Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>635.0103 M</td>
<td>Cleaning and Preparation of Pavement Surfaces-Lines</td>
<td>Meter</td>
</tr>
<tr>
<td>635.0203 M</td>
<td>Cleaning and Preparation of Pavement Surfaces-Letters</td>
<td>Each</td>
</tr>
<tr>
<td>635.0303 M</td>
<td>Cleaning and Preparation of Pavement Surfaces-Symbols</td>
<td>Each</td>
</tr>
</tbody>
</table>

SECTION 636 (VACANT)

SECTION 637 - ENGINEER'S OFFICE AND LABORATORY BUILDING

637-1 DESCRIPTION. This work shall consist of providing, furnishing and maintaining an Engineer's Office and a Field Laboratory Building for the exclusive use of and occupancy by the Department and Consultant field engineers. It shall be the responsibility of the Contractor to install and maintain the Engineer's Office in compliance with all applicable building, safety, and health regulations and/or laws. The Contractor shall maintain all facilities and furnished equipment in good working condition. The office shall be cleaned weekly, or as required by the Engineer.

637-1.01 Engineer's Office (Type A, B, C, D or E). The Contractor shall supply for the Engineer's use a building or mobile trailer, (specified at Type A, B, C, D or E), which shall be erected at a location selected by the Engineer and shall be separate from any building used by the Contractor.

637-1.02 Laboratory Building. The Contractor shall supply mobile building(s) or trailer(s) for use as field laboratories for soils and materials testing. As work progresses on the contract, the laboratory shall be moved by the Contractor to follow the work, at such times and to the locations approved or designated by the Engineer.

637-1.03 Furnishing Existing Facilities and Buildings. The Contractor may furnish equivalent facilities in existing buildings provided such facilities and building(s) are located to provide convenient service and provided that the building location(s) and facilities are approved by the Regional Director in writing.

637-1.04 Concrete Cylinder Curing Box. This work shall consist of furnishing, prior to placement of any structural concrete, an approved concrete cylinder curing box.

637-2 MATERIALS

637-2.01 General Construction. Each Engineer's Office or Field Laboratory shall be an approved and weatherproof building or mobile trailer of the type specified in the contract documents. The structure shall have a minimum ceiling height of 2.13 meters and shall be provided with weatherproof windows and weatherproof doors each equipped with adequate locking devices. Each window shall have a minimum area of 0.75 square meters, shall be screened and of a type that will open and close to provide adequate ventilation.

637-2.02 General Requirements for all Engineer's Offices.

A. Lighting. Electric light, non-glare type luminaires to provide a minimum illumination level of 1000 lux at desk height level.

B. Heating and Cooling. Adequate equipment to maintain an ambient air temperature of 21°C ±3°C.

C. 35mm Camera. Autofocus operation with "red-eye reduction" and "easy film loading" features. A soft storage/carry case shall be provided. The camera functions shall include the following.

Automatic and motorized film advance and rewind.
Automatic adjustment for DX coded films
Film speeds ISO 100 through 400
Built in flash with automatic sensor
Date stamp on each picture

The supply of batteries shall be replenished by the Contractor as required by the Engineer. Film and film processing will be the responsibility of the State.

**D. Typewriter with stand.** A standard electric office size with pica type and a stand with casters.

**E. Telephone.** A separate phone for the exclusive use of Department and Consultant personnel. The phone shall have modular jacks at the wall and phone and be adaptable to electronic communications. An extension telephone, of a type and location as required by the Engineer, with a minimum 7 meter cord shall also be provided. The number of telephones, each with an extension, to be provided is specified for each type of office.

**F. Potable Water.** From a local municipal water line and/or bottled water with refrigerator unit - hot/cold water.

**G. Adding Machine.** Tape type registering to at least ten digits, four function. The number of adding machines to be provided is specified for each type of office.

**H. First Aid Kit.** The Contractor shall keep the kit properly stocked with appropriate first aid supplies at all times.

**I. Toilet.** A separately enclosed room, properly ventilated and complying with applicable sanitary codes. The Contractor shall provide all lavatory amenities, necessary paper and soap products, hot and cold running water and a flush-type toilet. Any other toilet will not be acceptable unless as ordered by the Engineer (A.O.B.E.).

**J. Locker.** A metal or wood locker, with lock, of sufficient size for storage of surveying instruments and testing equipment.

**K. Refrigerator.** A standard electric cold storage type providing a minimum storage space of approximately 0.09 m³.

**L. Fire Extinguisher.** Non-toxic dry chemical, fire extinguisher meeting Underwriters Laboratories, Inc., approval for Class A, Class B and Class C fires with a minimum rating of 2A: 10B: 10C. 1 per room.

**M. Fire Resistant Cabinet.** Fire resistant, 4 drawer, legal size file cabinet with lock and 2 keys, meeting the requirements for “Insulating Filing Devices, Class 350-1 Hour (D)” of ANSI/UL 72 or the Class D rating of the original Underwriters Laboratories specification for insulated filing devices. The number of cabinets to be provided is specified for each type of office.

**N. Thermometer.** A minimum -- maximum celsius thermometer.

**O. Pencil Sharpener.** Manual, standard pencil sharpener. 1 per room.

**P. Photocopying Machine.** Desk top, heavy duty, electric, dry process photocopying machine. The machine shall be capable of copying 216 mm x 279 mm, 216 mm x 355 mm, 216 mm x 432 mm sheets. An adequate supply of 75 gram per square meter copy paper in the three (3) sizes shall be provided. The supply of copy paper shall be replenished by the Contractor as required by the Engineer.

**Q. Signs/Bulletin Board.** The Contractor shall furnish and install necessary signs to locate and identify the Project Engineers Office. The sign shall be installed at the location or locations directed by the Engineer. The panel material may be of any material permitted under §619-2.02, Construction Signs. The panel shall be
900 mm high by 1200 mm wide with white legend on green background with the phrases as positioned and described below.

The letters in the phrase “FIELD OFFICE” shall be 150 mm C series with the top of the letters 150 mm below the top of the panel. The letters in the phrase “PROJECT ENGINEER” shall be 150 mm B series with the top of the letters 450 below the top of the panel. The letters in the phrase “N.Y.S. DEPT. OF TRANSPORTATION” shall be 38 mm E series with the top of the letters 750 mm below the top of the panel. All phrases shall be centered horizontally on the panel.

If erected at a location where the sign might be struck by passing traffic, as determined by the Engineer, the sign support shall be a breakaway type. Payment for the sign and its supports shall be included in the price for the Engineer’s Office.

The Contractor shall also furnish and install a 1.2 m x 2.4 m weatherproof Bulletin Board in front of or adjacent to the Project Engineers Office. This Board may also be attached to the Office on an outside wall which is easily accessible and clearly visible.

**R. Stove.** The Contractor shall furnish an electric, propane or bottle gas stove adequate for rapid drying of soil samples, including all necessary fuel or electrical supply and all maintenance necessary for continued operation. Size of the stove shall be approved by the Engineer.

Stove will be necessary when Excavation, embankment, and/or culverts and storm drains are included in a project and a laboratory building is not included.

**S. Tack Board.** Cork Tack Boards (0.6 m x 1.2 m) mounted on a wall of each room.

**T. Bookcase.** A self-standing 3 shelf metal bookcase. 1 per room. (Approximate size 1.2 m high, 1.2 m wide, 0.3 m deep.)

**U. Waste Paper Baskets.** Constructed of metal. 1 per room.

**V. Parking Area.** The Contractor shall provide/furnish a paved or hard surfaced (gravel or bankrun material) parking area adjacent to the building where the Engineers Office is located. The number of spaces to be provided is specified for each type of office. Each space shall measure 2.75 m by 5.50 m.

