FOR INFORMATIONAL PURPOSES ONLY-DO NOT USE FOR BIDDING

Nassau County Department of Public Works
Bid Sheets for Contract: T62209-01G

Item No	Item Description	Quantity	Unit			
201.06	CLEARING AND GRUBBING	1	LS	For:		
203.02	UNCLASSIFIED EXCAVATION AND DISPOSAL	575	CY	For:		
203.06	SELECT FILL	25	CY	For:		
203.07	SELECT GRANULAR FILL	70	CY	For:		
206.0201	TRENCH AND CULVERT EXCAVATION	115	CY	For:		
206.03	CONDUIT EXCAVATION AND BACKFILL INCLUDING SURFACE RESTORATION	60	LF	For:		
206.03010010	CONDUIT EXCAVATION AND BACKFILL - (RESTORING TOP SURFACES NOT INCLUDED)	330	LF	For:		
206.04000001	TEST HOLES	14	CY	For:		
209.11010024	TEMPORARY CATCH BASIN INSERTS - TRASH, SEDIMENT AND DEBRIS REMOVAL	24	EA	For:		
304.10119917	SUBBASE COURSE, TYPE 1011-2	240	CY	For:		
404.000011	PLANT PRODUCTION QUALITY ADJUSTMENT TO ASPHALT ITEMS	120	QU	For:		
404.000031	JOINT DENSITY QUALITY ADJUSTMENT TO ASPHALT ITEMS	155	QU	For:		
404.018901	TRUING & LEVELING F9, ASPHALT, 80 SERIES COMPACTION	110	TON	For:		
404.098101	9.5 F1 TOP COURSE ASPHALT, 80 SERIES COMPACTION	1,705	TON	For:		
404.198901	19 F9 BINDER COURSE ASPHALT, 80 SERIES COMPACTION	365	TON	For:		
407.0102	DILUTED TACK COAT	1,770	GAL	For:		
418.7603	ASPHALT PAVEMENT JOINT ADHESIVE	13,725	LF	For:		
490.10	PRODUCTION COLD MILLING OF BITUMINOUS CONCRETE	20,250	SY	For:		

Nassau County Department of Public Works
Bid Sheets for Contract: T62209-01G

Item No	Item Description	Quantity	Unit			
490.30	MISCELLANEOUS COLD MILLING OF BITUMINOUS CONCRETE	1,970	SY	For:		
520.05000010	SAW CUTTING PCC AND COMPOSITE PAVEMENT	2,970	LF	For:		
520.09000010	SAWCUTTING ASPHALT CONCRETE	435	LF	For:		
552.13	TEMPORARY STEEL SHEETING	400	SF	For:		
552.17	SHIELDS AND SHORING	995	SF	For:		
603.6103	REINFORCED CONCRETE PIPE CLASS IV, 18 INCH DIAMETER	20	LF	For:		
603.6109	REINFORCED CONCRETE PIPE CLASS IV, 36 INCH DIAMETER	7	LF	For:		
604.07200110	SETTING NEW DRAINAGE FRAMES ON EXISTING DRAINAGE STRUCTURES	3	EA	For:		
604.07240110	REBUILDING TOP OF EXISTING DRAINAGE STRUCTURES	6	EA	For:		
604.07260011	CONNECTION TO EXISTING DRAINAGE FACILITIES	2	EA	For:		
604.501011	CATCH BASIN TYPE C-2	17	VLF	For:		
604.501024	MANHOLE TYPE A72	6	VLF	For:		
608.0101	CONCRETE SIDEWALKS AND DRIVEWAYS	70	CY	For:		
608.01050010	CONCRETE SIDEWALKS - UNREINFORCED (GRADING INCLUDED)	55	CY	For:		
608.01050109	CURB RAMP CONFIGURATION TYPE 1	15	EA	For:		
608.01050209	CURB RAMP CONFIGURATION TYPE 2	6	EA	For:		
608.01050309	CURB RAMP CONFIGURATION TYPE 3	2	EA	For:		
608.01050409	CURB RAMP CONFIGURATION TYPE 4	3	EA	For:		
608.01051009	CURB RAMP CONFIGURATION TYPE 10	2	EA	For:		

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Nassau County Department of Public Works
Bid Sheets for Contract: T62209-01G

Item No	Item Description	Quantity	Unit			
608.02010015	UNCLASSIFIED EXCAVATION AND DISPOSAL FOR SIDEWALKS, CURB RAMPS AND CURBS	70	CY	For:		
608.02020015	OPTIONAL TYPE SUBBASE COURSE FOR SIDEWALKS, CURB RAMPS AND CURBS	5	CY	For:		
608.020102	ASPHALT SIDEWALKS, DRIVEWAYS AND BICYCLE PATHS, AND VEGATATION CONTROL STRIPS	11	TON	For:		
608.03	BRICK PAVED SIDEWALKS AND DRIVEWAYS (SAND SETTING BED)	260	SY	For:		
609.0401	CAST-IN-PLACE CONCRETE CURB TYPE VF6	1,150	LF	For:		
609.0403	CAST-IN-PLACE CONCRETE CURB TYPE M6	290	LF	For:		
609.0405	CAST-IN-PLACE CONCRETE CURB TYPE M4	250	LF	For:		
610.1402	TOPSOIL - ROADSIDE	8	CY	For:		
610.1601	TURF ESTABLISHMENT - ROADSIDE	55	SY	For:		
619.01	BASIC WORK ZONE TRAFFIC CONTROL	1	LS	For:		
619.04	TYPE III CONSTRUCTION BARRICADE	25	EA	For:		
619.0901	TEMPORARY PAVEMENT MARKINGS, STRIPES (TRAFFIC PAINT)	10,425	LF	For:		
619.0904	TEMPORARY PAVEMENT MARKINGS, STRIPES (REMOVABLE WET REFELECTIVE TAPE)	2,610	LF	For:		
619.110511	(PVMS) STANDARD SIZE - FULL MATRIX (LED) NO OPTIONAL EQUIPMENT SPECIFIED, NO CELLULAR COMMUNICATIONS REQUIRED	2	EA	For:		
621.03	CLEANING CLOSED DRAINAGE SYSTEMS	140	LF	For:		
621.04	CLEANING DRAINAGE STRUCTURES	10	EA	For:		
624.31000003	CONCRETE VALLEY GUTTER	10	SF	For:		

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Nassau County Department of Public Works
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Item No	Item Description	Quantity	Unit			
625.01	SURVEY OPERATIONS	1	LS	For:		
633.12	CLEANING, SEALING AND/OR FILLING CRACKS	1	LS	For:		
633.13	CLEANING, SEALING AND/OR FILLING JOINTS	300	LF	For:		
633.15	REMOVAL AND REPAIR OF LOOSE, BROKEN, OR SPALLED PCC PAVEMENT	100	SY	For:		
645.5102	GROUND-MOUNTED SIGN PANELS LESS THAN OR EQUAL TO 32 SF WITH Z-BARS	200	SF	For:		
645.81	TYPE A SIGN POSTS	12	EA	For:		
645.81000101	RADAR SPEED DISPLAY ASSEMBLY (120V AC)	4	EA	For:		
645.8107	CONCRETE FOOTING FOR TYPE A OR BREAKAWAY WOODEN SIGN POSTS WITH STEEL TUBE INSERTS	12	EA	For:		
647.31	RELOCATE SIGN PANEL, ASSEMBLY, SIZE 1 (UNDER 30 SF)	5	EA	For:		
647.61	REMOVE AND DISPOSE SIGNS, GROUND MOUNTED TYPE A SIGN SUPPORTS AND FOUNDATIONS - SIZE 1 (UNDER 30 SF)	4	EA	For:		
653.1020	PAVEMENT RIDE QUALITY ADJUSTMENT TO ASPHALT LEVEL 2	18	QU	For:		
655.07030010	CAST FRAME F3, WITHOUT CURB BOX AND WITH RETICULINE GRATE G3	3	EA	For:		
655.1202	MANHOLE FRAME AND COVER	4	EA	For:		
656.01	MISCELLANEOUS METALS	4,320	LB	For:		
670.72010008	AERIAL TRIPEX SERVICE CABLE	110	LF	For:		
680.110004NA	FURNISH AND INSTALL 4 FOOT SIGNAL POST	4	EA	For:		
680.110008NA	FURNISH AND INSTALL 8 FOOT SIGNAL POST	1	EA	For:		

