WC) 0.000
 Inlet Temperature (°F) 70
 Design Temperature (°F) 70
 Gas Type Standard air
 Estimated Density (lb/ft³) 0.075

Motor Data

Power (HP) 3
 Enclosure TEFC
 Speed (RPM) 1800
 Voltage 460V
 Phase 3
 Frequency 60Hz
 Frame Size Unknown

Sound

Octave Bands	1	2	3	4	5	6	7	8	LwA
Level at Inlet	96	99	92	88	84	82	79	73	91

Distance in ft	1	3	5
dBA at inlet	91	81	77

Sound Power Levels in dB re.10⁻¹² Watts:

Estimated sound pressure level in dBA (re: 0.0002 microbar) based on a single * ducted installation:

*To estimate dBA level for ducted inlet and ducted outlet (into and out of the room) type installation, deduct 20 from the LwA value shown. Using a directivity factor of 1. Estimated Sound Pressure based on free field, spherical (Q = 1) radiation at stated distance.

Definitions:

- LwA** The overall (single value) fan sound power level, 'A' weighted.
- dBA** The environment for each fan installation influences its measured sound value, therefore dBA levels cannot be guaranteed. Consult AMCA Publication 303 for further details. A fan's dBA is influenced by nearby reflective surfaces.

SUBMITTAL

Job Name: 3M Cynthiana Warehouse

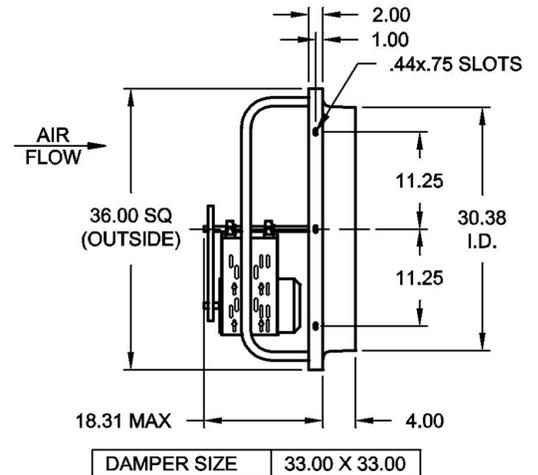


Tag: N/A
 Customer: 3M Company
 Job ID: DT-011918
 Date: January 19, 2018

WPB - Propeller Wall Fan, Light and Medium Duty, Belt Driven

Construction Features

- Fabricated steel or cast aluminum propellers.
- Steel panel with deep formed inlet venturi which distributes air velocity uniformly.
- Pre-Punched mounting holes.
- Motor supports are constructed of heavy-gauge galvanized steel.
- Fans designed for supply service are provided with motor and drive located on the building interior side of the fan.



D4820-3 WPB 30L

Description	Qty	Model	Size	Angle	Wt (lb.)
	7	WPB	30E4	30°	398

Approximate weight each, includes fan, motor and accessories.

Configuration	Class	Rotation	Arr	Disch	M. Pos	Disch Dir
	N/A	W/A	9	E	--	Irrelevant

Performance	CFM	SP (in WC)	RPM	Oper. BHP
	12,000	0.500	1,250	2.62

Temperature: 70 °F Altitude: 0 ft

Department of Energy	FEI	FEP (KW)	System FEI	System FEP (KW)
	1.07	2.35	N/A	N/A

Note that the Fan Energy Index (FEI) is an overall efficiency (wire-to-air) metric which includes not only the impact of the fan efficiency, but also each of the drive components used to operate the fan. The Fan Electrical Input Power (FEP) is the amount of power of a given fan at an operating point characterized by a value of flow and pressure.

Motor Data	HP	RPM	Volt/Ph/Hz	Enclosure
	3	1,750	460V/3/60	TEFC

Efficiency: Premium

Sound Data	Octave Bands	1	2	3	4	5	6	7	8	LwA	dBA	Sones
	Level at Inlet	96	99	92	88	84	82	79	73	91	77	37

LwA: The overall (single value) fan sound power level in dB re. 10⁻¹² Watts, 'A' weighted.

dBA: Estimated sound pressure level (re:0.0002 microbar) based on a single ducted installation at 5 ft., using a directivity factor of 1.