**W. Mailbox.** Standard mailbox (with post if necessary) or post office box shall be provided.

**X. Coat Rack.** A metal or wooden coat rack capable of holding at least 4 coats. 1 per room.

**Y. Telephone Answering Device.** A FCC approved automatic answering device capable of recording outgoing messages of 60 seconds long and receiving a minimum of 40 incoming messages of 60 seconds duration. The unit shall include a message mark so you can hear new messages without erasing old messages. The unit shall include remote programming of playback, backspace, and out-going message re-record. The unit shall include computer generated voice marking of time and day of each message received. The unit shall allow for the retrieval of messages without a remote beeper unit or shall include a number of remote control units as ordered by the Engineer (A.O.B.E.).

**Z. Telephone FAX Machine,** with a dedicated telephone line (in addition to the telephone line(s) specified in Table 637-1 and meeting the following requirements:

<table>
<thead>
<tr>
<th>DOCUMENT SIZE</th>
<th>216 mm X 279 mm both transmit and receive with transmit speed less than 20 seconds per page</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPATIBILITY</td>
<td>Group G3</td>
</tr>
<tr>
<td>RESOLUTION</td>
<td>Standard, with 16-Shade Gray Scale</td>
</tr>
<tr>
<td>RECEIVING</td>
<td>Automatic</td>
</tr>
<tr>
<td>DOC FEEDER</td>
<td>Automatic 5 Sheets</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>AUTO DIALER</th>
<th>10 Phone Number Memory with automatic redial and on-hook dialing</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRANSMIT TERMINAL IDENTIFICATION</td>
<td>Page number, Sender's Phone Number and Name</td>
</tr>
<tr>
<td>OUTPUT DOCUMENT SEPARATOR</td>
<td>Automatic Cutter</td>
</tr>
</tbody>
</table>

An adequate supply of fax paper shall be provided. The supply of fax paper shall be replenished by the Contractor as required by the Engineer.

637-2.03 General Requirements for Engineer's Offices, Types B, C, D and E only (Not Type A)

1. Freestanding Microcomputer System Workstation with a 1.50 m long by 0.75 m wide work surface and height of 0.70 m. The workstation shall include an adjustable shelf approximately 0.30 m wide and no less than 0.75 m long. This workstation shall be fully assembled.
2. Ergonomic Microcomputer Workstation Chair w/arms, five (5) legs w/casters and adjustable from approximately 0.4 m to 0.6 m height by pneumatic gas cylinder. This chair shall be fully assembled.
3. Antistatic Tabletop Mat for the Microcomputer System Workstation with an approximate size of 0.75 m long by 0.60 m wide.
4. Ergonomic and height adjustable “wrist rest” keyboarding support
5. Calculator. The device shall be capable of executing normal engineering/surveying calculations and have sufficient memory to accept and execute programs of at least 200 lines or steps. The device shall also be capable of printing the results of calculations and programs, storing programs resident in the device on a magnetic medium for later use, and accepting preprogrammed software. The Contractor shall supply the preprogrammed software capable of performing normal surveying computations and the printing paper. The supply of printing paper shall be replenished by the Contractor as required by the Engineer. Instruction manuals for the calculator and software shall also be provided.

637-2.04 Specific Requirements for all Engineer’s Offices (Type A, B, C, D, and E).

A. Engineer's Office Type A. In addition to the general requirements, Type A shall provide a minimum of 18 square meters of floor space with one outside door and four windows. The office shall be partitioned to provide two rooms with an adjoining door. The smaller room shall not be less than 6 square meters in floor space and shall contain at least one of the four windows. The furnishings shall be as indicated in Table 637-1 of this Section.

B. Engineer's Office Type B. In addition to the general requirements, Type B office shall provide a minimum 30 square meters of floor space with two outside doors and six windows. The office shall be partitioned to provide two rooms with an adjoining door. The smaller room shall be not less than 9 square meters in floor area and shall contain two of the six windows. The furnishings shall be as indicated in Table 637-1 of this Section.

C. Engineer's Office Type C. In addition to the general requirements, Type C office shall provide a minimum 42 square meters of floor space with two outside doors and six windows. The office shall be partitioned to provide three rooms with adjoining doors. The smaller rooms shall be not less than 9 square meters in floor area and shall contain two of the six windows. The furnishings shall be as indicated in Table 637-1 of this Section.

D. Engineer's Office Type D. In addition to the general requirements, Type D office shall provide a minimum of 66 square meters of floor space and shall be partitioned to provide four rooms: three small rooms and one large room with adjoining doors. The smaller rooms shall be not less than 9 square meters in area, and shall each contain two windows. Two outside doors and at

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least eight windows will be the total required. The furnishings shall be as indicated in Table 637-1 of this Section.

If two mobile trailer units are provided, they shall be joined in parallel fashion and shall have two weatherproof doorways or archways between units A.O.B.E. A minimum of two (2) outside doors shall still be required, and arranged so as to facilitate emergency access.

### TABLE 637-1 Specific Requirements for Offices

<table>
<thead>
<tr>
<th>Office Type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item Description</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
</tr>
<tr>
<td>Office Desks not less than 0.75 m X 1.5 m each with Drawers and Locks</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Office Chairs</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>Fire Resistant Cabinet, 4-Drawer as specified in §637-2.02M</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Drafting-type Tables, approximately 0.9 m by 1.8 m and supported</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>by brackets and legs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drafting stools</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Vertical filing plan rack for 6 sets of plans each</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Vertical filing plan rack for 12 sets of plans each</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Roll File Unit each with twelve 0.15 m X 0.15 m compartments for</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>twelve cross-section rolls each 0.60 meters long</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office table, not less than 0.9 m X 1.8 m each</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Metal storage cabinet with four adjustable shelves, tumbler lock and</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>two keys (approx. size 1.80 m high, 0.90 m wide, 0.45 m deep)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adding Machine as specified in §637-2.02G</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Telephone lines with extensions as specified in §637-2.02E</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Parking lot spaces as specified in §637-2.02V</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>

**E. Engineer's Office Type E.** In addition to the general requirements, Type E office shall provide a minimum of 85 square meters of floor space, a maximum of 130 square meters of floor space, and shall be partitioned to provide four rooms: two small rooms and two large rooms each with adjoining doors. The smaller rooms shall be not less than 11 square meters in area and shall each contain two windows. Two outside doors and at least twelve windows will be required. The furnishings shall be as indicated in Table 637-1 of this Section.

If two mobile trailer units are provided, they shall be joined in parallel fashion and shall have two weatherproof doorways or archways between units A.O.B.E. A minimum of two (2) outside doors shall still be required, and arranged so as to facilitate emergency access.

### 637-2.05 Minimum requirements for Field Laboratories.

**A. Area.** Floor space of 9 square meters.

**B. Windows.** Three windows.

**C. Doors.** One door with lock and two sets of keys.

**D. Floor Covering.** Linoleum, tile or other serviceable finish.

**E. Sink.** A sink at least 0.90 meters long by 0.60 meters wide by 0.45 meters deep, equipped with water faucet and drain line.
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F. Counter. A work counter next to sink at least 0.6 meters long by 0.6 meters wide.

G. Table. A heavy duty work table not less than 2.50 meters long by 0.75 meters wide by 0.90 meters high.

H. Cabinet. A storage cabinet or locker at least 0.6 meters square by 1.8 meters high, equipped with at least four shelves, lock and two keys.

I. Fire Resistant Cabinet. Two drawer as specified in §637-2.02M.

J. Desk. A desk or writing table with chair.

K. Pedestal. A heavy wooden block for soil compaction tests, nominally 0.25 meters square by 0.30 meters high. (Soils Lab. only.)

L. Stove. As specified in §637-2.02R.

M. Lighting. Electric lighting and not less than three convenient outlets. Electric service shall be for not less than 20 amperes, 115 VAC. Where an electric hotplate or stove is provided under (L) above, service shall be increased over 20 amperes by an amount equal to the rating of the device listed on the nameplate.