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Item No	Item Description	Quantity	Unit			
680.110010NA	FURNISH AND INSTALL 10 FOOT SIGNAL POST	1	EA	For:		
680.321001NA	MODEL 2070 LITE CONTROLLER	1	EA	For:		
680.336001NA	MODEL 336S CABINET AUXILIARY EQUIPMENT	1	EA	For:		
680.5001	POLE EXCAVATION AND CONCRETE FOUNDATION	18	CY	For:		
680.51050010	PULLBOX, RECTANGULAR REINFORCED CONCRETE (26 INCH X 18 INCH)	6	EA	For:		
680.520102	CONDUIT, METAL STEEL,ZINC COATED, 3/4"	25	LF	For:		
680.520104	CONDUIT, METAL STEEL, ZINC COATED, 1 1/4"	140	LF	For:		
680.520108	CONDUIT, METAL STEEL, ZINC COATED, 3"	270	LF	For:		
680.54	INDUCTANCE LOOP INSTALLATION	645	LF	For:		
680.700604	RISER ASSEMBLY, 1 1/2" DIAMETER	2	EA	For:		
680.700606	RISER ASSEMBLY, 2" DIAMETER	1	EA	For:		
680.72	INDUCTANCE LOOP WIRE	1,305	LF	For:		
680.730214	SIGNAL CABLE 2 CONDUCTORS, 14 AWG	2,180	LF	For:		
680.730314	SIGNAL CABLE 3 CONDUCTORS, 14 AWG	1,510	LF	For:		
680.730514	SIGNAL CABLE 5 CONDUCTORS, 14 AWG	350	LF	For:		
680.730714	SIGNAL CABLE 7 CONDUCTORS, 14 AWG	165	LF	For:		
680.732014	SIGNAL CABLE 20 CONDUCTORS, 14 AWG	370	LF	For:		
680.76610010	POWER SERVICE CONNECTION (NASSAU COUNTY)	3	EA	For:		
680.79000010	REMOVE TRAFFIC SIGNAL EQUIPMENT	1	LS	For:		

FOR INFORMATIONAL PURPOSES ONLY-DO NOT USE FOR BIDDING

Nassau County Department of Public Works
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Item No	Item Description	Quantity	Unit			
680.810101	TRAFFIC SIGNAL MODULE - 12 INCH, RED BALL, LED	15	EA	For:		
680.810103	TRAFFIC SIGNAL MODULE - 12 INCH, YELLOW BALL, LED	15	EA	For:		
680.810104	TRAFFIC SIGNAL MODULE - 12 INCH, YELLOW ARROW, LED	3	EA	For:		
680.810105	TRAFFIC SIGNAL MODULE - 12 INCH, GREEN BALL, LED	15	EA	For:		
680.810106	TRAFFIC SIGNAL MODULE - 12 INCH GREEN ARROW, LED	3	EA	For:		
680.810107	TRAFFIC SIGNAL SECTION - TYPE I, 12 INCH	51	EA	For:		
680.8111	TRAFFIC SIGNAL BRACKET ASSEMBLY - 1 WAY	5	EA	For:		
680.8113	TRAFFIC SIGNAL BRACKET ASSEMBLY - 3 WAY	2	EA	For:		
680.8114	TRAFFIC SIGNAL BRACKET ASSEMBLY - 4 WAY	2	EA	For:		
680.813108NA	LED PEDESTRIAN SIGNAL WITH COUNTDOWN TIMER ASSEMBLY 16"X18"	9	EA	For:		
680.81330010	AUDIBLE PEDESTRIAN SIGNAL	9	EA	For:		
680.81422010	AUXILIARY POLE AND FOUNDATION	1	EA	For:		
680.82174510	16.5 FT MAST ARM POLE WITH A 45 FT MAST ARM (NASSAU COUNTY)	2	EA	For:		
680.82254110 (MOD.)	RECTANGULAR RAPID FLASHING BEACON (RRFB) ASSEMBLY - FOUR BEACONS, AC POWERED (OVERHEAD SUPPLY)	2	EA	For:		
680.95020815	SERVICE CABLE 2 CONDUCTOR NO. 08 AWG	300	LF	For:		
685.03130018	RAISED REFLECTORIZED PLOWABLE PAVEMENT MARKERS	6	EA	For:		
685.07200110	WHITE EPOXY REFLECTORIZED PAVEMENT STRIPES - 20 MILS (WET NIGHT VISIBILITY SPHERES)	9,545	LF	For:		
685.07200210	WHITE EPOXY REFLECTORIZED PAVEMENT LETTERS - 20 MILS (WET NIGHT VISIBILITY SPHERES)	56	EA	For:		

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Item No	Item Description	Quantity	Unit			
685.07200310	WHITE EPOXY REFLECTORIZED PAVEMENT SYMBOLS - 20 MILS (WET NIGHT VISIBILITY SPHERES)	43	EA	For:		
685.07200410	WHITE EPOXY REFLECTORIZED PAVEMENT STRIPES (CROSS HATCHING) - 20 MILS (WET NIGHT VISIBILITY SPHERES)	7,355	LF	For:		
685.07200510	WHITE EPOXY REFLECTORIZED PAVEMENT STRIPES (SPECIAL MARKINGS) - 20 MILS (WET NIGHT VISIBILITY SPHERES)	5,400	LF	For:		
685.07200610	YELLOW EPOXY REFLECTORIZED PAVEMENT STRIPES - 20 MILS (WET NIGHT VISIBILITY SPHERES)	6,710	LF	For:		
685.07200710	YELLOW EPOXY REFLECTORIZED PAVEMENT STRIPES (CROSS HATCHING) 20 MILS THICK (WET NIGHT VISIBILITY SPHERES)	400	LF	For:		
699.040001	MOBILIZATION	1	LS	For:		

Nassau County Department of Public Works

CUTTER MILL ROAD
TRAFFIC CALMING IMPROVEMENTS

(From the vicinity of Bayview Avenue to Middle Neck Road)

SPECIAL SPECIFICATIONS

May 2023
Prepared by: L.K. McLean Associates

ITEM 206.03150010 - TRAFFIC SIGNAL CONDUIT EXCAVATION AND RESTORATION IN ASPHALT CONCRETE
ITEM 206.03160010 -TRAFFIC SIGNAL CONDUIT EXCAVATION AND RESTORATION IN PORTLAND CEMENT CONCRETE
ITEM 206.03170010 - TRAFFIC SIGNAL CONDUIT EXCAVATION AND RESTORATION IN COMPOSITE PAVEMENT
ITEM 206.03180010 - TRAFFIC SIGNAL CONDUIT EXCAVATION AND RESTORATION IN CONCRETE SIDEWALK AND DRIVEWAYS
ITEM 206.03190010 - TRAFFIC SIGNAL CONDUIT EXCAVATION AND RESTORATION IN ASPHALT SIDEWALK AND DRIVEWAYS
ITEM 206.03200010 - TRAFFIC SIGNAL CONDUIT EXCAVATION AND RESTORATION IN GRASS AND UNPAVED AREAS

DESCRIPTION:

This work shall consist of the excavation and necessary backfill and restoration required for traffic signal conduits

MATERIALS:

Materials for the restoration of top surfaces shall be as indicated on the plans and as approved by the Engineer

CONSTRUCTION DETAILS:

The requirements of subsection 206-3 of the Standard Specifications shall apply with the following additions:

When the contractor is required to excavate through portland cement concrete, asphalt concrete or composite pavement, or sidewalk, he shall saw cut along neat lines as shown on the plans or as ordered by the Engineer. An approved power saw, as approved by the Engineer prior to actual use, shall be used to saw cut to the depth specified on the plans or as directed by the Engineer.

The conduit excavation and backfill and the restoration of top surface courses shall also conform to the applicable notes and details shown on the plans.

METHOD OF MEASUREMENT:

Subsection 206-4.03 of the Standard Specifications shall apply.

BASIS OF PAYMENT:

The unit price bid per linear foot shall include the cost of furnishing all labor, materials, and equipment necessary to complete the work including excavation, backfill, saw cutting, and restoring as shown on the plans.
Any damage to existing pavement, sidewalk, curb, or other facilities caused by the Contractor's operations shall be repaired by the Contractor to the satisfaction of the Engineer at no additional cost to the State.