Accessories Included

Weather Hood w/Birdscreen Std Flange,
 Factory Assembled

Backdraft Damper, ALUM

Wall Box w/ Bolted Guard, Factory
 Assembled

Extended Lube Lines - Polyethylene

Variable Speed V-Belt Drive, 1.5 SF



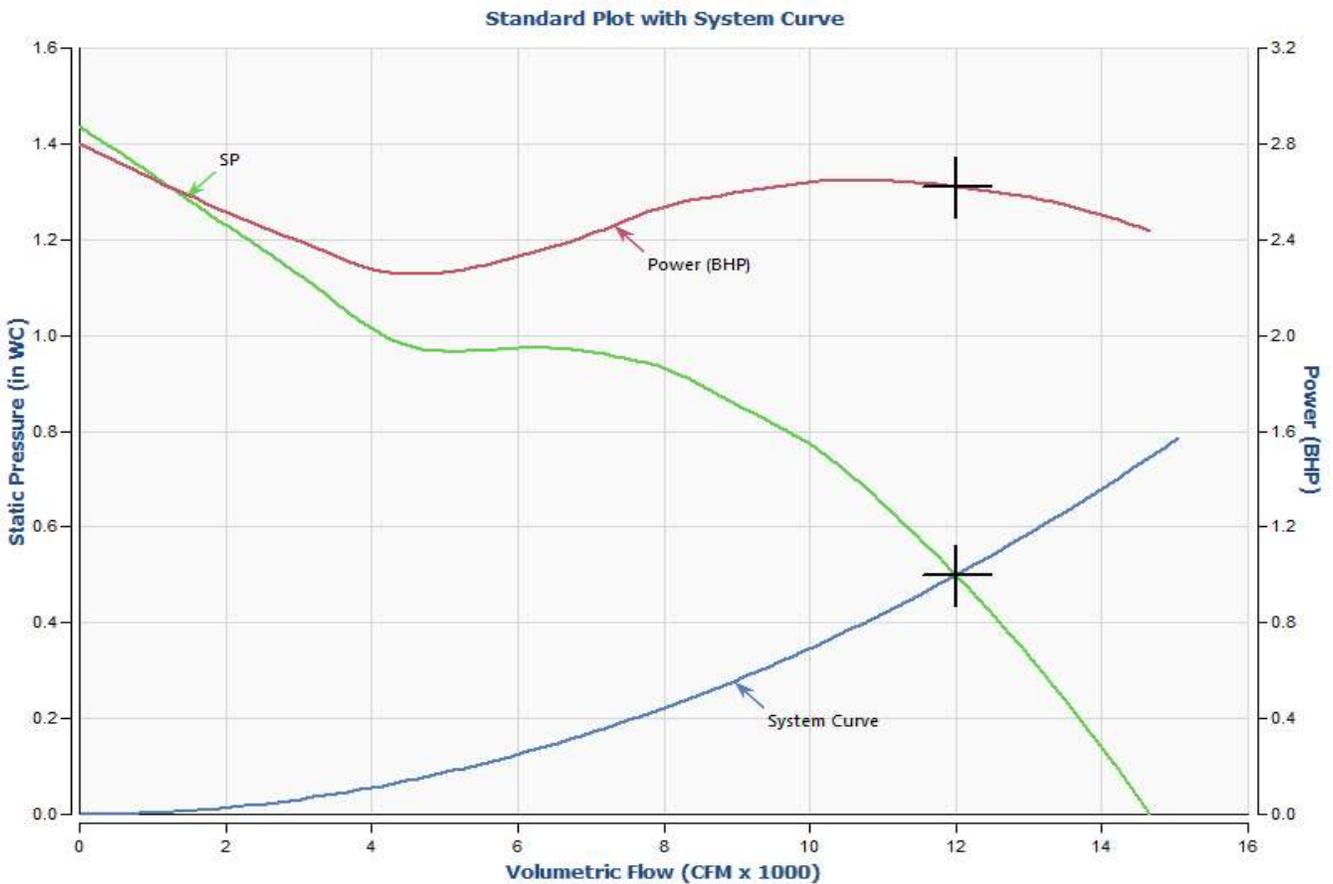
Customer: 3M Company
Job ID: DT-011918
Date: January 19, 2018

Tag:

Fan information

Size/Model	30E4/WPB	Class	N/A	Outlet Vel (FPM)	2386
Volumetric Flow (CFM)	12000	Speed (RPM)	1250	Density (lb/ft ³)	0.075
SP (in WC)	0.5	Max Speed	1,565 RPM @ 70 °F		
Blade Angle	30°	Power (BHP)	2.62		