N. Potable Water. Potable water supplied from an existing system or from an external 200 liter (minimum) gravity-feed storage tank connected to the sink faucet.

O. Heater. A space heater with the necessary fuel and outside vent, if required.

P. Fire Extinguisher. As specified in §637-2.02L.

637-2.06 Concrete Cylinder Curing Box. The materials shall meet the requirements of §735-01, Concrete Cylinder Curing Box.

637-3 CONSTRUCTION DETAILS

637-3.01 General Requirements. The buildings shall be fully equipped and made available for use and occupancy by the Department personnel as well as comparable personnel employed by a Consultant prior to the start of any contract work. Such use and occupancy shall be made available after the work has been accepted by the Department as directed in writing by the Regional Director.

All buildings shall be maintained in good condition and appearance by the Contractor for the designated period after which all portable buildings or trailers, fencing, surfacing and utilities shall be removed from the location, the areas cleaned, loamed and seeded if required and left in a neat and acceptable condition.

The Contractor shall be responsible, until use and occupancy of the Engineer's office and Laboratory building is relinquished by the State, for any and all damage, direct or indirect, of whatever nature, occurring to the property of the State of New York, property of the Department's personnel, property of the Department's Consultant representative, including other employees of the Consultant assigned to this office, which is kept in the Engineer's Office and Laboratory Building. Non-State owned or employee property shall only be those items used by appropriate personnel in the performance of project-related work activities. Such property shall be replaced within 30 days of the reported damages and would include any loss caused by, but not limited to, fire, theft, vandalism or malicious mischief.

The Engineer shall provide the Contractor a detailed list of items, with corresponding dollar values, belonging to the State of New York, the Department's personnel, the Department's Consultant representative, and the Consultant's employees at least once every three months but not more than once a month. The Contractor shall not be responsible for items kept in the Engineer's office that are not on this list.

637-3.02 Concrete Cylinder Curing Box. The Contractor shall furnish the Engineer a concrete cylinder curing box and two locks with two keys for each lock. The locks shall fit each securing latch of the curing box. This concrete cylinder curing box shall remain exclusively available to the Engineer
at the location selected by the Engineer. The Contractor shall relocate to any new location directed by the Engineer, repair or replace, if necessary, paint, clean and otherwise maintain the concrete cylinder curing box for the duration of the contract. The Contractor shall also provide and maintain all necessary utility connections to operate the curing box.

The concrete cylinder curing box will remain the property of the Contractor and shall be removed from the site of the work upon completion of the contract.

§637-4 METHOD OF MEASUREMENT

637-4.01 Engineer’s Office (Type A, B, C, D and E). Payment will be made for each month (to the nearest 0.25 month increment), of availability for occupancy by the field engineers during the period of the contract. Payment will begin the first month that the office is fully equipped, serviced as specified, and made available for occupancy. Monthly payments will continue until the date of acceptance of the contract. When directed in writing by the Regional Director, payment for each month’s occupancy after the date of acceptance will be made as part of the final estimate. Failure of the Contractor to supply all documents required to complete the final estimate may result in a non-payment during this delaying period. This non-payment will be in the form of a charge to the Contractor as further stated in §637-5 of this Specification. Monthly payments may be terminated on a specified date prior to acceptance of the contract by written notification by the Regional Director that such office will no longer be required on the contract.

No payment will be made for occupancy and services during the periods of contract extension of time where Engineering Charges are assessed, except that, in such cases, payment for each month’s occupancy after the date of acceptance will be made as part of the final estimate when directed in writing by the Regional Director.

637-4.02 Laboratory. Payment will be made for each building or trailer furnished under this work as follows: Seventy-five (75%) of the amount bid will be paid when the building or trailer equipped as specified has been placed on the work site and fully operative. The remaining twenty-five percent (25%) will be paid when the Engineer estimates the contract to be ninety percent (90%) complete, on a dollar basis.

637-4.03 Concrete Cylinder Curing Box. Concrete cylinder curing boxes will be measured by the number of units furnished and installed and actually used in accordance with these specifications.

§637-5 BASIS OF PAYMENT

637-5.01 Engineer’s Office (Type A, B, C, D, and E). The unit price bid per month shall include the cost of all labor, material, equipment, ground rental and utility charges necessary to complete the work.

No payment will be made under Engineer’s Office for each calendar day during which there are deficiencies in compliance with the requirements of any sub-section of this specification. The first calendar day shall commence 24 hours after notice to the Contractor of such a deficiency. This non-payment shall be deducted from the Contractor’s next estimate as a charge to Contractor on the item. The amount of such calendar day non-payment will be determined by dividing the unit price bid per month by 30.

In addition, if the cited deficiencies exceeds 72 hours or is permitted to recur, liquidated damages will be assessed at twenty percent (20%) the rate shown in Table 108-1 of §108-03 for each subsequent calendar day or part thereof that a cited deficiency resulting in non-payment, as prescribed herein, is not corrected.

637-5.02 Laboratory. The price bid for each building or trailer shall include the cost of furnishing all labor, materials and equipment necessary to erect, relocate and remove the building or trailer as directed by the Engineer, together with all fuel, water, ground rental, or other expenses incidental thereto.
§637-5

637-5.03 Concrete Cylinder Curing Box. The unit price bid for each box shall include the cost of all labor, material, equipment, ground rental, relocation, repair or replacement, painting, cleaning, maintenance, and utility charges necessary for operation.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>637.01 M</td>
<td>Laboratory Building</td>
<td>Each</td>
</tr>
<tr>
<td>637.03 M</td>
<td>Concrete Cylinder Curing Box</td>
<td>Each</td>
</tr>
<tr>
<td>637.0502 M</td>
<td>Engineer's Office-Type A</td>
<td>Month</td>
</tr>
<tr>
<td>637.0602 M</td>
<td>Engineer's Office-Type B</td>
<td>Month</td>
</tr>
<tr>
<td>637.0702 M</td>
<td>Engineer's Office-Type C</td>
<td>Month</td>
</tr>
<tr>
<td>637.0802 M</td>
<td>Engineer's Office-Type D</td>
<td>Month</td>
</tr>
<tr>
<td>637.0902 M</td>
<td>Engineer's Office--Type E</td>
<td>Month</td>
</tr>
</tbody>
</table>

SECTION 638 - WHITE SYNTHETIC RESIN BINDER CONCRETE

638-1 DESCRIPTION. This work shall consist of the construction of white synthetic resin binder concrete pavement in accordance with these specifications and in reasonably close conformity with lines and grades shown on the plans or established by the Engineer.

638-2 MATERIALS. The materials shall meet the requirements of §402-2, Materials, except as modified below.

638-2.01 Aggregates. The requirements of §703-05, Fine Aggregate for White Portland Cement Concrete, shall apply except that the gradation shall meet the general limits described in §638-2.05, Mix Design. A sample of the white aggregate will be obtained by the Department from the stockpile located at the mixing plant and submitted to the Materials Bureau at least 10 days prior to the production of the mix for color approval by the Director, Materials Bureau. Unless otherwise approved by the Regional Director, the material shall be stockpiled in advance and in sufficient quantity to complete the work. Any additions to the stockpile or apparent contamination of the aggregate, as determined by the Engineer, will require submission of samples to the Materials Bureau for evaluation and approval by the Director, Materials Bureau.

638-2.02 Mineral Filler. Mineral Filler, if required in the mix to meet gradation requirements shall be hydrated lime.

638-2.03 Binder. The binder shall conform to the requirements of §702-70. The synthetic resin binder shall be supplied by a manufacturer appearing on the Department's Approved List of Synthetic Resins. When the one component binder is used, the binder shall be available 10 days prior to production of the mix so representative samples of the binder can be obtained by the Engineer and tested by the Materials Bureau for conformance to §702–70.