4/07/08E
8/19/98

ITEM 206.04000001 - TEST HOLES

DESCRIPTION:

This work shall consist of the excavation of all materials, backfill, and surface restoration for locating existing subsurface utilities, storage tanks, and other underground structures and obstructions as directed by the Engineer.

MATERIALS:

Backfill shall consist of suitable excavated material unless otherwise directed by the Engineer.

CONSTRUCTION DETAILS:

The provisions of Section 206-3 shall apply.

The Contractor shall take appropriate precautions while performing test hole excavations to not damage existing subsurface facilities. Such precautions may include, but are not limited to, hand digging.

METHOD OF MEASUREMENT:

The quantity of excavation shall be the number of cubic yards of material computed from neat lines established by the Engineer prior to performing the work or as modified by the Engineer during the exploratory excavations.

The elevation of the bottom payment line shall be the actual depth necessary to locate the subsurface obstruction, as determined by the Engineer. The top payment line shall be the existing ground surface at the center of the excavation at the time the test pit is performed. The side payment lines shall be vertical to the bottom payment line and shall be the actual bottom width necessary, as determined by the Engineer, to locate the subsurface obstruction.

BASIS OF PAYMENT:

The unit price bid for this work shall include the cost of labor, materials, and equipment required to satisfactorily complete the work, including the costs of excavation, backfill (except select backfill paid for separately), disposal of excavated material, keeping the site dewatered and free from earth, water, ice, and snow when necessary, and replacement of any pavement, shoulder, and sidewalk courses, subcourses, curbs, drives, and other top surfaces as required.

The cost for necessary guarding and protection required to protect the public from open trenches and, that required for the protection to ensure the safety of the workers shall be included in the bid price for Test Holes except that any support or protective system directed by the Engineer shall be paid for separately under the appropriate contract item.

ITEM 209.11XXNN24 – TEMPORARY CATCH BASIN INSERT (CBI)

DESCRIPTION:
The work shall consist of furnishing, installing, maintaining (removing, disposal of debris and resetting), replacing (if needed), and disposing (at end of contract) a temporary catch basin insert at the locations indicated in and according to the contract documents, and as directed by the Engineer.

The work shall also consist of removing and storing an existing temporary catch basin insert prior to a catastrophic storm event (e.g., flooding), and reinstalling it after the event at the locations indicated in and according to the contract documents, and as directed by the Engineer.

Acronyms
CBI – Temporary Catch Basin Insert

Temporary removal, storage and reinstallation of temporary catch basin inserts does not include the cost of a new temporary catch basin insert.

MATERIALS:
The following sections of the standard specification shall apply:

Temporary Catch Basin Insert	713-21

CONSTRUCTION DETAILS
The following section of the standard specifications shall apply:

Soil Erosion and Sediment Control	209-3.01

with the following exceptions:
- Torn or punctured geotextile must be replaced (see Maintenance below)
- Sediment deposition removed from the CBI shall be disposed of in accordance with §107-10 E.

Installation: Install the CBI according to manufacturer's instructions.

Inspection: Using the most restrictive inspection criteria listed below, the Contractor shall inspect each CBI:
- daily,
- after a rainfall event of 0.5" or more per twenty-four (24) hour period,
- as per manufacturer's instructions, and
- as per the conditions of the Stormwater Pollution Prevention Plan (SWPPP) (if the contract includes one).

Maintenance: Maintenance shall include the following:
- Removal of all accumulated sediment and debris from the vicinity of the CBI after each rainfall event of 0.5" or more per twenty-four (24) hour period and prior to removal of the insert for maintenance.
- Removal of CBI according to manufacturer's instructions.

ITEM 209.11XXNN24 – TEMPORARY CATCH BASIN INSERT (CBI)

- Emptying the CBI when the CBI's containment area is more than one third (1/3) full or before the sediment/trash/debris reaches the overflow openings. The Contractor shall ensure that the CBI is not so full that removing it causes the geotextile to rip, tear or become non-functioning. CBIs damaged during sediment removal shall be replaced at the Contractor's expense. The Engineer will determine if a damaged CBI warrants replacement. Sediment and/or debris that has been released into the drainage structure shall be removed by the Contractor and disposed of as below.
  - Refer to the manufacturer's instructions for emptying and re-installing the CBI. Removal of trash, sediment and debris from the CBI shall be done in a manner that ensures no trash, sediment or debris will enter an unprotected drainage structure.
- Disposal of the removed sediment shall occur at an upland location away from all stormwater conveyances.
  - Trash shall be disposed of according to §107-10 E. of the standard specifications.
- If a CBI's fabric or strap is torn,
  - dispose of the sediment and debris contained within the unit according to this specification, and
  - replace the entire CBI. A CBI shall be replaced at no additional cost to the state.
- When CBI servicing results in a non-functioning or poorly functioning CBI, the CBI shall be replaced at no additional cost to the state. The Engineer will determine if a CBI is non-functioning or poorly functioning.
- CBIs shall be removed prior to winter shut down. Re-installation of the CBIs shall occur prior to ground disturbance or first thaw in the following spring, whichever occurs first, and according to manufacturer's instructions.

Emergency Removal, Storage and Reinstallation: Emergency removal, storage and reinstallation shall be performed in association with catastrophic events (e.g. storms and flooding) as follows:

- As directed in consideration of forecasted events (e.g. moderate or major flood warnings) in impacted urban or residential locations where flooding is likely to result in hazardous public conditions.
- Removal, storage, and reinstallation as specified and applicable under Maintenance above. This includes replacing any damaged, poorly functioning, or non-functioning CBI.
- CBIs removed for emergency flooding events shall be reinstalled prior to resuming construction.

CBIs shall be removed according to §209-3.01 and disposed of according to §107-01 E. after all soil disturbance areas have been fully stabilized with an established, permanent, and approved vegetative cover at a uniform density of eighty percent (80%).

METHOD OF MEASUREMENT

Temporary Catch Basin Insert. The work will be measured as the number of each CBI furnished, installed, maintained, replaced, and disposed.

Temporary Catch Basin Insert Emergency Removal and Reinstallation. The work will be measured as the number of each CBI removed, stored, and reinstalled.

ITEM 209.11XXNN24 – TEMPORARY CATCH BASIN INSERT (CBI)

BASIS OF PAYMENT

Temporary Catch Basin Insert. The unit price bid for each CBI furnished, installed, maintained, replaced, and disposed shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete the work.

Temporary Catch Basin Insert Emergency Removal and Reinstallation. The unit price bid for each CBI removed, stored, and reinstalled shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete the work.

Progress payments will be made at fifty percent (50%) of the unit price bid upon installation of each CBI. The remaining fifty percent (50%) will be paid after soil disturbance areas have been fully stabilized with an established, permanent, and approved vegetative cover at a uniform density of eighty percent (80%) and the CBI has been removed. No progress payments are offered for the emergency removal and reinstallation of CBI.

Payment will be made under:

Item Number	Description	Unit
209.11010024	Temporary Catch Basin Insert – Trash, Sediment, and Debris Removal	EA
209.11020024	Temporary Catch Basin Insert –Trash, Sediment and Debris Removal, plus Oil and Hydrocarbon Removal	EA
209.11030024	Oil and Hydrocarbon Absorbent Pouches for Temporary Catch Basin Insert	EA
209.11040024	Temporary Removal, Storage and Reinstallation of a Temporary Catch Basin Insert	EA

ITEM 304.10119917 - SUBBASE COURSE, TYPE 1011-2

All of the requirements of Section 304 *Subbase Course* shall apply except as herein modified:

MATERIALS

Material shall conform to the requirements of §733-04 *Subbase Course* with the addition of the following requirement:

Natural Material. Natural material obtained from sources located in Richmond, Kings, Queens, Nassau and Suffolk Counties shall conform to the following gradation:

Sieve Size Designation	Percentage Passing by Weight
2 in.	100
1 in.	80-100
¼ in.	50-85
No. 10	30-70
No. 40	15-40
No. 200	6-12

Natural material obtained from sources other than those listed above shall conform to the gradation requirements of Table 733-04A *Subbase Gradation* in §733-04B. *Gradation.*

BASIS OF PAYMENT

Payment will be made under:

Item No.	Item	Pay Unit
304.10119917	Subbase Course, Type 1011-2	Cubic Yard

ITEM 520.05000010 - SAW CUTTING PORTLAND CEMENT CONCRETE AND COMPOSITE PAVEMENTS

DESCRIPTION. This work shall consist of saw cutting existing reinforced or unreinforced portland cement concrete, including portland cement concrete pavement and sidewalk, and composite pavement (asphalt concrete on reinforced or unreinforced portland cement concrete), at the locations indicated on the plans or where directed by the Engineer.

