

APPENDIX F

**TECHICAL SPECIFICATIONS FOR STEEL DOORS AND FRAMES,
ANALYZERS, AND PLC**

SECTION 08110

STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated steel doors and frames.
- B. Steel frames for wood doors.
- C. Fire-rated steel doors and frames.
- D. Thermally insulated steel doors.
- E. Sound-rated steel doors and frames.
- F. Steel glazing frames.
- G. Accessories, including glazing, louvers, and matching panels.

1.02 RELATED SECTIONS

- A. Section 08710 - Door Hardware.
- B. Section 08800 - Glazing: Glass for doors and borrowed lites.
- C. Section 09900 - Paints and Coatings: Field painting.

1.03 REFERENCES

- A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2003.
- B. ANSI A250.3 - Test Procedure and Acceptance Criteria for Factory-Applied Finish Painted Steel Surfaces for Steel Doors and Frames; 1999.
- C. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 2003.
- D. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 1998 (R2004).
- E. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or

Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2005a.

F. ASTM C 236 - Standard Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box; 1989 (Reapproved 1993).

G. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus; 2005.

H. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2004.

I. ASTM E 413 - Classification for Rating Sound Insulation; 2004.

J. ASTM E 1408 - Standard Test Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems; 1991 (Reapproved 2000).

K. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; 2000 (ANSI/DHI A115 Series).

L. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

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M. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 1999.

N. NAAMM HMMA 860 - Guide Specifications for Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 1992.

O. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2000.

P. NAAMM HMMA 862 - Guide Specifications for Commercial Security Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2003.

Q. NAAMM HMMA 863 - Guide Specifications for Detention Security Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2004.

R. NAAMM HMMA 865 - Guide Specifications for Swinging Sound Control Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2003.

S. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association; 2007.

T. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; 2003.

U. UBC Std 7-2, Part II - Test Standard for Smoke- and Draft-control Assemblies; International Conference of Building Officials; 1997.

V. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

W. UL 10B - Standard for Fire Tests of Door Assemblies; 1997.

X. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; 1998.

Y. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; 2001.

1.04 SUBMITTALS

A. See Section 01340 - Administrative Requirements for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

D. Samples: Submit two samples of metal, 2 x 2 inches (50 x 50 mm) in size showing factory finishes, colors, and surface texture.

E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

F. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

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

B. Maintain at the project site a copy of all reference standards dealing with installation.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Store in accordance with NAAMM HMMA 840.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

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PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Steel Doors and Frames:

1. Steelcraft; www.steelcraft.com.
2. Assa Abloy Ceco,: www.assaabloydss.com.
3. Windsor Republic Doors; www.republicdoor.com.
4. Substitutions: See Section 01600 - Product Requirements.

2.02 DOORS AND FRAMES

A. Requirements for All Doors and Frames:

1. Accessibility: Comply with ANSI/ICC A117.1.
2. Door Top Closures: Flush with top of faces and edges.
3. Door Edge Profile: Beveled on both edges.
4. Door Texture: Smooth faces.
5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
6. Hardware Preparation: In accordance with DHI A115 Series, with reinforcement welded in place, in addition to other requirements specified in door grade standard.

7. Galvanizing for Units in Wet Areas: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturer's standard coating thickness.

8. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 STEEL DOORS

A. Doors Type L-16 Series:

1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless.

2. Grade: NAAMM HMMA 861, physical performance Level A.

3. Core: Honeycomb core system.

4. Top Closures for Outswinging Doors:

a. Flush with top of faces and edges.

b. Not less than 16 ga. Flush or inverted.

c. Welded to the face sheet.

5. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.

6. Texture: Smooth faces.

7. Astragals: Flat security type.

8. Weatherstripping: Separate, see Section 08710.

9. Glazing kit: Overlapping steel trim.

10. Finish: Kynar. At all exterior locations.

11. Finish: Painted at interior doors (factory primed).

2.04 STEEL FRAMES

A. General:

1. Comply with the requirements of grade specified for corresponding door, except:
 - a. ANSI A250.8 Level 1 Doors: 16 gage frames. (Interior Doors)
 - b. ANSI A250.8 Level 3 Doors: 14 gage frames. (Exterior Doors)
2. Finish: Same as for door.
3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

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4. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches (100 mm) high to fill opening without cutting masonry units.
5. Frames wider than 48 Inches (1200 mm): Reinforce with steel channel fitted tightly into frame head, flush with top.
6. Frames Installed Back-to-Back: Reinforce with steel channels anchored to floor and overhead structure.
7. Frame Anchors
 - a. Existing Masonry or Concrete
 1. 3/8 inch countersunk flat head bolt and expansion shields.
 2. Locate 6 inches from top and bottom and maximum 24 inches on center.
 3. Weld pipe spacers or other type of spacers, per manufacturers standard design, in back of frame soffit.
 - b. Attachment to Drywall Construction:
 1. Steel or Wood Stud type to accommodate frame jamb depth and face dimension on welded type frame.