638-2.04 Pigment. The pigment shall conform to the requirements of §712-16, Pigment for Colored Synthetic Resin Binder Concrete.

638-2.05 Mix Design. The job mix formula stating the proposed aggregate gradation, binder and pigment contents shall be prepared by the synthetic resin binder concrete producer according to the requirements of §401-2.01, Hot Mix Asphalt Designs, except for the modifications in this specification.

The general limits for the mix are as follows:
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<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>General Limits (1) % Passing</th>
<th>Job Mix % Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.3 mm</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>3.2 mm</td>
<td>90–100</td>
<td>±5</td>
</tr>
<tr>
<td>850 μm</td>
<td>42–68</td>
<td>±7</td>
</tr>
<tr>
<td>425 μm</td>
<td>20–50</td>
<td>±6</td>
</tr>
<tr>
<td>180 μm</td>
<td>10–22</td>
<td>±3</td>
</tr>
<tr>
<td>75 μm</td>
<td>6–12</td>
<td>±2</td>
</tr>
</tbody>
</table>

Synthetic Binder Content (2) 7.0–8.0
Pigment (1,3) 2.3–2.7
Mix and Placing Temperature 120°C–160°C

NOTES:
1. Based on total aggregate weight.
2. Based on total mix weight.
3. The pigment shall be considered as mineral filler passing the 75 μm sieve.

638-2.06 Tack Coat. The tack coat shall be supplied by a manufacturer appearing on the Department's Approved List of Synthetic Resins. The tack coat shall conform to the requirements of §702–71. The tack coat material shall be available 10 days prior to production of the mix so representative samples of the tack coat can be obtained by the Engineer and tested by the Materials Bureau for conformance of §702–71.

638-3 CONSTRUCTION DETAILS. Except as provided in this specification, the construction requirements shall meet those of §402-3, Hot Mix Asphalt (HMA) Pavements - Construction Details.

638-3.01 Weather Limitations. The requirements for top course mixes in §402-3.01, Weather and Seasonal Limitations, shall apply.

638-3.02 Preparation of Mixture. The mixing plant shall meet the requirements of §401-3.08 unless otherwise approved by the Director, Materials Bureau. Before the pugmill is allowed to produce white synthetic resin binder concrete, it shall be thoroughly cleaned by charging a minimum of two (2) successive batches of hot dry aggregate into the pugmill and mixing each batch for a minimum of four (4) minutes. In addition, the first batch of white synthetic resin binder concrete produced, after a change from normal asphalt concrete production, shall not be incorporated into the work. Such batches shall be at least fifty (50) percent of the rated pugmill capacity. This batch may also be used for the first material passed through the paver as described in §638–3.04, Paving. The white aggregate shall be introduced into the pugmill, between the limits of 120°C to 180°C and the temperature of the synthetic resin binder (one component) shall be maintained between the limits of 130°C and 150°C. When the binder is added directly into the pugmill in cold, prepackaged units (two components), the temperature of the aggregate may be increased accordingly to meet the specified mix temperature, but shall not exceed 220°C. For either method of binder addition, the resulting mix temperature shall be in the range of 120°C to 160°C.

The pigment, resin chips, plasticizing oil and hydrated lime shall be added to the pugmill in whole bag units. If the pigment and/or hydrated lime is not delivered from the manufacturers as whole units, the Contractor may weigh and repackage in a manner approved by the Engineer so that the pigment and/or hydrated lime may be added as whole units. The hydrated lime may be added in a manner approved by the Engineer, if difficulties are encountered in maintaining the specified mix temperature when adding the hydrated lime directly to the pugmill.

Batching and mixing requirements for the White Synthetic Resin Binder Concrete are as follows:

A. One Component Binder. After the hot aggregate is discharged into the pugmill, add the pigment and hydrated lime in whole bag units as required and dry mix for a minimum of 15 seconds.
§638-3

After the dry mix the synthetic resin binder should be added and wet mixed for a minimum of 45 seconds.

**B. Two Component Binder.** After the hot aggregate is discharged into the pugmill add resin chips in whole bag units as required. This should be immediately followed by the addition of the hydrated lime in whole bag units and dry mixed for 30 seconds. Following the dry mix add the plasticizing oil and pigment in whole bag units in that order and wet mix for 30 seconds after all components are in the pugmill.

Any increase in pigment content above that specified on the job mix formula for the convenience of mixing shall be made at no additional cost to the Department. The pigment content may be increased within the general limits, as directed by the Engineer, to obtain a satisfactory color during production.

638-3.03 *Preparation of Surface.* All surfaces to be paved shall be thoroughly cleaned of all foreign material, including membrane curing compound of Portland Cement concrete pavement, prior to the placing of the pavement. A tack coat, consisting of a uniform application of rapid curing synthetic resin liquid, §702–71, shall be applied at a uniform rate between 0.15 to 0.25 liters per square meter over the areas to be paved. The tack coat shall be applied with either a paint roller or spray unit to assure uniform application. The tack coat shall not be poured onto the pavement surface for application. After the tack coat application, curing time shall be sufficient to permit the coating to become tacky before paving. No traffic shall be permitted on the tack coated surface.

638-3.04 *Paving.* The mix shall be laid between the temperatures of 120° to 160°C as specified by the Engineer. All areas of uniform width of 1.2 meters or more shall be paved with an approved paving machine. Areas of narrow or variable width may be placed without a paver but in a manner approved by the Engineer. All paving edges shall be formed in a manner approved by the Engineer to obtain a true edge. The equipment including trucks, paving machine rollers and tools which come in contact with the white synthetic resin binder concrete shall be thoroughly cleaned before use. In addition, the paving machine shall be cleaned of excess asphalt by spraying with solvent. This shall be directly followed by the passage and subsequent wastage of at least one (1) metric ton of the white material. The material may be from the same batch used to clean the pugmill.

638-3.05 *Compaction.* Provisions of §402-3.07 Compaction shall apply except that a minimum of two passes of a nominal 9 metric ton steel wheel tandem roller shall be used for compaction. The edge forms shall be removed prior to applying the second roller pass. This shall be done as expeditiously as possible so that the second roller pass is completed while the mat is still hot. Forms used for the formation of transverse drainage troughs shall be kept in place until the completion of all rolling operations. Narrow areas which are subject to overstressing with a 9 metric ton roller may be rolled with a small roller as approved by the Engineer. The paving edge forms shall be removed prior to applying the final roller pass with the small roller as previously described for the 9 metric ton rollers. The use of a pneumatic tire roller will not be required for this item.

638-4 *METHOD OF MEASUREMENT.* The quantity of white synthetic resin binder concrete shall be measured by the number of metric tons of compacted material in place.

638-5 *BASIS OF PAYMENT.* The unit price bid per metric ton of white synthetic resin binder concrete shall include the cost of all materials, equipment and labor necessary to complete the work including the synthetic resin binder, pigment and tack coat.

*Payment will be made under:*

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>638.0104 M</td>
<td>White Synthetic Resin Binder Concrete</td>
<td>Metric Ton</td>
</tr>
</tbody>
</table>
SECTION 639 (VACANT)

SECTION 640 - REFLECTORIZED PAVEMENT MARKING PAINTS

640-1 DESCRIPTION. Under this work, the Contractor shall furnish and apply painted reflectorized pavement marking paint at the locations and in accordance with the patterns indicated on the plans or as directed by the Engineer, and in accordance with the NYSMUTCD and these specifications.

640-2 MATERIALS. Reflectorized pavement marking paints shall be selected from the Department's Approved List of White and Yellow Reflectorized Pavement Marking Paints. Project acceptance will be based on the appearance of an approved brand name on the container label.

All paints shall conform to Federal, State, and local air pollution regulations, including those for the control (emission) of volatile organic compounds (VOC) as established by the U.S. Environmental Protection Agency, and the New York State Department of Environmental Conservation.