MATERIALS. All equipment proposed for this work shall be subject to approval by the Engineer prior to actual use. Rotary rock saws shall not be used for cuts under this item.

CONSTRUCTION DETAILS. Saw cutting shall be along a neat line as indicated on the plans or where directed by the Engineer. The cuts shall be neat and true with no shatter. Saw cuts shall be made to the depth (s) indicated on the plans and as stated below.

When removing composite pavement the Contractor shall saw cut the existing pavement for the full depth of the concrete pavement. The total saw cut depth will be more, depending on the thickness of the asphalt. At the Contractor's option, the asphalt concrete may first be saw cut and removed before making a second cut through the portland cement concrete.

Any damage to material not indicated for removal, caused by the Contractor's operations, shall be repaired by the Contractor. All repair shall be done in a manner satisfactory to the Engineer.

METHOD OF MEASUREMENT. This work will be measured by the number of linear feet of saw cutting done. No allowance will be made for saw cuts of different depths.

Saw cutting which is done for the Contractor's convenience will not be measured for payment under this item.

BASIS OF PAYMENT. The unit price bid per linear foot of saw cutting shall include the cost of all labor, materials, and equipment necessary to complete the work.

Only one payment will be made for saw cutting when removing composite pavement regardless of the method chosen. The cost of saw cutting the asphalt concrete in the composite pavement is included in this item. No payment will be made for this saw cutting under the item for saw cutting asphalt concrete.

Any repairs made necessary by the Contractor's operations shall be done to the satisfaction of the Engineer at no additional cost to the State

ITEM 520.09000010 - SAW CUTTING ASPHALT CONCRETE

DESCRIPTION. This work shall consist of saw cutting existing asphalt concrete pavement or sidewalk at the locations indicated on the plans or where directed by the Engineer.

MATERIALS. All equipment proposed for this work shall be approved by the Engineer prior to actual use.

CONSTRUCTION DETAILS. Saw cutting shall be along a neat line as indicated on the plans or where directed by the Engineer. Saw cuts shall be made to the depth(s) indicated on the plans.

Any damage to material not indicated for removal, caused by the Contractor's operations shall be repaired by the Contractor. All repair shall be done in a manner satisfactory to the Engineer.

METHOD OF MEASUREMENT. This work will be measured by the number of linear feet of saw cutting done. No allowances will be made for saw cuts of different depths.

No saw cutting will be measured for payment under this item which the Contractor may choose to do for his own convenience.

BASIS OF PAYMENT. The unit price bid per linear foot of saw cutting shall include the cost of all labor, materials, and equipment necessary to complete the work.

Any repairs made necessary by the Contractor's operations shall be done to the satisfaction of the Engineer at no additional cost to the State.

08/15/08E 8/81
2/1/96 M

ITEM 604.07200110 - SETTING NEW DRAINAGE FRAMES ON EXISTING DRAINAGE STRUCTURES

DESCRIPTION

This work shall consist of setting new drainage frames, complete with grates or covers, to grade on existing drainage structures and shall include removing, storing, and/or disposing of the existing frames, grates, covers, and appurtenances.

This item shall also include the setting of new drainage frames on existing drainage structures modified under the item, "Rebuilding Top of Existing Drainage Structures."

MATERIALS

The new drainage frames, grates, and covers will be furnished under separate items.

Materials shall meet the requirements of the following subsections of Section 700:

Concrete Repair Material	701-04
Concrete Grouting Material	701-05
Precast Concrete Pavers	704-13

Concrete shall be Class A meeting the requirements of Section 501.

CONSTRUCTION DETAILS.

The existing frames, grates, covers, and appurtenances shall be removed and, as indicated in the plans or directed by the Engineer, stored for pick up by others, used elsewhere on the contract, or disposed of off the work site.

The existing masonry adjustment collar, or a portion of it, shall be removed where necessary for setting of the new frame. The new frames shall be set to the line and grade as indicated in the plans or as directed by the Engineer, using precast concrete pavers and concrete grouting material and/or Class A concrete. The frames shall be set in a concrete grouting bed on the existing structure.

Any asphalt pavement and shoulder courses, subcourses, curbs, sidewalks, lawns and other top surfaces removed or damaged during the work of removing the existing frames and setting the new frames, shall be replaced in kind, unless otherwise directed by the Engineer. This shall include all sawcutting necessary for this removal.

Existing concrete/composite pavement shall be removed and restored as per the details given in the plans.

METHOD OF MEASUREMENT

This work will be measured by the number of new drainage frames complete with grates or covers, set to grade on existing drainage structures or on existing drainage structures modified under the item, "Rebuilding Top of Existing Drainage Structures."

ITEM 604.07200010 - SETTING NEW DRAINAGE FRAMES ON EXISTING DRAINAGE STRUCTURES

BASIS OF PAYMENT

The unit price bid for setting each drainage frame shall include the cost of all labor, materials, and equipment necessary to complete the work including any necessary sawcutting, removal and replacement of pavement and shoulder courses, subcourses, curbs, sidewalks, lawns and other top surfaces, unless otherwise indicated in the plans or proposal. Removal and restoration of concrete/composite pavement will be paid for separately.

New drainage frames, grates, and covers will be paid for under the appropriate items. Any frames, grates, covers or appurtenances broken thru carelessness on the part of the Contractor shall be replaced at the Contractor's expense.

ITEM 604.07240110 - REBUILDING TOP OF EXISTING DRAINAGE STRUCTURES

DESCRIPTION

This work shall consist of rebuilding the top of existing drainage structures as shown in the plans or as directed by the Engineer.

MATERIALS

Unless otherwise indicated in the plans or directed by the Engineer, the materials for rebuilding the top of existing drainage structures shall be the same type as used in the original construction, except that neither concrete brick nor concrete block shall be used.

Concrete shall be Class A meeting the requirement of Section 501. Other materials shall conform to the following subsections of Section 700:

Concrete Repair Material	701-04
Concrete Grouting Material	701-05
Precast Concrete Pavers	704-13
Precast Concrete Driveway and Sidewalk Pavers	704-13
Precast Concrete Drainage Units	706-04
Bar Reinforcement, Grade 420	709-01

CONSTRUCTION DETAILS

The top slab and/or top portion of the walls shall be removed and rebuilt as indicated in the plans or as directed by the Engineer. Removed material shall be disposed of off the work site.

Excavation shall be performed in accordance with the requirements of Subsection 206-3. This work shall include all necessary sawcutting and removal of all overlaying material including asphalt pavement and shoulder, curb, turf, etc. Existing concrete/composite pavement shall be removed and restored as per the details given in the plans.

Concrete construction shall conform to the requirements of Section 555.

No structure shall be backfilled until all the mortar has completely set. The requirements of Subsection 203-3.13 shall apply.

Each structure shall be cleaned of any accumulation of silt, debris, or foreign matter of any kind and shall be kept clean of such accumulation until final acceptance of the work.

METHOD OF MEASUREMENT

This work will be measured by the number of existing drainage structures for which the top is rebuilt as specified.

BASIS OF PAYMENT

Except as noted below, the unit price bid for rebuilding each top of existing drainage structures shall include the cost of all labor, materials, and equipment, including sawcutting, excavation and removal of underlying materials necessary to complete the work. Removing and resetting existing drainage frames on existing drainage structures, furnishing new frames and grates, setting new drainage frames on existing drainage structures, and all necessary backfill and restoration will be paid for under the appropriate items. Removal and restoration of concrete/composite pavement will be paid for separately.

ITEM 604.07260011 – CONNECTION TO EXISTING DRAINAGE FACILITIES

Description:

Under this item, the Contractor shall remove portions of existing drainage facilities and connect new drainage facilities thereto at the locations shown on the plans as ordered by the Engineer.