- c. Provide one anchor for every 30 inches of jamb or fraction thereof.
- d. Floor Anchor: angle clip type.
 - 1. 16 Gauge.
 - 2. Two fasteners per jamb.
 - 3. Weld to bottom of each jamb.
- 8. Preparation for Hardware
 - a. Reinforce per SDI 107.
 - b. Lock and Closer reinforcement: box type.
 - c. Door Hinge reinforcement: 7 gauge or equivalent, manufacturer's standard.
 - d. Punch strike jambs to receive three silencers; double leaf frames to receive manufacturer's standard preparation.
 - e. Hardware locations per "Recommended Locations for Builders' Hardware for Standard Steel Doors and Frames".
 - f. Provide welded in place guards for all hardware cutouts in frame.
 - g. Electrical preps: provide welded-in-place boxes, special designed anchors, raceways and access panels as required.
- B. Door Frames: Face welded, F16 Series, sanded and grinded smooth, seamless with joints filled.
 - 1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.
 - 2. Finish: Kynar at exterior doors with Type A-Series doors, Factory-primed and field-painted at other locations
 - 3. Weatherstripping: Separate, see Section 08710.
- C. Interior Door Frames: See Section 08120.
- E. Mullions for Pairs of Doors: Fixed, of profile similar to jambs.

F. Frames for Interior Glazing or Borrowed Lights: Construction and face dimensions to match door frames, and as indicated on drawings.

G. Transom Bars: Fixed, of profile same as jamb and head.

2.05 ACCESSORY MATERIALS

A. Glazing: As specified in Section 08800, factory installed.

B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

C. Astragals for Double Doors: Specified in Section 08710.

1. Exterior Doors: Steel, Z-shaped.

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2. Fire-Rated Doors: Steel, shape as required to accomplish fire rating.

D. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.

E. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

F. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.06 FINISH MATERIALS

A. Primer: Rust-inhibiting, Factory Applied (Interior Doors), complying with ANSI A250.10, door manufacturer's standard.

B. Kynar finish. Color to be selected. (Exterior Doors)

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.
- B. Coat inside of other frames with bituminous coating to a thickness of 1/16 inch (1.5 mm).

3.03 INSTALLATION

- A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
- B. In addition, install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Coordinate installation of hardware.
- F. Coordinate installation of glazing.
- G. Coordinate installation of electrical connections to electrical hardware items.
- H. Touch up damaged factory finishes.

3.04 ERECTION TOLERANCES

- A. Clearances Between Door and Frame: As specified in ANSI A250.8.
- B. Maximum Diagonal Distortion: 1/16 in (1.5 mm) measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.
- B. Adjust sound control doors so that seals are fully engaged when door is closed.
- C. Test sound control doors for force to close, latch, and unlatch in accordance with ASTM E 1408; adjust as required to comply.

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3.06 SCHEDULE

A. Refer to Door and Frame Schedule appended to this section.

END OF SECTION

SECTION 409112 - PROCESS ANALYZER MEASURING SYSTEMS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

- A. **General:** The CONTRACTOR shall provide all Process Analyzer Measuring Packaged Equipment Systems, complete and operable, in accordance with the Contract Documents. The analyzer equipment systems shall be fully assembled at the shop and delivered to the site as complete packaged equipments.
- B. The requirements of Section 409100 - Process Control and Instrumentation Systems apply to this Section.

PART 2 -- PRODUCTS

2.1 GENERAL

- A. **Power Input:** Analyzers shall be the fully isolated 2-wire type, unless the type is not available, in which case the analyzer shall be the fully isolated four wire type with power supply of 115 volts plus and minus 10 percent, 60 Hz plus and minus 5 percent.
- B. **Signal Output:** Outputs shall be current regulated 4-20 mA DC capable of driving 0 to 600 ohms.
- C. **Ambient Conditions:** Analyzers shall be suitable for continuous automatic on-line analysis of the indicated parameter under the conditions indicated.
 - 1. Equipment shall operate satisfactorily in ambient temperatures between minus 20 degrees and plus 120 degrees or shall be provided with isothermal enclosures so that accuracies will not exceed one percent of span.
 - 2. Process fluid temperatures will range between 40 and 100 degrees F unless indicated otherwise.
- D. **Cabinet:** Cabinet shall be freestanding Nema 4X Type 316 stainless steel with sun shield and containing all analyzers, equipment, pumps and valves. Cabinet shall have drain holes and splash guards in case of leakage.
- E. **Sample Flow:** Samples shall not pass through housings containing electronics unless indicated otherwise.
- F. **Local Indication:** Each analyzer shall be provided with local digital indication scaled in process units.
- G. **Calibration:** Each analyzer shall be fitted with calibration connections at the analyzer.
- H. **Single manufacturer:** All electrodes, fittings, and transmitters on analyzers measuring the same parameter shall be products of a single manufacturer.