Adjusted for

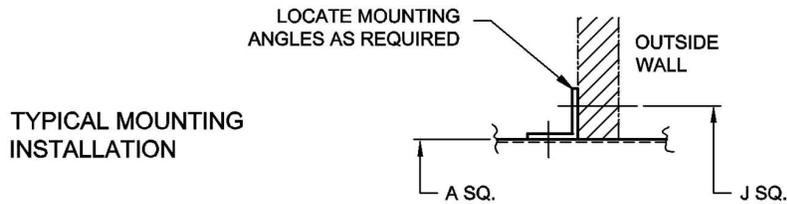
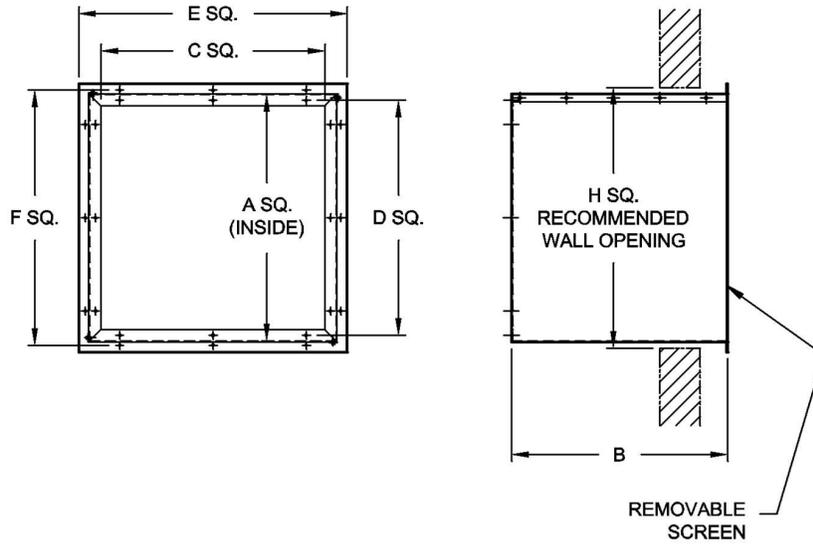


SUBMITTAL

Job Name: 3M Cynthiana Warehouse



Tag: N/A
 Customer: 3M Company
 Job ID: DT-011918
 Date: January 19, 2018



SIZE	A SQ.	B	C SQ.	D SQ.	E SQ.	F SQ.	MAT'L GAGE	H SQ.	J SQ.
14	17.25	33.50	14.63	15.75	19.75	18.13	18	18.00	19.38
16	20.25	34.00	17.63	18.75	22.75	21.13	18	21.00	22.38
18	22.25	34.00	19.63	20.75	24.75	23.13	18	23.00	24.38
21	25.25	36.00	22.63	23.75	27.75	26.13	18	26.00	27.38
24	28.25	37.00	25.63	26.75	30.75	29.13	18	29.00	30.38
30	36.25	40.00	33.63	34.75	38.75	37.13	16	37.00	38.38
36	42.25	40.00	39.63	40.75	44.75	43.13	16	43.00	44.38
42	48.25	43.00	45.63	46.75	50.75	49.13	16	49.00	50.38
48	54.25	43.00	51.63	52.75	56.75	55.13	16	55.00	56.38
54	60.25	49.00	57.63	58.75	62.75	61.13	16	61.00	62.38
60	66.25	50.00	63.63	64.75	68.75	67.13	16	67.00	68.38

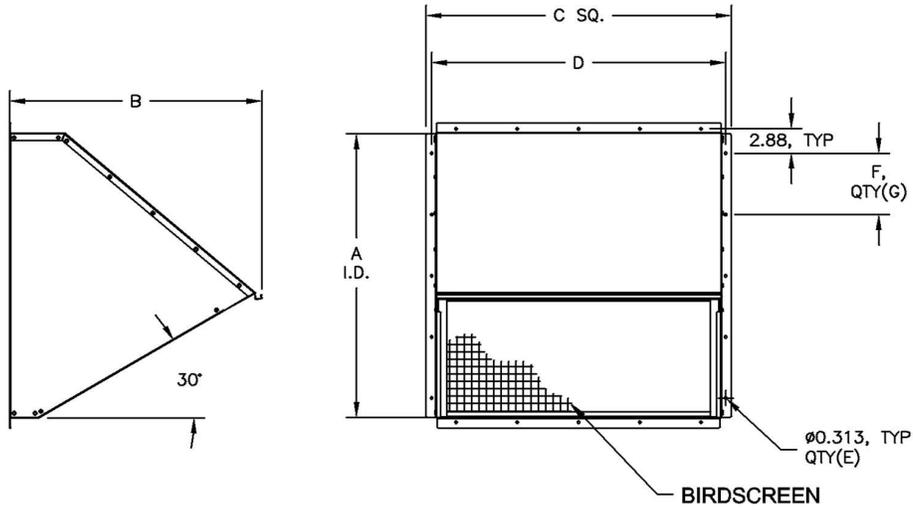
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SUBMITTAL