Materials:

Concrete	Class A Section 501
Concrete Grouting Material	Section 701-05
Bar Reinforcement	Grade 60 Section 709-01

Construction Details:

The work under this item provides for connecting new pipe lines to existing pipe lines or structures. The Contractor shall maintain the existing pipe lines and structures in continuous service as required and/or directed by the Engineer.

The Contractor shall perform all excavation and backfill and dispose of all excess materials as required to complete the work. Backfilling shall be compacted in conformance with Section 203 of the Standard Specifications.

When connecting to the existing pipe line or structures, the existing facility shall be broken into and reinforcement cut back only as needed to accommodate the new pipe as indicated on the plans. The new pipe shall be set to required grade and the existing pipe wall shall be repaired and patched as required to provide a secure and waterproof connection. Ends of the new pipe projecting into the existing drainage facility shall be neatly cut off and trimmed flush with the inside face of the structure.

Method of Measurement:

The quantity to be paid for shall be the actual number of connections made in conformance with the plans and specifications and the orders of the Engineer.

Basis of Payment:

Payment will be made at the unit price bid for each connection which shall include the cost of all materials, labor and equipment necessary to complete the work except excavation and backfill which will be paid under Trench and Culvert Excavation Item 206.02 and the new pipe which shall be paid under the appropriate pipe item.

ITEM 608.0105NN09 –CURB RAMP

DESCRIPTION

The work shall consist of constructing Curb Ramps, landings and associated curbing in accordance with the applicable Standard Sheets and Specifications, and in accordance with the Contract Documents.

The fifth and sixth number to the right of the decimal place (NN), in the item number, is a Serialized number to match the different types of Curb Ramp Configurations depicted in the US Customary Standard Sheets 608-01.

The work shall include demolition, saw cutting, excavation, disposal, fill, subbase material, compaction, construction of the new Curb Ramps, landings and associated curbing. Also included are detectable warning units (supplied and installed where required), repairs to affected asphalt (as necessary), topsoil, establishing turf (to disturbed areas), and finish work. All material and labor required to perform these tasks is included. Any required adjustments to utilities shall be performed under the specifications for that work.

MATERIAL

Materials required for this work shall comply with, but are not limited to, the following Sections: 304-2, 608-2, 609-2, and 610-2.

CONSTRUCTION DETAILS

The work shall be in conformance with the US Customary Standard Sheets 608-01. The work performed shall comply with, but is not limited to, the following Sections of the Standard Specifications: 203-3, 204-3, 304-3, 401-3, 402-3, 608-3, 609-3, and 610-3.

Any existing utility facilities not indicated to be removed that are damaged by the contractor's operations performing this work, shall be repaired by the contractor, to the satisfaction of the Engineer, at no additional cost.

METHOD OF MEASUREMENT

Payment will be made at the unit price bid for each type of Curb Ramp, (as shown in the US Customary Standard Sheets 608-01), satisfactorily installed, in accordance with the Contract Documents.

BASIS OF PAYMENT

The inclusive unit price bid shall include the cost of furnishing all labor, material, and equipment necessary to satisfactorily complete the work, to the acceptance of the Engineer. Sidewalk beyond the upper landing, as shown in the US Customary Standard Sheets 608-01, will be paid for separately. Any required Survey, shall be paid for separately under the lump sum price bid for survey operations.

Item Number	*Description*	*Pay unit*
608.01050009	Curb Ramp as shown in project details	Each
608.01050109	Curb Ramp Configuration Type 1	Each
608.01050209	Curb Ramp Configuration Type 2	Each
608.01050309	Curb Ramp Configuration Type 3	Each
608.01050409	Curb Ramp Configuration Type 4	Each
608.01050509	Curb Ramp Configuration Type 5	Each
608.01050609	Curb Ramp Configuration Type 6	Each
608.01050709	Curb Ramp Configuration Type 7	Each
608.01050809	Curb Ramp Configuration Type 8	Each
608.01050909	Curb Ramp Configuration Type 9	Each
608.01051009	Curb Ramp Configuration Type 10	Each
608.01051109	Curb Ramp Configuration Type 11	Each
608.01051209	Curb Ramp Configuration Type 12	Each
608.01051309	Curb Ramp Configuration Type 13	Each
608.01051409	Curb Ramp Configuration Type 14	Each

ITEM 608.01050010 - CONCRETE SIDEWALKS - UNREINFORCED (GRADING INCLUDED)

DESCRIPTION.
The work shall consist of the construction of portland cement concrete sidewalks and necessary grading as shown on the plans.

MATERIALS.
The following requirements of Sections 203 and 608 shall apply: 203-2.02A, 608-2, and 608-2.01.

CONSTRUCTION DETAILS.
The requirements of Subsection 203-3.12 shall apply to the placement of embankment.

The requirements of Subsection 608-3.01 shall apply except that all references to driveways and wire fabric for reinforcement shall be disregarded. The sidewalk shall be constructed without wire fabric for concrete reinforcement.

The location of the sidewalks shall be properly graded to conform with the sidewalk cross-section and line and grade. The graded area shall be firm and dry before placing the concrete and all organic or unsuitable materials, existing curbs, sidewalks, and driveways shall be removed.

METHOD OF MEASUREMENT.
Concrete sidewalks will be measured by the number of cubic yards of cement concrete computed from payment lines shown on the plans.

BASIS OF PAYMENT.
The unit price bid per cubic yard will include all excavation, embankment, preparation of subgrade, and all other materials, equipment, and labor necessary to complete the work as called for on the plans and to the satisfaction of the Engineer.

No separate payment will be made for excavation or embankment above, below, or within the volume of sidewalk placed.

Payment at the unit bid price will be made after the concrete sidewalks and curing application have been properly placed.

1 of 1 12/16/08E
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ITEM 608.02010015 - Unclassified Excavation and Disposal for Sidewalks, Curb Ramps and Curbs
ITEM 608.02020015 - Optional Type Subbase Course for Sidewalks, Curb Ramps and Curbs

All the provisions of *Unclassified Excavation and Disposal* under Section 203 shall apply.

All the provisions of *Subbase Course, Optional Type* under Section 304 shall apply.

Payment shall be made under:

ITEM NO.	ITEM DESCRIPTION	PAY UNIT
608.02010015	Unclassified Excavation and Disposal for Sidewalks, Curb Ramps and Curbs	Cubic Yards
608.02020015	Optional Type Subbase Course for Sidewalks, Curb Ramps and Curbs	Cubic Yards

ITEM 624.31000003 - CONCRETE VALLEY GUTTER

Description

This work shall consist of the construction of conventionally formed or machine formed Portland Cement concrete valley gutter in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or established by the Engineer.

Materials

A. The concrete shall be in accordance with Section 624-2.02 Conventionally Formed Concrete Gutter or Section 624-2.05 Machine Formed Concrete Gutter of the Standard Specifications.

B. Bar reinforcement shall meet the requirements of Section 709-01 Bar Reinforcement, Grade 420 of the Standard Specifications.

C. Wire reinforcement shall meet the requirements of Section 709-02 Wire Fabric for Concrete Reinforcement of the Standard Specifications.

Construction Details

Section 624-3.02 Conventionally Formed or Machine Formed Concrete Gutter shall apply.

Method of Measurement

Section 624-4.02 of the Standard Specifications shall apply.

Basis of Payment

Section 624-5.02 of the Standard Specifications shall apply.

March 4, 1992
August 20, 1997 M
March 7, 2007 E

ITEM 645.81000101 – RADAR SPEED DISPLAY ASSEMBLY (120V AC)
ITEM 645.81000201 – RADAR SPEED DISPLAY ASSEMBLY (SOLAR)

DESCRIPTION

This work shall consist of furnishing and installing a Radar Speed Display Assembly in accordance with the contract documents or directions of the Engineer. All material and labor required to provide a complete functioning system are to be included. All provisions of Sections 645 and 680 of the New York State Department of Transportation Standard Specifications shall apply except as modified below:

Assembly in this specification includes:
The scope of this specification includes, but is not limited to, excavation, disposal, concrete foundation, transformer base, traffic signal pole, controller cabinet, control systems, conduit, an all LED ,two digit Radar Speed Feedback display sign, mounting brackets, power service, power disconnect, communications device(s), control systems, work pad, topsoil, and any required adjustments to utilities, incidental components to complete the system, and site restoration.