Reflective glass beads shall conform to §727-05 Glass Beads for Reflectorized Pavement Marking Paints.

Details for obtaining Approved List status are available from the Materials Bureau.

640-3 CONSTRUCTION DETAILS

640-3.01 General. All pavement markings and patterns shall be placed as shown in the contract documents and in accordance with the New York State Manual of Uniform Traffic Control Devices.

Before any pavement marking work is begun a schedule of operations shall be submitted to and approved by the Engineer.

When pavement markings are applied under traffic, the Contractor shall provide all the necessary flags, signs, cones, shadow vehicles, flashing arrow boards, etc. to maintain and protect traffic, to protect the work operation, and to protect the painted pavement markings until thoroughly dry and serviceable. No additional payment will be made for these items. The application of pavement markings shall be done in the general direction of traffic. Striping against the direction of normal flow of traffic shall not be allowed.

The Contractor shall be responsible for cleaning the pavement, to the satisfaction of the Engineer, of dust, dirt, and other foreign material which may be detrimental to the adhesion of the paint film.

When necessary, the Contractor shall establish marking line points at nine (9) meter intervals throughout the length of the pavement or as directed by the Engineer.

The Contractor shall be responsible for removing, to the satisfaction of the Engineer, all tracking marks, spilled paint, and paint applied in unauthorized areas.

640-3.02 Application of Pavement Markings. Painted pavement markings shall be applied with either atomizing or airless type striping equipment. The striping equipment may be either truck mounted or hand operated, and shall be equipped with glass bead dispensing equipment. The striping equipment shall be compatible with and suitable for the application of the type of paint being used.

At the time of paint application, the pavement surface and ambient temperature shall not be less than 10°C, the relative humidity shall not exceed 85%, and the pavement surface shall be dry. Painted pavement markings shall not be applied during periods of rain or if rain is imminent. Waterborne type paints shall not be applied if rain is expected within 4 hours after the paint application.

Paint shall be applied in strict accordance with the manufacturer's recommendations for use. In no case shall the paint be heated above 65°C.

The painted pavement markings shall be uniformly applied to the pavement surface at the minimum specified wet film thickness. Immediately following paint application reflective glass beads shall be uniformly applied to the wet paint film at the rate of 0.75 kg/L of paint. The applied pavement markings shall have clean-cut edges, and true and smooth alignment.

On pavements where traffic is to be maintained and the final marking pattern is known, reflectorized pavement marking paint shall be applied before nightfall or before the end of the working day, whichever comes sooner. If the Contractor is unable to apply these final pavement markings, where traffic is to be
§640-3

maintained, then Short-Term Pavement Markings meeting the requirements of §619-3.06 shall be installed using removable reflectorized pavement markings, offset from the location of the project’s final pavement markings, at no additional cost to the State.

640-4 METHOD OF MEASUREMENT. Pavement striping will be measured in linear meters along the centerline of the pavement stripe and shall be based on a 100 mm wide stripe. Measurement for striping with a plan width greater or less than the basic 100 mm as shown in the contract documents or as directed by the Engineer, will be made by the following method:

\[
\text{Plan Width of Striping (Millimeters) x Meters} \times \frac{100 \text{ Millimeters}}{100 \text{ mm stripe}}
\]

No payment will be made for the number of meters of gaps in between the dashed lines. Letters and symbols will be measured by each unit applied. A unit will consist of one letter or one symbol. Examples: “SCHOOL” will be measured as six units. Double and triple headed arrows will each be measured as a single unit. The “X” in railroad grade crossing markings (MUTCD figure 263-33) will be measured by meter of 100 mm stripe.

640-5 BASIS OF PAYMENT. The accepted quantities of pavement markings will be paid for at the contract unit price bid, which shall include the cost of furnishing all labor, materials, and equipment to satisfactorily complete the work. The cost for maintaining and protecting traffic during the painting operations shall be included in the price bid. The application of Short-Term Pavement Markings, necessitated by the Contractor’s failure to apply the required Reflectorized Pavement Marking Paints, shall be at no additional cost to the State.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>640.10 M</td>
<td>White Paint Reflectorized Pavement Stripes - 0.38 mm</td>
<td>Meter</td>
</tr>
<tr>
<td>640.11 M</td>
<td>Yellow Paint Reflectorized Pavement Stripes - 0.38 mm</td>
<td>Meter</td>
</tr>
<tr>
<td>640.12 M</td>
<td>White Paint Reflectorized Pavement Letters - 0.38 mm</td>
<td>Each</td>
</tr>
<tr>
<td>640.13 M</td>
<td>White Paint Reflectorized Pavement Symbols - 0.38 mm</td>
<td>Each</td>
</tr>
<tr>
<td>640.20 M</td>
<td>White Paint Reflectorized Pavement Stripes - 0.51 mm</td>
<td>Meter</td>
</tr>
<tr>
<td>640.21 M</td>
<td>Yellow Paint Reflectorized Pavement Stripes - 0.51 mm</td>
<td>Meter</td>
</tr>
<tr>
<td>640.22 M</td>
<td>White Paint Reflectorized Pavement Letters - 0.51 mm</td>
<td>Each</td>
</tr>
<tr>
<td>640.23 M</td>
<td>White Paint Reflectorized Pavement Symbols - 0.51 mm</td>
<td>Each</td>
</tr>
</tbody>
</table>

SECTION 641, 642 AND 643 (VACANT)

SECTION 644 - SIGN STRUCTURES

644-1 DESCRIPTION. Under this work the contractor shall furnish and erect sign structures for overhead signs in accordance with the plans, specifications and standard sheets or in a manner approved by the Engineer. Structure dampeners, when specified, shall meet the requirements included herein.

644-2 MATERIALS

644-2.01 Aluminum for Sign Structures. Aluminum for components of sign structures shall conform to the appropriate current ASTM Specification and alloy listed in Table 644-1.
### TABLE 644-1
Aluminum Components for Sign Structures

<table>
<thead>
<tr>
<th>Product</th>
<th>ASTM Specification Number</th>
<th>ANSI H35.1(M) Alloy &amp; Temper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent Mold Castings</td>
<td>B 108</td>
<td>A356.0-T61</td>
</tr>
<tr>
<td>Sand Castings</td>
<td>B 26M</td>
<td>356.0-T6</td>
</tr>
<tr>
<td>Plates</td>
<td>B 209M</td>
<td>6061-T6</td>
</tr>
<tr>
<td>Rolled Bars and Nuts</td>
<td>B 221M</td>
<td>6061-T6</td>
</tr>
<tr>
<td>Rolled or Extruded Structural Shapes</td>
<td>B 308M</td>
<td>6061-T6</td>
</tr>
<tr>
<td>Extruded Bars</td>
<td>B 211M</td>
<td>6061-T6</td>
</tr>
<tr>
<td>Drawn Tubes</td>
<td>B 210M</td>
<td>6061-T6</td>
</tr>
<tr>
<td>Extruded Tubes</td>
<td>B 221M</td>
<td>6061-T6</td>
</tr>
<tr>
<td>Pipe</td>
<td>B 429M*</td>
<td>6061-T6</td>
</tr>
<tr>
<td>Shims</td>
<td>B 209M</td>
<td>1100-0</td>
</tr>
<tr>
<td>Flat Washers</td>
<td>B 209M</td>
<td>2024-T4</td>
</tr>
<tr>
<td>Lock Washers</td>
<td>B 316M</td>
<td>**7075-T6</td>
</tr>
<tr>
<td>Bolts and Set Screws</td>
<td>F 468M</td>
<td>2024-T4</td>
</tr>
<tr>
<td>Nuts: M6 and smaller</td>
<td>F 467M</td>
<td>2024-T4</td>
</tr>
</tbody>
</table>

*with Table X1.1 replaced with ANSI-H35.2(M) Table 16.7.  **Alclad

The various alloys shall have the minimum yield strength as indicated in their respective ASTM Specifications.