2.2 LOW RANGE TURBIDITY MEASURING SYSTEMS

- A. The turbidity measuring system shall have a flow rate of 0.1 L/min to 1 L/min with a measurement range of 0 to 1.00 NTU/FNU. The display shall be a two-line LCD with backlight. The maximum inlet pressure shall be 200 psi and the maximum outlet pressure shall be 15 psi.
- B. The analog signal with field selectable range shall be an active 4-20 mA.
- C. Turbidimeter shall be Georg Fischer Signet 4150 Turbidimeter, Sigrist Aquascat P or approved equal.

2.3 pH MEASURING SYSTEMS

- A. **Sensor:** The pH measurement system shall consist of a probe and an amplifier/transmitter with indicator. The probe assembly shall be a heavy duty industrial type consisting of a glass pH measuring electrode, a reference or standard electrode, and a temperature compensation/solution grounding electrode, all completely encapsulated and internally temperature compensated. The reference/standard electrodes shall contain enough electrolyte and buffer solution for 10 years continuous operation without replenishment. Probes requiring more frequent replenishment shall not be provided. Probes shall be flow through configuration, as indicated.
- B. **Transmitter:** The transmitter shall consist of amplifier, signal conversion, indication, and transmission functions housed in an enclosure suitable for surface mounting. Indication shall be on a 4-inch scale in pH units. Output signal shall be linear in proportion to the range of 0 to 14, into a 650 ohm max receiving loop, and shall include a range compression and expansion option.
- C. Manufactures: pH Measuring Systems shall be Rosemount Analytical 1054e pH with 320B flow through sensor or equal.

2.4 MONOCHLORAMINE MEASURING SYSTEMS

- A. **Sensor:** The monochloramine sensor shall be a two electrode membrane-covered sensor with a gold mesh cathode and a silver/silver chloride anode. The fill solution shall be a solution of potassium bromide in dilute acetic acid. The sensor shall be fitted with an RTD to allow continuous correction for changes in membrane permeability caused by temperature.
- B. **Transmitter:** The analyzer shall have a two-line back-lit display. The display shall show ppm monochloramine and temperature in one screen. The user shall be able to choose the other screens to display additional information such as raw sensor current. The analyzer shall have dual 4-20mA isolated outputs. Outputs shall be fully scalable and assignable independently to monochloramine or temperature.
- C. Manufacturer: Manufacturer shall submit information and references showing successful operation of product with similar service for a minimum of 2-years. Monochloramine measuring system shall be Rosemount model MCL -210, or approved equal.

2.5 PERISTALTIC PUMPS

- A. A peristaltic pump shall be provided in each analyzer equipment system to return flow back to the tank. The discharge of the pump shall be connected to the inlet piping of the tank.
- B. Design Condition
 - 1. Fluid: potable water
 - 2. Flow range: 0-200 gph
 - 3. Pressure: 25 psi
- C. Each pump shall be provided complete with the pump head, tubing, drive, and appurtenances.
 - 1. The pump head shall be constructed of polyphenylene sulfide housing with stainless steel rotor. The pump head design shall allow for quick tubing change. Pump head shall be provided with spring loaded retainers, tubing guide and adjustable occlusion.
 - 2. The tubing shall be sized adequately by the pump manufacturer to meet the flow range. Tubing shall be FDA approved and constructed of viton, neoprene, or other flexible material suitable for the service. The drive shall be compact and heavy duty, and provided with speed control and LED display. The housing shall be constructed of aluminum or epoxy coated steel. The drive shall be provided with a $\frac{1}{3}$ hp, 60-Hz, 120V, 1-phase brushless motor.
 - 3. Quick disconnect hose connections shall be provided on each suction and discharge connection.
- D. Manufacturer: Peristaltic pumps shall be Masterflex Model I/P or approved equal.

2.6 SAMPLE SYSTEM

- A. The Contractor shall design and provide a sample system for each facility in accordance with the diagram shown on the drawing and as specified herein.
- B. The sample system shall be able to collect a sample from three (3) sources/location – (1) tank outlet line, (2) tank inlet line and (3) from inside the tank at a point $\frac{1}{3}$ the tank radius and 12-inches off the floor.
- C. All sample tubing external to the analyzer panel shall be protected inside a Sch. 40 PVC pipe leading to and from the sample collection and discharge points.
- D. Design Criteria:
 - 1. In order to prevent stagnant sample in the line, the flow of the sample shall be continuous. A needle valve shall be used to regulate sample flow to the pump suction in order to minimize waste.
 - 2. Three- way valves shall be used in the sample system in such a way that only a single sample source shall be analyzed by all three analyzers at a time.