MATERIALS

All provisions of Sections 709-01, 715, 723, 724 and 730 shall apply to this specification except as modified below:

Radar equipment and host cabinet:
The local equipment controlling the components of the Radar Speed Display shall be contained in a controller cabinet constructed out of aluminum and be as lightweight as possible (the cabinet shall be lockable, watertight, vandal and tamper resistant). The dimensions shall be sufficient to house the controller, communication components, toggle switch, radar gun, and batteries for back-up power supply. All components shall be designed to operate under ambient temperature conditions from -40 degrees Fahrenheit to ≥ +130 degrees Fahrenheit for up to 24 hours per day.

Speed Display:
The driver feedback speed display shall have the capability to display the approaching vehicle speed in increments of 1 MPH. The driver feedback display shall utilize numeric characters, 15 inches in height. The LEDs luminous intensity shall be controlled automatically to optimize lighting intensity for daytime, nighttime, and adverse weather conditions. The speed limit display shall be readable from at least 400 feet away in all lighting conditions. The driver feedback speed display and sign shall conform to the requirements of the MUTCD and provide for the feedback display on the lower portion and shall have “YOUR SPEED” printed in 4 inch high black letters on a yellow background above the display on the sign face.

Controls:
The minimum PC system requirements shall be Windows 7 unless otherwise specified in the Contract Documents. The system shall have the capability to remotely turn the display on and off during the programmed times through the use of a wireless modem. A direct land-line modem shall also be provided when specified in the Contract Documents. The communication option(s) shall be capable of data transfer to include updates.

Emergency shutoff:

One toggle-type power switch, for either the AC or solar power source, shall be provided for emergency shutoff at the local cabinet on the pole.

Software:
The controller software shall be programmable and capable of creating and preloading a single computer-controlled schedule of operation for the display for a minimum of one year. The operator must be provided the ability to remotely and independently activate and deactivate the system during the programmed times. The software shall provide a method to remotely upload schedules to the display. In addition, the software shall allow for remotely retrieving information, such as the status of the display and direct control of display functions such as test patterns, lighting controls, and grid voltages (for 120V AC electric power source).

Power Supply:
The power supply shall be either Solar or 120 V AC, meet all applicable codes and be capable of operating the system for 24 hours per day, with 10 days of battery backup for solar power source.

Solar Power (as applicable) shall include the following:

1. One solar (330 watt min) panel array with a bracket for mounting to the top of the pole.

2. Flexible, liquid tight conduit shall be utilized from the solar panel to the weatherhead on the pole or as instructed by the solar panel manufacturer's instructions.

Electrical Power (as applicable) shall include the following:
The system shall operate on a 120 V AC. The AC input terminals shall be equipped with a 210 J (joule) capacity power line surge suppressor and shall have noise blanking capability.

Where required by the utility company, a meter shall be included.

CONSTRUCTION DETAILS

All provisions of Sections 645 and 680 shall apply to this specification except as modified below:

Electrical and communication shall be run in separate conduits.

The Contractor shall submit to the Engineer, at least two weeks before installation, detailed specifications, parts lists, manufacturer's cut sheets, instruction sheets, and wiring diagrams for the equipment to be installed. The Engineer will submit the documents to the Regional Traffic Engineer for review. The Contractor must receive approval from the Engineer, prior to any installation of any of the components of the Radar Speed Display Assembly.

The Contractor shall place and orient the radar speed display assembly and its Radar Speed

Feedback display sign in such a manner as to optimize viewing and detection angles using the manufacturer's recommendations and instructions for installation and as approved by the Engineer.

If the Engineer determines that the unit is not functioning properly, the Contractor shall secure the services of the manufacturer's representative for the installation and testing and if necessary, for the orientation of the Radar Speed Display Assembly components, to include orienting the solar panel array for optimum performance.

Where new work is to meet existing materials, the Contractor's methods shall provide for neat lines, being careful not to damage the material to remain. The restoration of disturbed areas shall utilize material and workmanship of like-kind-quality commensurate with preexisting conditions.

METHOD OF MEASUREMENT

This work will be measured as the number of complete functioning Radar Speed Display Assemblies satisfactorily furnished and installed.

BASIS OF PAYMENT

The unit price bid shall include the cost of furnishing all labor, materials, equipment and incidentals necessary to satisfactorily complete the work. Any signs (other than the driver feedback speed display sign) shown in the associated details will be paid for separately.

ITEM 655.07010010 - CAST FRAME F1, WITHOUT CURB BOX AND WITH RETICULINE GRATE G1
ITEM 655.07020010 - CAST FRAME F2, WITHOUT CURB BOX AND WITH RETICULINE GRATE G2
ITEM 655.07030010 - CAST FRAME F3, WITHOUT CURB BOX AND WITH RETICULINE GRATE G3

All conditions and requirements of Items 655.0701, 655.0702, and 655.0703 of the Standard Specifications shall apply except for the following modifications:

These shall be cast frame without curb box and with reticuline grate as detailed on the plans.

ITEM 670.72010008 – AERIAL TRIPLEX SERVICE CABLE

DESCRIPTION:
This work shall consist of furnishing and installing an aerial triplex service cable at the locations indicated in the plans or as directed by the Engineer. The wire gauge for the cable shall be as specified in the plans.

MATERIALS:
The cable shall conform to the requirements for aerial cable of the National Electrical Code and be Underwriters Laboratory approved. The cable shall be rated for 600 volt service and the conductors shall be stranded aluminum wire.

The cable consists of 2 black insulated conductors twisted around a bare aluminum messenger cable.

CONSTRUCTION DETAILS:
All installations shall conform to the latest EEI, NEMA, ANSI, and ASTM standards. In addition, workmanship shall conform to the latest requirement of the National Electric Code; local power company requirements and any local ordinances which may apply.

A sufficient length of cable, not less than 24 inches, shall be left at the end of the run to allow for the tap to be made by the power company. The Contractor shall make all connections except those for which the utility company is responsible.

Aerial cable shall have a clearance of not less than 18 feet above ground.

The aerial cable shall be tested per New York State Standard Specification Section 670-3.16 before being energized. Test results shall be recorded and documented for each test and provided to the Engineer.

Activation of the aerial cable shall be made upon approval of the test results by the Engineer. All final connection fees shall be paid for by the contractor.

METHOD OF MEASUREMENT:
This work will be measured as the number of feet of aerial cable installed in accordance with the contract documents or as directed by the Engineer, activated, tested and accepted.

BASIS OF PAYMENT:
The unit price bid per linear foot of aerial cable shall include the cost of all labor, equipment, material, terminating, connections, incidental fittings, testing, attaching, fees, and documentation detailed in the contract documents for this bid item.

ITEM 680.82XXYY10 – MAST ARM POLE WITH ROTATING ARM LENGTH UPTO 50 ft

DESCRIPTION

Under these items, the Contractor shall furnish and install the combined mast arm poles and mast arms which will support traffic control signals and auxiliary equipment as shown on the Contract Documents or as ordered by the Engineer.

MATERIALS

A GENERAL

1. The mast arm pole and mast arm may be fabricated of pipe, tube, or cold-formed hot rolled steel conforming to one of the following alloys:

   ASTM A53 Grade B
   ASTM A252 Grade 2 or 3
   ASTM A595 Grade A or B

   All alloys used shall be subject to approval of the Engineer.

2. The yield of this pipe or tube shall be not less than 48 ksi. The yield of the cold-formed hot rolled steel shall not be less than 55 ksi for ASTM A595 Grade A or 60 ksi for Grade B.

3. The mast arm pole, mast arm, and base shall be hot-dipped galvanized in accordance with ASTM 123.

4. The anchor bolts, nuts, and washers shall conform to the standard specifications for low-carbon steel, "Externally and Internally Threaded Standard Fasteners," A.S.T.M. Designation A307, current edition AISI, C1035, special quality. The bolts, nuts, and washers shall be galvanized in accordance with ASTM 123. The bolts shall be galvanized after threading and assembly.

5. All other miscellaneous hardware shall be stainless steel.

6. Nut covers shall be cast aluminum or spun aluminum.

7. All hardware shall be packaged for each pole furnished.

B DESIGN REQUIREMENTS: GENERAL

1. Design stress for mast arm poles, mast arms, and all its components shall not exceed 55% (percent) of yield strength of the specified material used, equivalent to a 1.8 factor of safety.