**A. Hardware.** Bolts, set screws, flat washers and nuts specified as Alloy 2024-T4, shall have Type 205 anodic coating as specified in §719-02.

**B. Filler Metal.** Filler metal for welding aluminum shall conform to the specifications for Aluminum and Aluminum-Alloy Welding Rods and Bare Electrodes, AWSA5.10, current edition AWS Filler Metal Classification ER5356 or ER5556.

**C. Acceptance.** All aluminum furnished shall be documented in accordance with the following:

A certified copy of test results of chemical analyses and physical (mechanical) tests required shall be furnished for all aluminum. These test data shall be given to the shop inspector for submittal to the Deputy Chief Engineer (Structures) with his/her final inspection report.

A manufacturer's certification of the results of chemical and physical (mechanical) tests conducted as required by the specifications will be interpreted to mean that the manufacturer has tested the product as required by the specifications, and has found both materials and workmanship to conform to the specification designation listed on the report of physical and chemical test results that are certified to be accurate. Workmanship as defined herein shall include dimensional accuracy, surface finish, temper and any other physical and/or mechanical property which may be affected by manufacturing procedures.
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644-2.02 Steel for Sign Structures. Steel for component parts of sign structures shall meet the requirements specified in the following, except that steel manufactured by the Bessemer process will not be acceptable. All steel thicker than 12 mm, except nuts and bolts, which is subjected to design tensile stress, shall meet the Charpy V-Notch toughness requirements of §715-01.

A. Pipe. Pipe shall meet the requirements of one of the following:

- ASTM A53, Welded and Seamless Steel Pipe, Grade B, Type E or S.
- ASTM A252, Welded and Seamless Steel Pipe, Grade 2 or 3.
- American Petroleum Institute Specification 5LX52.

B. Tapered Posts. Steel for tapered posts shall meet the requirements of ASTM A595, low carbon steel tubes, tapered for structural use and having a minimum tensile yield strength of 380 Mpa.

C. Structural Shapes. Structural steel for structural shapes, plates, and bars shall meet the requirements of §715-01 Structural Steel, and the A.S.T.M. Specification noted on the plans or on the standard sheets.

D. Anchor Bolts, Nuts and Washers. Anchor bolts, nuts and washers shall meet the requirements of Materials Detail 723-60, or the following:

- Anchor Bolts: ASTM F 568 Class 4.6
- Nuts: ASTM A 563M Carbon and Alloy Steel Nuts, Grade A, Heavy Hex Style
- Washers: ASTM F 436M Hardened Steel Washers or ASTM F 844 with a hardness of Rockwell C31 - C38 or Brinell 295 - 352.

Nuts, washers, and the top third of anchor bolts shall be galvanized in accordance with the requirements of Materials Detail 719-01 Type II, Galvanized Coatings and Repair Methods - Zinc Coating (Hot Dip) on Iron and Steel Hardware.

E. High Strength Steel Bolts, Nuts and Washers. High strength connection hardware shall meet the following requirements:

<table>
<thead>
<tr>
<th>Part</th>
<th>ASTM Specification</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolts</td>
<td>A 325M</td>
<td>High-Strength Bolts for Structural Steel Joints [Metric]</td>
</tr>
<tr>
<td>Washers</td>
<td>F 436M</td>
<td>Hardened Steel Washers [Metric]</td>
</tr>
<tr>
<td>Nuts</td>
<td>A 563M</td>
<td>Carbon and Alloy Steel Nuts [Metric]</td>
</tr>
</tbody>
</table>

High strength bolts, nuts and washers shall be galvanized in accordance with the requirements of Type II of §719-01, Galvanized Coatings and Repair Methods.

F. Acceptance. All steel furnished shall be documented in accordance with the requirements of §715-01 Basis of Acceptance.

644-2.03 Concrete. All cast-in-place pullboxes and sign post foundations shall meet the requirements of Class A concrete in section 501, Portland Cement Concrete General, except that the requirements for inspection facilities, automated batching controls and recordation do not apply. The batching, mixing and curing methods and the inspection facilities shall meet the approval of the Department or its representative. The Contractor may submit, for approval by Director, Materials Bureau, a mix at least equivalent to the specified Class A Concrete.

All precast concrete pullboxes and sign post foundations shall meet the requirements of §723-45 Precast Reinforced Concrete Pullboxes.
§644-3

644-2.04 Sign Structure Damper. Unless otherwise approved by the D.C.E.S. all sign structure dampeners shall be the Stockbridge type. All dampeners shall meet the manufacturer's specifications. All steel and cast iron components shall be galvanized after fabrication. All material needed for making an attachment(s) to the overhead sign structure shall meet the requirements of that specific structure and the appropriate Standard Sheet. All sign structure dampeners shall meet the following criteria for weight:

<table>
<thead>
<tr>
<th>SPAN LENGTH</th>
<th>DAMPER MASS (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum</td>
</tr>
<tr>
<td>43 meters or less</td>
<td>14</td>
</tr>
<tr>
<td>Greater than 43 meters</td>
<td>16</td>
</tr>
</tbody>
</table>

644-2.05 Sign Structure Bearing Pads. Pads shall conform to the material requirements of the following:

- Type A. Pad-Rubber Impregnated Woven Cotton Fabric 728-01
- Type B. Pad-Rubber Impregnated Random Fiber Pad 728-02

The specific pad types shall be specified in the contract documents or by the Engineer.

644-2.06 Stainless Steel Bolts, Nuts, Washers, and Set Screws. Stainless steel bolts, nuts, washers and set screws shall conform to the requirements of §715-16, Stainless Steel Connecting Products.

644-2.07 Caulking Compound. This shall be a silicone rubber sealant suitable for exterior use. The specific sealant the Contractor proposes to use shall be approved by the Engineer prior to its actual placement.

644-3 CONSTRUCTION DETAILS

644-3.01 Drawings. The drawings on the appropriate Standard Sheets and Standard Drawings may be used as shop drawings. In the event the Contractor wishes to use details other than those shown on the Standard Sheets and Standard Drawings, he/she must submit shop drawings in accordance with the requirements specified under 'Drawings' in the New York State Steel Construction Manual.

If shop drawings will not be submitted for approval, the Contractor (or fabricator) shall provide notification of this fact to all persons and agencies that would have received approved shop drawings in accordance with the New York State Steel Construction Manual. No fabrication shall commence until 14 days after delivery of said notice to the designated Shop Inspection Agency.

644-3.02 Fabrication.

A. General.

1. Storage of Materials. Structural material shall be stored in a manner that will protect the materials from deformation, surface deterioration and accumulations of dirt, oil, or other foreign matter.

2. Straightening Materials. Prior to fabrication in the shop, all deformed structural materials shall be properly straightened by methods which are non-injurious. Sharp kinks and bends, and deep dents will be cause for rejection.

3. Anchor Bolts. Where anchor bolts have been or are being set under a separate contract, the Contractor shall check the size, location, and spacing of anchor bolts before fabricating the structure.

4. Quality. The fabricator shall have a Quality Control plan in place, utilizing certified inspectors, prior to the fabrication of any sign structure element.

5. Castings. Surfaces of castings designed to bear shall be machined to produce a surface
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finish of ANSI 250 as described in ANSI Standard B46.1, Part 1. After machining, the surface shall be plane and true with no out-of-flatness greater than 0.25 mm on the machine finished area.

6. Inspection. Shop inspection by inspectors representing the N.Y.S.D.O.T. may occur at any time.

7. Acceptance For Shipping. Each section of a sign structure shall bear the Inspector’s mark of acceptance prior to shipping.