3. Using the same 3-way valves, the sample shall be directed to flow through to a single header from which the sample will be fed to each analyzer. A needle valve shall be used to regulate the flow into each analyzer at a rate recommended by the analyzer's manufacturer. A rotameter shall be used to monitor the flow rate.
4. Once analyzed, the sample shall be directed to the pump suction.
5. Shut off valves shall be bused where necessary.
6. Rotometers shall be furnished with integral or a separate needle valve to regulate the flow into the analyzer.
7. The sample system shall be mounted in a protected and secure enclosure and noted on the drawings. The enclosure shall be able to be locked.

E. Rotometers

1. Rotometers for water application shall be the variable area type and shall have vertical bottom inlets and top outlets with NPT connections
2. The bodies shall have union ends for ease of maintenance, polysulphone tubes, and stainless steel fittings, Type 316 stainless steel internal parts and scales suitable for the required capacity range. The scale shall be calibrated in gallons per minutes or L/Min.
3. The meters shall have an accuracy of not more than plus and minus 5 percent over the capacity range indicated.
4. Manufacturers, or equal: **Headland In-Line Meters**, or **Universal Flow Monitors, Inc. INSITE Meters**, or **McCrometer SK**

- F. Valves: The sample system shall be provided with three-way valves, needle valves, ball valves, and globe valve, as indicated on the schematic shown on the Piping and Instrumentation Diagram for each tank site to perform the operation as described above.. The valves shall be suitable for potable water service and rated for a minimum pressure for 150 lbs. Valve bodies, balls, diaphragms, needles, stems shall be stainless steel. Wetted seals and elastomers shall be Buna-N or other material suitable for potable water service. The valves shall have screwed or flanged ends and be provided with manual actuators.

PART 3 -- EXECUTION

3.1 GENERAL:

- A. Process analyzer measuring systems shall be executed according to Section 409100 - Process Control and Instrumentation Systems.

- END OF SECTION -

SECTION 409510- PLC-BASED CONTROL SYSTEMS HARDWARE

PART 1 -- GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR, through the use of the Instrumentation Supplier and qualified electrical installers, shall provide the PLC-based control system (PLCS) complete and operable, in accordance with the Contract Documents.
1. **Instrumentation Supplier:** It is the intent of these specifications to have the Instrumentation Supplier singularly responsible for selecting, configuring, and verifying correct operation of compatible hardware to provide a functional PLCS and to provide future support of all PLCS hardware. In order to preserve this focused responsibility, the Instrumentation Supplier shall be the integrator of all hardware.
- B. The conditions of the existing PCSI and the required interface to the existing PLC and SCADA system are described in Section 409100- 3.3. The WORK also includes
1. Provide the equipment described below for each site and performed the work required to facilitate the integration of the new I/Os into the existing SCADA system.
 2. Provide the interconnecting cabling between the R-I/Os and the existing PLC and installing them as described on the drawings.
- C. **Minimum Instrumentation Supplier Scope:** It is the intent of these specifications that the Instrumentation Supplier, under the direction of the CONTRACTOR, shall assume full responsibility for the following, as a minimum:
1. Procurement of all hardware required to conform to these specifications.
 2. Design and submit PLCS hardware and spare parts submittals.
 3. Design and submit PLCS training for on-site training.
 4. Perform all required PLCS tests, adjustments, and calibrations.
 5. Furnish qualified labor to supervise PLCS installation and to perform start-up activities.
 6. Furnish qualified certified instructors to provide PLCS instruction and training.
 7. Furnish all required PLCS tools, test equipment, spare parts, supplies, operations and maintenance manuals, reproducible record drawings, and program listings if required by this specifications. .
- D. **PLCS Configuration:** See Section 409100 for description of existing conditions. The PLCS shall consist of existing PLC's, new remote I/O modules, communication modules and SCADA system as described in these specifications. , Certain existing equipment and systems shall become an integral part of the existing PLCs. The Instrumentation Supplier shall be responsible for providing the following equipment:

1. New remote I/O modules to accommodate all the required new I/Os in the form of a new Schneider Electric Modicon Momentum PLC (R I/O). The R-I/O shall be able to interface with the existing Modicon 984 via a Modbus/TCP communication link for interfacing to the existing local PLC's)
2. Ethernet communication adapter to enable communication and integration of the R-I/O to the existing local PLC using Modbus/TCP
3. Hardware Furnish only Network hardware as specified below for connecting RS-485 communication from the SolarBee mixers and the R-I/O communication adapter for each of the local PLC's will be added to by this project.