2. All poles shall be designed to support at the free end of the mast arm a load of 463 lb applied vertically downward and a load of 701 lb applied perpendicular to the axis of the mast arm and the vertical force.

3. The mast arm pole and mast arm of the length designated shall be designed such that when assembled as a unit, the maximum horizontal deflection of the pole shall not exceed 3 inches at the top of the shaft in any direction.
   The manufacturer shall certify by a load test in each arm, that the Maximum Vertical Deflection with an applied dead load of 190 lbs. to the free end of the mast arm (as measured in the installed position) shall be limited to the following:

Mast Arm Length (ft.)	Max. Vertical Arm Deflection (in.)
40 and below	6
45	9
50	12

The maximum horizontal (sideways) deflection of the free end of the mast arm, from the no load position, shall not exceed those indicated on the contract plans.

4. The dimension and roadway clearances shall be as indicated on the contract plans.

5. The assembled unit of mast arm and pole shall be so designed as to permit the arm to be rotated to any angle (0° – 360°) in a horizontal plane and to be secured in that position. This rotation capability shall be provided for at the top of the vertical shaft, where the arm is attached.

C DESIGN REQUIREMENTS: MAST ARM POLES

1. The mast arm pole shall be designed under the load and design requirements set forth in Section B.

2. The cross section of the poles shall be symmetrical about its axis. The poles shall be round. They may be uniformly tapered or have a constant nominal diameter not exceeding those indicated on the details at the base. If longitudinally welded, the exposed weld shall be ground or rolled smooth and flush with the base metal. All such welds shall be continuous. All pipe or tubings shall be full lengths for poles. No splicing will be permitted.

3. The base shall be designed to fully develop the ultimate strength of the pole. The base may have a cross section similar to the pole; it may be round or a regular polygon and shall be designed to fully transfer the load to the anchor bolts.

4. The base of each pole, shall be fabricated to receive anchor bolts spaced equally apart on a bolt circle, indicated on the details symmetrically about the axis of the pole.

5. Each anchor bolt shall be supplied with a leveling nut and a stop nut. Each anchor bolt shall be sized and threaded as indicated on the details. A flat steel plate shall be either welded with a fillet weld or threaded or bolted to the imbedded end.

6. Each pole shall be furnished with bolt cover plates for concealing the exposed ends of the anchor bolts and nuts. A means shall be provided to secure the bolt covers to the base.

7. Each pole shall be provided with a reinforced handhole, as indicated on the details. The removable cover shall be equipped with two (2) Allen keyed, stainless steel bolts.

8. The pole shall be designed and fabricated to accommodate mast arms of 15, 20, 25, 30, 35, 40, 45, and 50 feet. The mast arms and pole shall be completely interchangeable.

9. A bronze grounding stud with bronze lock washer shall be installed inside the pole welded to the shaft opposite the handhole.

D DESIGN REQUIREMENTS: MAST ARMS

1. The mast arm shall be designed for the load and design requirements set forth in Section B.

2. The mast arm shall be designed as a single member without spreader arms, tie rods, or truss members. The mast arm shall have the appearance of an upsweep curving arc.

3. The mast arm shall have a cross section similar to that of the mast arm pole.

4. The rise of the mast arm from the pole end to the free end shall be as indicated on the details. This rise shall be accomplished by sloping the mast arm upward and curving it such that the middle ordinate distance between the curved mast arm and the chord shall not be less than 6 inches for any mast arm length.

5. The arm shall consist of a straight section and a constant radius curved section. These sections shall be dimensioned as indicated on the details. The curved arm shall meet the horizontal plane at the free end with an upward angle of three (3) degrees. The diameter of the arm shall not be greater than the diameter of the pole. Any difference between the diameters shall be made through a smooth appearing tapered reduction fitting at the point of joining. The minimum length of taper shall be as indicated on the details.

6. The mast arm shall be provided with a standard pipe sized as indicated on the details to support standard traffic signal heads to be located at the end of the mast arm.

7. There shall be means provided for a weather tight entrance of electrical conductors from the traffic control devices to the mast arm. This entrance shall be located through the end of the mast arm pipe fitting. At the juncture of the mast arm and mast arm pole, a weather tight exit from the mast arm to the mast arm pole for electrical conductors shall be provided internally.

E BASIS OF ACCEPTANCE

1. The Contractor shall provide descriptions and drawings of each type of mast arm pole for approval.

2. All testing for deflections, when required, shall be made on the mast arm pole and mast arm assembled as a unit. The deflection shall not exceed those specified on the details subject to the loads specified in Section B.2.

3. The manufacturer shall provide when required, a certified report from a certified independent test laboratory that the mast arm and pole have been tested and meet these specifications for deflections and materials. Additional field tests of a complete unit, pole with mast arm attached, may be required as determined by the Engineer.

F GUARANTEE

1. All material and workmanship furnished under this specification, shall be guaranteed for a period of one year from the date of completion of this contact.

2. The Contractor shall be responsible for any defective parts, due to faulty material or workmanship, free from any expense to the State during the term of this guarantee, where such material is exposed to normal operation conditions.

3. Units or parts found damaged or imperfect when inspected after delivery, shall be replaced by the Contractor at his own expense, including all subsequent delivery and shipping charges.

CONSTRUCTION DETAILS

Subsections 680-3.01 to 680-3.12 and 680-3.32 shall apply.

The mast arm pole and mast arm shall be erected upon a foundation, installed under another item, with the handhole located in a direction as approved by the Engineer. The mast arm shall be aligned as shown on the plans or as ordered by the Engineer.

The mast arm pole shall be raked when the mast arm is under a full load as shown on the intersection drawing. The pole shall be raked to a vertical position.

The pole shall be grounded with a solid copper equipment grounding conductor.

All holes and openings shall be field drilled and tapped to insure the proper alignment of attachments and fittings.

All scraped or bruised areas on the mast arm pole or mast arm shall be regalvanized in the field to the satisfaction of the Engineer.

METHOD OF MEASUREMENT

This work shall be measured by the number of mast arm poles with mast arm furnished and installed in accordance with the Contract Documents or as directed by the Engineer.

BASIS OF PAYMENT

Subsection 680-5.01 of the Standard Specifications shall apply.

The unit price bid for each pole shall include the necessary grounding system, anchor bolts, mast arms, pole assembly and erection, field galvanizing as required and the following items. Breakaway transformer bases, when specified, shall be included in the price bid for each pole.

a. Anchor bolt covers if specified.
b. Weather heads and couplings as required.
c. Service bracket.
d. Pole cap and mast arm end caps.
e. Cabinet mounting fittings, plates, brackets as needed for the cabinet being installed.
f. Reinforced couplings for wire entrances to cabinets.
g. Galvanized eyebolt, nuts and washers for attaching span wire assembly.
h. Galvanized pole clamps with eyes for attaching tether wires.

Payment will be made under:

Item No.	Item	Pay Unit
680.82XXYY10	Mast Arm Traffic Signal Pole XX = Mast Arm mounting height in feet. YY = Mast Arm length in whole feet.	Each

ITEM 680.110004NA - FURNISH AND INSTALL 4 FOOT SIGNAL POST
ITEM 680.110008NA - FURNISH AND INSTALL 8 FOOT SIGNAL POST
ITEM 680.110010NA - FURNISH AND INSTALL 10 FOOT SIGNAL POST
ITEM 680.110012NA - FURNISH AND INSTALL 12 FOOT SIGNAL POST

DESCRIPTION

This work shall consist of furnishing and installing aluminum signal posts in accordance with the contract documents and as directed by the Engineer.

MATERIALS

1. Materials and Finish

1.1 The shaft shall be one piece seamless round aluminum tubing conforming to the Aluminum Association Alloy 6061-T6. The aluminum shaft shall have a satin brushed finish.

2.2 Screws, nuts, bolts, washers and miscellaneous hardware other than anchor bolts, shall be made of Stainless Steel Alloy No. 302.

1.3 Anchor bolts, nuts, and washers shall conform to the Standard Specifications for Low Carbon Steel Externally and Internally Threaded Standard Fasteners, latest edition AISI C 1035 special quality. Nuts, washers, base plate, and the anchor bolts shall be galvanized in accordance with ASTM 153. Bolts shall be galvanized after threading.