Job Name: 3M Cynthiana Warehouse



Tag: N/A
 Customer: 3M Company
 Job ID: DT-011918
 Date: January 19, 2018



SIZE	A	B	C	D	E	F	G
14	14.63	16.43	17.13	15.75	12	5.00	2
16	17.63	18.43	20.13	18.75	12	6.50	2
18	19.63	19.80	22.13	20.75	12	7.50	2
21	22.63	22.55	25.13	23.75	12	9.00	2
24	25.63	25.68	28.13	26.75	16	7.00	3
30	33.63	33.30	36.13	34.75	20	7.25	4
36	39.63	40.80	42.13	40.75	28	5.83	6
42	45.63	45.93	48.13	46.75	28	6.83	6
48	51.63	51.98	54.13	52.75	28	7.83	6
54	57.63	56.98	60.13	58.75	36	6.63	8
60	63.63	62.98	66.13	64.75	36	7.38	8

NOTES:

1. TO BE MOUNTED TO WALL BOX.

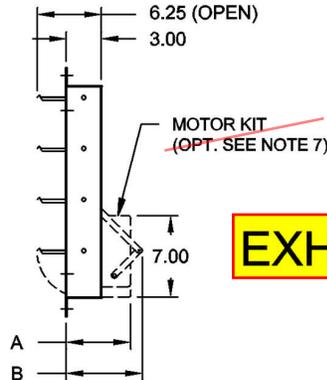
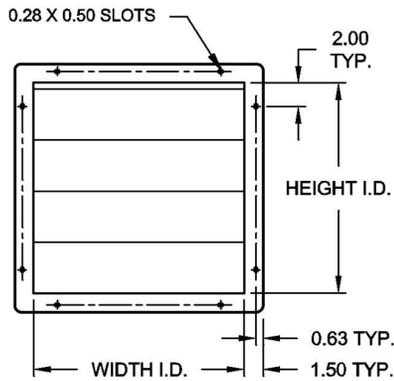
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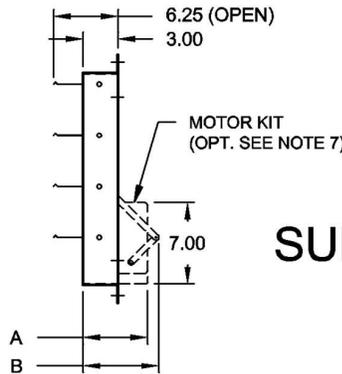
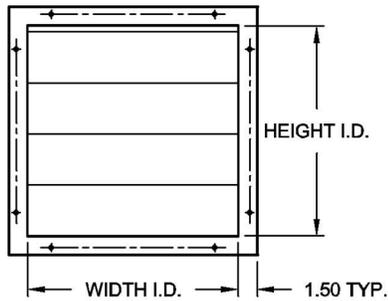
Job Name: 3M Cynthiana Warehouse



Tag: N/A
 Customer: 3M Company
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EXHAUST



SUPPLY

1. FRAME: .080 MILL FINISH EXTRUDED ALUMINUM.
2. BLADES: 26 GA. MILL FINISH ALUM. BLADES WITH A GALV. REINFORCING STRIP ACROSS TOP OF BLADE.
3. FELT SEAL ON LEADING EDGE OF BLADES.
4. STAINLESS STEEL BUSHINGS, PIVOT PINS AND RIVETS.
5. TIE ROD ATTACHED TO ALL BLADES.
6. DAMPERS INDIVIDUALLY PACKAGED.
7. FOR MOTORIZED APPLICATIONS (OPT.) MOTOR KIT RATED AT 115/230V, 460V OR 24V. FOR 575V APPLICATIONS A TRANSFORMER IS REQUIRED.
8. DAMPERS 39.0 - 63.0 ARE DOUBLE PANEL CONSTRUCTION.

SIZE	HEIGHT	WIDTH	A	B
14	14.0	14.0	5.50	6.50
16	17.0	17.0		
18	19.0	19.0		
21	22.0	22.0		
24	25.0	25.0		
30	33.0	33.0		
36	39.0	39.0	8.00	8.50
42	45.0	45.0	8.00	8.00
48	51.0	51.0		
54	57.0	57.0		
60	63.0	63.0		

DMP-R000 WPB 008-4101