1.2 CONTRACTOR SUBMITTALS

- A. **Shop Drawings:** PLCS submittals shall be in accordance with the applicable requirements of Section 409100. PLCS submittals shall, however, be made separately from other process control and instrumentation system submittals.
- B. **Hardware Submittals:** The PLCS hardware submittal shall be in accordance with the applicable submittal requirements of Section 409100. The submittal shall also include:
 1. Complete grounding requirements for the entire PLCS including any requirements for PLCS communication networks.
 2. Requirements for physical separation between PLC components and 120 volt, 480 volt elements.
 3. Load requirement to enable the OWNER to size the a circuit breaker
 4. A complete set of PLCS diagrams which depict:
 - a. All PLCSs, communication devices, and communication links.
 - b. All cables required to support the communication requirements. A separate diagram shall be submitted for each component fully annotated with conduit size and number associated with the power source. .
 5. Complete and detailed bills of materials: A bill of material list, including quantity, description, manufacturer, and part number, shall be submitted for each component of the PLCS system. Bills of material shall include all items within an enclosure.
 6. Site-specific arrangement and construction drawings for all equipment cabinets, including dimensions identification of all components, preparation and finish data, nameplates, and the like. Drawings shall be scaled and show the position of the equipment on its intended installation location. Drawings must show a scaled representation of the placement of all equipment and its spatial relationship to all other equipment located in the abutting and adjoining areas. All acquired access and clearances associated with the equipment must be shown with a statement of compliance to manufacturer's recommendations, NEC, and other applicable codes.
 7. Calibration, adjustment, and test details for all PLCS components.

- C. **Owner's Manuals:** General requirements for Owner's Manuals are as described in Section 409100.

1.3 STORAGE AND HANDLING

- A. All equipment and materials delivered to the Site shall be stored in a location which shall not interfere with the operations of the OWNER's personnel or interfere with construction. Storage and handling shall be performed in a manner which shall afford maximum protection to the equipment and materials. It is the CONTRACTOR's responsibility to assure proper handling and on-site storage..

PART 2 -- PRODUCTS

2.1 GENERAL

- A. The requirements of Section 409100 apply to this Section.
- B. All materials and all PLCS equipment furnished under this Contract shall be new, free from defects, of first quality, and produced by manufacturers regularly engaged in the manufacture of these products.
- C. **Hardware Commonality:** Where there is more than one item of similar equipment being furnished all such similar equipment shall be the product of a singular manufacturer.
- D. PLCS Growth Provisions:
 - 1. All equipment and resources, including PLC I/O cards and implementation services, shall be provided such that at least 25 percent project growth can be implemented into the PLCS without any additional cost to the OWNER. The I/O points included in the 25 percent project growth requirement shall be wired and terminated onto a field interface terminal block.
 - 2. The entire PLCS being furnished shall be capable of being modularly expanded to accommodate any anticipated future expansion without the need to replace or retire any PLCS component or resource.

2.2 PLCS ENCLOSURES

- A. Description of the existing conditions and the required work is provided in Section 409100 and in the Drawings. In addition the following shall be provided and performed:
 - 1. The CONTRACTOR shall provide a back panel for mounting the R-I/O.
 - 2. , All new I/O wiring from the field to the new I/O modules shall be terminated on terminal blocks inside the R-I/O enclosures.

2.3 PROGRAMMABLE LOGIC CONTROLLER (PLC)

- A. General: No new I/O can be added to the existing Modicon 984 PLC's but will be added in the form of Modicon Momentum PLC's remote I/Os that will communicate to the existing PLC via Modbus TCP/IP via CAT 5e cable. . Each site shall have new R-I/Os and a communication module

- B. Due to the fact that the R-I/Os must communicate with and be integrated into the existing PLC and SCADA system, the R-I/O shall be compatible with the existing PLC. The R-I/Os shall be **Schneider Electric Modicon Momentum Series with Modbus TCP communication capability. No equal.**

2.4 PLC COMPONENTS – R-I/Os

A. PLC Input/output (I/O) Modules

1. I/O Modules General: All I/O housings and modules shall be suitable for hostile industrial environments. All I/O modules shall be isolated and conform to IEEE Surge Withstand Standards and NEMA Noise Immunity Standards. The I/Os shall be 4 - 20mA DC for all analog inputs and outputs and shall be 24 VDC for discrete inputs and dry relay contacts for safe discrete outputs. Modules shall be removable without having to disconnect wiring from the module's terminals by means of a swing-arm or plug-in wiring connector. Each PLC I/O location shall contain the I/O modules required to provide all of the I/O points contained in the I/O Lists. As a minimum, each PLC I/O location shall contain an installed spare capacity as described above. During normal operation, a malfunction in any remote input/output channel shall affect the operation of only that channel and not the operation of the CPU or any other channel. Any remote input/output channel shall be field selectable to shut down the CPU upon failure of that channel. Upon remote channel shutdown the CPU shall see all inputs on the malfunctioning channel as they were when the shutdown occurred and all outputs shall de-energize on that channel. Circuit components for both remote input and output shall be mounted on plug-in modules and keyed to prevent module insertion into the wrong slot. Isolation shall be used between all internal logic and external power circuits. This isolation shall meet the minimum specification of 1500 VRMS.
2. Discrete Input Modules: Defined as dry relay contact closure inputs from devices external to the programmable controller module. Individual inputs shall be optically isolated from low energy common mode transients to 1500 volts peak from users wiring or other I/O Modules. The modules shall have LED's to indicate status of each discrete input. Input signal level shall be 24 VDC. The input module shall have a maximum of 16 points each. The PLC system shall also offer discrete input hardware consisting of the following types:
 - a. AC/DC input for devices which operate at 120 VAC, 50/60 Hz. or 120 VDC, 220 VAC, 50/60 Hz. or 220 VDC.
 - b. DC input for devices which operate at 5 to 30 VDC and 10 to 60 VDC.
 - c. Isolated AC input which provides isolation of 120 VAC or 120 VDC input signals.