B. Steel. All steel fabrication welding and welder qualifications shall be done in accordance with the requirements of the N.Y.S. Steel Construction Manual.

The Contractor shall submit the welder qualification test records and copies of his/her welding procedure specification to the D.C.E.S. for approval, prior to beginning the work. Only test records dated three years previously, or less, prior to the start of welding will be considered. All welders who qualify, shall be requalified by the above testing procedure at least three years subsequent to the last qualifying test. No welding shall be done prior to the approval of the welding procedure specification. A sample of an acceptable specification may be found in the SCM Appendix F.

C. Aluminum

1. Straightening or Bending. Aluminum may be heated to a temperature not exceeding 200°C for a time period not exceeding 10 minutes to facilitate straightening, or to bend for cambering.

2. Bolt Holes. Bolt holes shall be drilled, subpunched and reamed, or cast to the size indicated on the plans or on the standard sheets.

3. Cutting. Material less than 13 mm thick may be sheared, sawed or cut with a router. Material 13 mm or thicker shall be sawed or routed. Cut edges shall be true and smooth, and free from burrs or ragged breaks. Flame cutting and plasma arc cutting of aluminum alloys are not permitted.

4. Welding. All aluminum fabrication welding shall be done in accordance with American Welding Society Structural Welding Code - Aluminum, AWS D1.2 with the following modifications. Welding Procedure shall be either the Gas Metal Arc (GMAW) or the Gas Tungsten Arc (GTAW) welding process.

The shielding gas shall be pure argon or a welding grade mixture of helium and argon. The moisture content of all shielding gasses shall correspond to a dew point of -53°C.

Qualification of welders shall be in accordance with the provisions of AWS D1.2.

The Contractor shall submit the welder qualification test records and copies of the welding procedure specification to the D.C.E.S. for approval, prior to beginning the work. Only test records dated three years previously, or less, prior to the proposed start of welding will be considered. All welders who qualify, shall be requalified by the above testing procedure at least three years subsequent to the last qualifying test. No welding shall be done prior to the approval of the welding procedure specification. A sample of an acceptable specification may be found in the SCM Appendix F.

Base metal areas to be welded shall either be solvent cleaned or vapor degreased, to remove all dirt and organic materials. After the solvent or vapor cleaning is completed, the area to be welded shall be cleaned of oxides by brushing with stainless steel wire brushes. The area to be welded shall have a bright finish immediately prior to welding.

If more than one welding bead, or pass, is necessary to complete the required weld, all oxides, smut, fume deposits, flux, spatter, and other foreign material shall be cleaned from the weld joint prior to depositing each additional weld pass, or layer. The cleaning may be accomplished by use of grinders, chisels, stainless steel wire brushes, or other effective means.
Cleaning tools and methods shall not damage the deposited weld metal. The cleaning procedure shall also be done after welding is completed, whether welding is completed in one pass, or multiple passes.

No weld pass shall be deposited over a previous weld pass which contains a defect. A defect is rejectable work as defined by the SCM. Weld defects shall be removed and repaired, with procedures approved by the D.C.E.S., prior to the deposition of additional weld metal. Chipping, sawing, filing and grinding are approved methods of removing welds defects. Repair excavations may be rewelded using the approved Welding Procedure Specification.

Preheating for welding and interpass temperature shall not exceed 150°C unless prior approval is obtained from the D.C.E.S.

Field welding is prohibited.

644-3.03 Transportation. Sign structures (including supports) shall be supported for their full length during shipment. Structures shall be shimmed, braced, blocked, and tied down to prevent distortion, or other damage from occurring during transportation. The use of any device which does not support the member for its entire length will not be permitted. This prohibition includes but is not limited to dolly wheels and trailers.

The Engineer shall examine sign structures after delivery to the work site. Selected welds may be trepanned to verify the required effective weld throat. Defects in materials or workmanship will be cause for rejection of the overhead sign structures or their supports. Defective structures, or components, shall be removed from the work site and repaired, or replaced as required by the D.C.E.S. All work relating to the repair, or replacement, of defective structures, or components, shall be done at no additional cost to the State.

644-3.04 Excavation. All excavation shall conform to Section 206 Trench, Culvert and Structure Excavation except that slope layback shall not be allowed for bored foundations. Included shall be the protection of workers and the public. Details of this protection shall conform to the requirements of 29CFR1926, Safety and Health Regulations for Construction (OSHA) and §107-05 Safety and Health Requirements Paragraph F.

Excavation shall not be performed until immediately before installation of the footings, pullboxes or any other appurtenances. The excavated material shall be placed in a location or locations approved by the Engineer. These locations shall be selected by the Contractor so as to cause the least inconvenience to vehicular and pedestrian traffic and to avoid interference with the surface drainage. All surplus excavated material shall be removed and disposed of by the Contractor as specified in §203-3.08 Disposal of Surplus Excavated Materials.

Excavation shall be backfilled as specified in §203-3.15, Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables.

The outline of all areas to be removed in sidewalks, driveways, and pavement shall be saw cut to a depth of at least 75 mm prior to removing the sidewalk, driveway or pavement. Cuts shall be neat and true along score lines with no shatter outside the removal area. Damaged saw cut areas shall be recut.

Pavement, shoulder, sidewalks, curbs, driveways, lawns, plants and other such features shall be replaced in kind with material of equal quality or as shown on the plans, standard sheets or as directed by the Engineer. For transverse sidewalk, curb or gutter cuts in concrete the entire square or section shall be removed and replaced with the same kind and quality of material. For longitudinal cuts in concrete sidewalks only the area removed between sawcuts shall be replaced unless specified otherwise on the plans.

Whenever a part of a square or slab of existing concrete sidewalk, curb, gutter or driveway is broken or damaged, the entire square, section or slab shall be removed and replaced with the same kind and quality of material.

644-3.05 Concrete Foundation. Foundations shall be constructed as shown in the contract documents or as directed by the Engineer. However, the Contractor has the option to use either Cast-in-Place or Precast Concrete foundations for the circular footings.
§644-3

644-3.06 Erection of Sign Structures

A. Handling and Storage. Structural members shall be loaded, moved, and unloaded such that they will not be subjected to stresses in excess of those provided for by the structure design. Permanent distortion, or other damage, attributable to the Contractor's operations will be cause for rejection.

Members stored either in the fabricator's storage area, or at the work site, or at other storage areas, shall be supported off the ground in a manner which will not allow distortion, or other damage to occur.

B. Field Inspection. All material shall be field inspected for workmanship and finish. Also, immediately prior to erection, all material shall be inspected by the Engineer. Materials and fabrication which do not conform to contract document requirements, or damage attributable to the Contractor's operations shall be cause for rejection. Dirty components shall be cleaned prior to erection. Rejected structures or components shall not be used in the work but shall be removed from the work site. Damage includes, but is not limited to, bends, kinks, dents, cracks and pits.

C. Setting Anchor Bolts. Anchor bolts shall be carefully set to proper location, alignment, and elevation by using templates. Templates cast into the footing concrete shall have minimum 50 mm diameter perforations or be made of bar sock to prevent honeycombing. Templates exposed in the end product shall be galvanized. Elevations shall be determined by the Engineer.

Anchor bolts shall not be realigned by bending to fit the base plate. Anchor bolts that do not fit the sign base plates will be rejected. The Contractor may propose a remediation method for rejected anchor bolts subject to approval of the Regional Director. Rejected anchor bolts, and the concrete they are embedded in shall be replaced by new materials at no cost to the Department.

D. Bolting. Steel-to-steel flange-bolted connections shall be made with bolts, nuts and washers meeting the material requirements of §715-14 and the galvanizing requirements of §719-01. Each bolt shall be furnished with two flat washers, one to be installed under the bolt head and one under the nut. All connections shall be made by first tightening all nuts and bolts sufficiently to bring all components into full contact with each other. After full contact has been achieved, all connections shall be brought to a condition beyond snug tight as required by Table 1001.3b of the New York State Steel Construction Manual. “Snug tight” is defined by the S.C.M., Part 1001.3.