The discrete input and output modules can be combined on a single I/O module as long as the I/O quantity of each type meets specified requirement. The combination discrete input and output module shall be **Schneider Electric Modicon Momentum Series model 170-ADM 390 30-10 with. No substitution and no equal.**

3. Discrete Output Modules: Defined as dry relay contact closure outputs for ON/OFF operation of devices external to the programmable controller module. The output modules shall be optically isolated from inductively generated, normal mode and low

energy, common mode transients to 1500 volts peak. All output modules shall have LEDs to indicate status of each output point. Output contact rating shall be 2A minimum, 24V AC. Each output point shall be individually isolated and fused.

Note: Discrete output contacts which are used to operate motors greater than 10 HP or with size 2 or larger starters shall be provided with interposing relays in the PLC enclosure. Both the automatic start/stop output contacts and the safety/power system permissive output contacts shall be provided with relays when the above condition is met. Both the automatic start/stop output contacts and the safety/power system permissive output contacts shall be provided with relays when the above condition is met. . The PLC system shall also offer discrete input hardware consisting of the following types:

- a. AC output for devices which operate at 120 VAC, 50/60 Hz.
- b. Isolated AC output which provides 6 isolated outputs capable of switching 120 VAC or 220 VAC power.
- c. Contact output which provides 8 normally open/normally closed reed relay outputs.
- d. Contact output which provides 4 normally open or 4 normally closed wetted contacts.

The discrete input and output modules can be combined on a single I/O module as long as the I/O quantity of each type meets specified requirement. For combination part number see discrete input above.

4. Analog Input Modules: Defined as 4 to 20mA DC signals, where an analog to digital conversion is performed with 12 bit precision and the digital result is entered into the processor. The analog to digital conversion shall be updated with each scan of the processor. Input modules shall be source or sink to handle 2 wire or 4 wire transmitters respectively. Analog inputs shall also be available in the following ranges:
 - a. Voltage range: 0 to +5 VDC, +1 to +5 VDC, 0 to +10 VDC, -5 to +5VDC, -10 to +10 VDC.
 - b. Current range: 4 to 20mA,

Analog Input Modules shall be **Schneider Electric Modicon Momentum Series model 170 AAI 140 00 – 16 channel singles ended analog input. No substitution and no or equal.**

5. Analog Output Modules Defined as 4 to 20mA DC output signals where each output circuit performs a digital to analog conversion minimum of 12 bit precision with each scan of the processor. Each analog output module shall have two isolated output points which shall be rated for loads of up to 1200 ohms. The CONTRACTOR shall provide current loop isolators as required to break ground loops.

2.5 NETWORK HARDWARE

- A. As part of the interface requirement between the R-I/O and the existing PLC, the CONTRACTOR shall provide and equip the R-I/O unit with an Ethernet communication

module to enable the R-I/O communicate Modbus/TCP to the existing PLC, and for the R-I/Os to be integrated into it.

The Ethernet communication module shall be **Schneider Electric Modicon Momentum Series model 170 ENT 110 02. No substitution and no or equal.**

- B. The CONTRACTOR shall furnish to the OWNER (furnish only, new in a box to be installed by the OWNER) an 8-port Ethernet switch with IEEE802.3/802.3u/802.3x technology standards that can support 10/100BaseT(X) to serve as a hub for the Modbus TCP communication to the existing PLC. The Ethernet switch shall be **Moxa EDS-208 or equal.**
- C. The CONTRACTOR shall furnish to the OWNER (furnish only, new in a box to be installed by the OWNER) a Modbus Bridge to allow the SolarBee Mixer RS-485 signal to interface to the existing PLC The Modbus Bridge shall be a **Schneider Electric model 174CEV30020 no equal to match existing.**
- D. All unshielded twisted pair cabling shall be rated EIA/TIA 568 category 5e. CAT 5e cabling shall be provided between the Schneider Electric Modicon R-I/O communication module and the existing PLC cabinet long enough to reach the top of the PLC cabinet plus 3 feet of extra cable (coiled) to be conneted by the OWNER. The cable shall be provided with the proper connector on both ends and connected only to the R-I/O communication module.