Aluminum-to-steel and aluminum-to-aluminum flange-bolted connections shall be made with bolts and nuts meeting the material requirements of §715-14 and the galvanizing requirements of §719-01, unless other bolts are specified in the Contract Documents. Each bolt shall be furnished with two stainless steel flat washers meeting the requirements of §715-16. One washer shall be installed under the bolt head and one under the nut. The connection shall be made by first tightening all bolts to bring the components into full contact with each other. All high-strength bolts shall then be tightened to the “snug torque” value shown in TABLE 644-2. Tighten other bolts as specified in Contract Documents. Finally, all bolts shall have a second nut installed and sufficiently tightened against the first nut to lock the installation.

All aluminum flange-bolted connections shall be sealed against the intrusion of water by means of a silicone rubber sealant placed between the flanges in strict accordance with the sealant manufacturer’s instructions.

E. Welding. Field welding will not be permitted on any part of the structure.

<table>
<thead>
<tr>
<th>BOLT SIZE</th>
<th>SNUG TORQUE (N·m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to and including M16</td>
<td>135</td>
</tr>
<tr>
<td>M20</td>
<td>150</td>
</tr>
<tr>
<td>M22 and larger</td>
<td>200</td>
</tr>
</tbody>
</table>
F. Galvanized Metal Repair. When directed by the Engineer, the Contractor shall repair damage to the galvanized surfaces in conformance with the field repair requirements specified in §719-01, Galvanized Coatings and Repair Methods.

G. Methods and Equipment. Before starting work, the Contractor shall fully inform the Regional Director of the method of erection and types of equipment he proposes to use, which shall be subject to the approval of the Regional Director. This approval shall not be considered as relieving the Contractor of the responsibility for the safety of the methods or equipment, or for damage to the structures due to overloading.

H. Interim Loading. As soon as a span type structure is erected it shall be suitably loaded to prevent excessive resonance of the structure. This interim loading may be either a concentrated dead load or a blank sign panel. The load shall not scratch, mar or otherwise damage the structure. This interim loading shall not be removed until the permanent sign panels are in place. If the plans or standard sheets call for a dampener on the structure, it may be installed in lieu of the interim loading.

All materials used in this loading except required dampener, shall remain the property of the Contractor and shall be removed by the Contractor from the site of work. If the sign structure is damaged due to the lack or insufficiency of the interim loading, it shall be repaired or replaced, as directed by the Engineer.

Should any cantilever type structure show signs of excessive resonance it shall be similarly loaded.

No work shall be done without the approval of the Engineer.

644-3.07 Erection of Dampener. The dampener shall be securely clamped to the overhead sign structure in the position shown on the plans or standard sheets, preferably before the sign structure is erected.

644-4 METHOD OF MEASUREMENT

644-4.01 Sign Structure. The work will be measured as the number of sign structures (including dampener), without sign panels, installed.

644-4.02 Circular Footing Method A. The payment quantity will be the volume shown for the specified footing in the table on the standard sheet, “Footings for Sign Assemblies With Single Posts,” unless the Engineer orders a change in the footing size. No adjustment will be made for the contractor's election to use a square footing or a precast footing. If the Engineer orders a change in the footing size or to use a square footing, the payment quantity will be the length times the cross section area ordered by the Engineer.

644-5 BASIS OF PAYMENT

644-5.01 Sign Structure. The unit price bid for each structure for supporting sign panels shall be compensation in full for fabricating, furnishing and erecting the structure complete as specified including upright support, span and/or cantilever assemblies, diagonal bracing, all necessary hardware, leveling nuts, regular nuts, washers, cotter pins or clevis pins, caulking compounds and all other material, equipment and labor necessary to properly complete the work as shown on the plans, standard sheets and called for in the specifications. Footings and anchor bolts shall be paid for under separate items or will be furnished by others.

644-5.02 Circular Footing Method A. The unit price bid per cubic meter shall include the excavation, any protective system(s) required to ensure the safety of the workers and the public, backfill (select granular backfill or concrete), form work, concrete, bar reinforcement for concrete, excavation and backfilling of test holes, conduit and fittings, restoration of surfaces in kind, disposal of excess excavated material, and sawcutting.

Payment will be made under:
§644-5

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>644.01nn M</td>
<td>Single Cantilever Sign Structure</td>
<td>Each</td>
</tr>
<tr>
<td>644.02nn M</td>
<td>Double Cantilever Sign Structure</td>
<td>Each</td>
</tr>
<tr>
<td>644.03nn M</td>
<td>Single Span Sign Structure</td>
<td>Each</td>
</tr>
<tr>
<td>644.04nn M</td>
<td>Single Span and Cantilever Sign Structure</td>
<td>Each</td>
</tr>
<tr>
<td>644.05nn M</td>
<td>Multi-Span Sign Structure</td>
<td>Each</td>
</tr>
<tr>
<td>644.10 M</td>
<td>Circular Footing Method A</td>
<td>Cubic Meter</td>
</tr>
<tr>
<td>644.11 M</td>
<td>Anchor Bolts</td>
<td>Kilogram</td>
</tr>
</tbody>
</table>

Note: nn denotes serialized pay item. See §101-02 Definitions of Terms under "Specifications" and the Standard Drawings.

SECTION 645 - SIGNS

645-1 DESCRIPTION. This work shall consist of fabricating, furnishing, installing and covering traffic signs, sign support systems, sign posts, sign panels, and illuminated sign panels in accordance with the plans, these specifications, standard sheets, the MUTCD and directions of the Engineer.

645-2 MATERIALS. Materials shall meet the requirements of the following subsections:

- Weathered Brown Guide Rail Paint
- Stainless Steel Connecting Products
- Aluminum Sign Panels
- Reflective Sheeting (Class A)
- Reflective Sheeting (Class B)
- Reflectorized Sheeting Sign Characters (Type IV)
- Reflectorized Sheeting Sign Characters (Type V)
- Stiffeners, Overhead Brackets, and Miscellaneous Hardware
- Fiberglass Reinforced Plastic Sign Panels
- Type A Sign Supports
- Type B Sign Posts
- Breakaway Bases and Hinge Assemblies

Additional requirements are indicated below.

645-2.01 SIGN PANELS

A. Ground Mounted (MUTCD §201.1) Codes G&I Signs and All Overhead Mounted Sign Panels. Sign Panels for Ground Mounted MUTCD Codes G&I Signs and all Overhead Mounted Sign Panels shall be aluminum alloy 3 mm thick meeting the requirements of §730-01, Aluminum Sign Panels.

B. Ground Mounted (MUTCD §201.1) Codes R, P, W & M Signs. Panels for Ground Mounted MUTCD Codes R, P, W & M signs shall be aluminum alloy 2.5 mm thick meeting the requirements of §730-01, Aluminum Sign Panels. Fiberglass Reinforced Plastic Sign Panels, 3.5 mm thick, meeting the requirements of §730-23, may be used for sign panels up to 1.2 m X 1.2 m.

C. Illuminated Sign Panels. Illuminated Sign Panels shall be aluminum alloy 3 mm thick meeting the requirements of §730-01, Aluminum Sign Panels. All materials necessary to illuminate the sign panels shall be as shown in the contract documents.

D. Reflective Sheeting. The reflective sheeting materials used on sign panels shall conform to the class (type) and usage requirements described in Table 1 of §730-05. In general, Class A Sheeting, also known as AASHTO Type I or Engineer Grade Sheeting, may be used on tourist and motorist services signs; and Class B Sheeting, also known as AASHTO Type III or High Intensity Sheeting, shall be used on guide, regulatory, and warning signs.