2.6 SPARE PARTS

- A. PLC system spare parts shall be furnished in accordance with Section 409100.

PART 3 -- EXECUTION

3.1 INSTALLATION

- A. The CONTRACTOR shall utilize personnel to accomplish, or supervise the physical installation of all elements, components, accessories, or assemblies which it provides. The CONTRACTOR shall employ installers who are skilled and experienced in the installation and connection of all elements, components, accessories, and assemblies it provides.
- B. All components of the PLCS including all communication cabling shall be the installation responsibility of the CONTRACTOR unless specifically noted otherwise. The installation of the communication network shall be the complete installation responsibility of the CONTRACTOR including all cables, connectors, transceivers, and any required electrical grounds. Grounding shall be shown on submittal drawings. After installation of the PLCS is completed, the installation shall be inspected jointly by the CONTRACTOR and the Equipment Manufacturer's representatives. Any problems shall be corrected, and when both are satisfied with the installation, a written certification of the installation shall be delivered to the ENGINEER. The certification shall state that all PLC communication and I/O modules, system grounds, communication network and all other components of the PLCS System have been inspected and are installed in accordance with the manufacturer's guidelines.

3.2 FACTORY TEST

- A. **General:** No factory test is required for this project as only new I/O is being added to the existing PLC's in the field.

3.3 CALIBRATION, TESTING, AND INSTALLATION

- A. **Calibration:** All analog inputs and outputs of the PLC shall have their calibration checked at a minimum of 4 points to verify consistency with the balance of the analog loop. This calibration check shall be done in conjunction with the analog loop tests in Section 409100.
- B. **Testing:** After the R-I/O installation has been certified and the analog points have been calibrated, the R-I/O shall be tested and verified that all discrete inputs and outputs are correct. All points shall be checked "end to end." An I/O checklist shall be used to record test results and a copy provided to the ENGINEER upon completion.
- C. **System Testing:** When the PLC installation has been certified and analog loop calibration and discrete I/O testing have been completed, system testing shall be performed in accordance with the approved test procedures. System testing shall operate the various process systems to verify compliance with all functional requirements specified, including the automatic control modes and valve controller interlocks described in the control strategies contained in these specifications. . Tests which fail to demonstrate the required operation shall be repeated in their entirety or continued after corrective action has been completed at the discretion of the ENGINEER.
- D. **Plant/Facility Start-Up Test:** The CONTRACTOR shall provide start-up support to include the Instrumentation Supplier's personnel, electrical personnel, and the PLC system manufacturer's representative as required during the testing period to produce a fully operational treatment plant. This support shall be provided as part of the WORK.

3.4 TRAINING

- A. **Instruction:** The CONTRACTOR shall provide an 8 hour training session for the purpose of familiarizing the OWNER's maintenance and troubleshooting and operating with the use, maintenance, calibration, and repair of all components of the R-I/O.
- B. The training shall be scheduled in advance and be concurrent with the calibration, equipment testing, and process system testing phases of the project. The training shall be performed by qualified representatives of the CONTRACTOR or the Manufacturer
- C. Within 10 days after the completion of each class the CONTRACTOR shall present to the ENGINEER the following:
 - 1. A list of all OWNER personnel that attended the class.
 - 2. An evaluation of OWNER personnel that attended the class via written testing or equivalent evaluation.

3. A copy of the hard copy text utilized during the class with all notes, diagrams, and comments. This documentation shall be contained in the Training Manual.

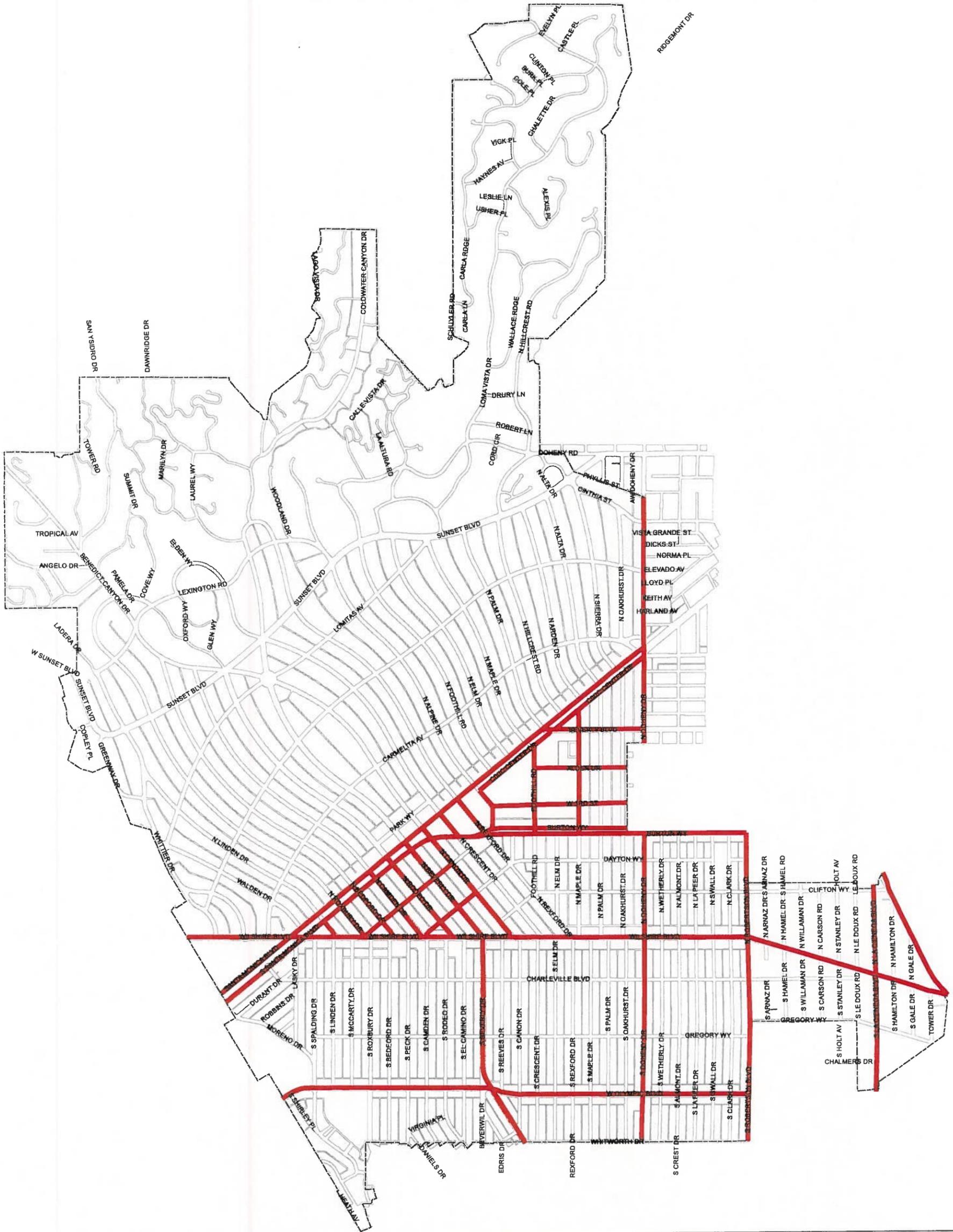
- END OF SECTION -

APPENDIX G

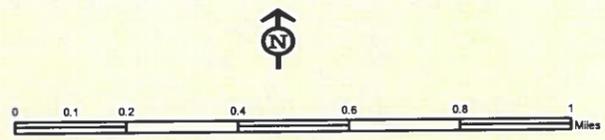
COBH APPROVED HEAVY HAUL TRUCK ROUTE MAP



Approved Heavy Haul Routes - City of Beverly Hills, California



 Heavy Haul Route
 City Boundry



This map is for informational purposes. The City of Beverly Hills makes no representations or warranties of any kind with respect to the accuracy of the information or data furnished herein.

Map produced by: City of Beverly Hills - Information Technology - GIS
 455 N. Rexford Dr. Beverly Hills, CA 90210
 March 2009

Sterling Codifiers, Inc.

7-2-203: STREETS DESIGNATED FOR HEAVY VEHICLE USAGE: 

The following streets are designated for use by vehicles exceeding a maximum gross weight, including the vehicle and its load, of three (3) tons:

Alden Drive;

Bedford Drive from Wilshire Boulevard to Santa Monica Boulevard (north);

Beverly Boulevard;

Beverly Drive from the south city limits to Santa Monica Boulevard (north);

Brighton Way from Canon Drive to Wilshire Boulevard;

Burton Way;

Camden Drive from Wilshire Boulevard to Santa Monica Boulevard (north);

Canon Drive from Wilshire Boulevard to Santa Monica Boulevard (north);

Civic Center Drive from Burton Way to Santa Monica Boulevard (south);

Crescent Drive between the north and south roadways of Santa Monica Boulevard;

Dayton Way from Canon Drive to Wilshire Boulevard;

Doheny Drive;

Foothill Road from Burton Way to Santa Monica Boulevard (south);

La Cienega Boulevard;

Linden Drive from Wilshire Boulevard to Santa Monica Boulevard (south);

Maple Drive from Burton Way to Santa Monica Boulevard (south);

Olympic Boulevard;

Rexford Drive from Santa Monica Boulevard (north) to Burton Way;

Robertson Boulevard;

Rodeo Drive from Wilshire Boulevard to Santa Monica Boulevard (north);

Roxbury Drive from Wilshire Boulevard to Santa Monica Boulevard (north);

San Vicente Boulevard;

Santa Monica Boulevard (north and south roadways);

Third Street;

Wilshire Boulevard. (1962 Code § 3-6.1306)