2. Design Requirements

2.1 The post shall be designed to support two thirty-five (35) pound traffic signal faces with backplates, each with a surface area of five (5) square feet and two (2) pedestrian signals, each with a surface area of 1.8 square feet. The post shall be designed to support these signal heads when subjected to a load from a hundred (100) mile per hour wind.

2.2 The base shall be fabricated from steel plate. The corners shall be rounded. A hole shall be cut in the center of the plate to receive a standard 4” diameter steel coupling. The coupling shall be fillet welded on the top and bottom of the plate. The base shall be of sufficient cross section to fully develop the ultimate strength of the post. The base shall be designed to fully transfer the load to the anchor bolts. The top of the installed 4” diameter pole coupling and the top of the anchor bolt nuts shall be a maximum of 4” above grade.

2.3 The base shall be fabricated to receive four (4) anchor bolts spaced ninety (90) degrees apart on a 12-3/4” diameter bolt circle, indicated on the Standard Traffic Drawings.

3. Specific Requirements

3.1 The posts shall be round. If welded longitudinally, the exposed weld shall be ground or rolled smooth and flush with the base metal. All welds shall be continuous. Transverse welds, other than fillet welds shall not be permitted.

3.2 A handhole with aluminum cover plate shall be provided. The longer dimension shall be vertical. The handhole shall be centered above the base plate, at a distance indicated on the Standard Drawings. The cover plate shall be secured by two (2) stainless steel "tamper proof" screws.

3.3 A grounding stud with a bronze lock washer and nut shall be mounted inside the shaft opposite the handhole for attaching the equipment grounding conductor.

3.4 Each post shall be provided with four (4) anchor bolts. Each anchor bolt shall be provided with a leveling nut and an "acorn type" top nut.

3.5 The size of each anchor bolt shall be as indicated on the Standard Traffic Drawings.

3.6 The top of the shaft shall be designed to receive a slip fitter.

3.7 When required, the aluminum shaft shall be furnished with a weatherproof spun aluminum pole cap, complete with three (3) stainless steel set screws for fastening to the top of the shaft.

3.8 The total height of the shaft and base shall be as specified.

3.9 All dimensions shall be as indicated on the Standard Traffic Drawings.

4. Certification and Drawings

4.1 The Contractor shall provide descriptions and drawings of the signal post for approval.

4.2 The manufacturer, when required, shall provide a certificate that the post meets the material requirements of this specification.

CONSTRUCTION DETAILS

5. Installation

5.1 The signal post shall be erected on a foundation installed under another item.

5.2 The handhole shall be located as ordered by the Engineer.

5.3 The post shall be properly plumbed by the use of the leveling nuts and secured in place by "acorn type" top nuts.

5.4 The signal post, conduit, and ground rod shall be interconnected by a bare solid copper equipment grounding conductor indicated on the Standard Traffic Drawings.

METHOD OF MEASUREMENT

This work will be measured as the number of signal posts satisfactorily furnished and installed.

ITEM 680.110004NA - FURNISH AND INSTALL 4 FOOT SIGNAL POST
ITEM 680.110008NA - FURNISH AND INSTALL 8 FOOT SIGNAL POST
ITEM 680.110010NA - FURNISH AND INSTALL 10 FOOT SIGNAL POST
ITEM 680.110012NA - FURNISH AND INSTALL 12 FOOT SIGNAL POST

BASIS OF PAYMENT

The unit price bid shall include the cost of furnishing all labor, materials, tools, transportation, handling, incidentals and equipment necessary to satisfactorily complete the work including the signal post, anchor bolts, acorn nuts, leveling nuts, pole cap (if required), bare copper equipment grounding conductor, ground rod.

ITEM 680.321001NA - MODEL 2070 LITE CONTROLLER

DESCRIPTION

This work shall consist of furnishing and installing Model 2070 LITE (2070L) Controllers in accordance with the contract documents and as directed by the Engineer.

MATERIALS

1. Qualification

1.1 All components supplied under this specification shall be listed on the CalTrans Qualified Product List (QPL) that is in effect on the issue date of this invitation (see section 1.2 for 2070L controller qualification). Equipment that is not defined by the CalTrans "Transportation Electrical Equipment Specifications" (TEES) that is in effect on the issue date of this invitation is not covered by this requirement. For each piece of equipment that is covered by this requirement, the vendor shall submit a notarized certification the equipment is listed on the QPL that was in effect as of the date of issue of this invitation. Failure to provide this certification shall cause the bid to be rejected as unresponsive. If during the course of the contract, any piece of equipment ceases to be listed on the current QPL, the County may, at its option, require the vendor to provide a suitable replacement that is listed on the current QPL at no additional cost.

1.2 Model 2070L controllers furnished as part of this item specification must be listed on the Nassau County Qualified Products List (QPL) for 2070L Traffic Signal Controllers.

2. Requirements

2.1 All materials furnished, assembled, fabricated and installed shall be new, corrosion resistant and in strict accordance with the latest provisions set forth by the California Department of Transportation (CalTrans) Specifications.

The specifications for the Model 2070L Controller Unit will be as stated in the CalTrans document TEES, August 16, 2002 or latest revisions and all addenda thereof.

2.2 The Model 2070L Controller Unit shall be delivered in the following configuration:

- Unit Chassis
- Model 2070 – 1B CPU Card (LITE)
- Model 2070 – 2A Field I/O Card
- Model 2070 – 3B Front Panel Interface
- Model 2070 – 4A Power Supply
- Model 2070 – 7A 2070 RS-232 Card (EIA-232 Serial Port)

2.3 The Model 2070L Controller Units supplied to this specification shall have the chassis openings for any unused Motherboard connector covered with the appropriate cover plates so that the entire rear of the controller is closed.

2.4 The Model 2070L Controller Units shall be supplied with 2X Wide Cover Plates installed over the chassis openings for connectors A1 and A2 so that the rear of the controller is completely enclosed.

CONSTRUCTION DETAILS

3. Installation

3.1 The Contractor shall install the Model 2070L Controller Unit and all related hardware in the Model 336S or 332 Cabinet at locations specified on the plans.

3.2 The County will provide the signal control software and the Contractor shall be required to program and test the Controller prior to installation in the field.

3.3 The Contractor shall program each Model 2070L Controller Unit with a unique internet protocol (IP) address provided by the County and recorded in each equipment cabinet.

4. Documentation Requirements

4.1 One (1) complete set of operations and maintenance manuals shall be placed in each field cabinet and one (1) complete set shall be delivered to Nassau County. The manuals shall, as a minimum, include the following:

- Complete and accurate schematic diagrams.
- Complete installation procedures.
- Complete parts list including names of vendors for parts not identified by universal part numbers such as JEDEC, RETMA, or EIA.
- Pictorial of components layout on circuit board.
- Complete maintenance and trouble-shooting procedures.
- Complete stage-by-stage explanation of circuit theory and operation.

5. Testing Requirements

5.1 Design Approval Tests shall include all functional and environmental tests specified in the most current version of the CALTRANS TEES Specifications.

A complete Quality Control (QC)/ final test report for the 2070L shall be supplied with each unit. The test report shall indicate the name of the tester and shall be signed by a responsible manager. The QC procedure shall include the following:

- Acceptance of all supplied components.
- Physical and functional testing of all modules and items.
- A minimum 100-hour burn-in of all equipment

ITEM 680.321001NA - MODEL 2070 LITE CONTROLLER

METHOD OF MEASUREMENT

This work will be measured as the number of Model 2070 LITE Controllers satisfactorily furnished, installed, tested and made fully operational.

BASIS OF PAYMENT

The unit price bid shall include the cost of furnishing all labor, materials, tools and equipment necessary to satisfactorily complete the work. Payment for all documentation and testing specified herein shall be included under this contract item.

ITEM 680.336001NA - MODEL 336S CABINET AND AUXILIARY EQUIPMENT

DESCRIPTION

This work shall consist of furnishing and installing a Model 336S (Stretch) Cabinet and Auxiliary Equipment in accordance with the contract documents and as directed by the Engineer.

MATERIALS

1. Controller Requirements

   1.1 All components and plug-in modules supplied under this item shall conform to the New York State Transportation Management Equipment Specifications for peripheral equipment. Model 2070L controllers shall be on the latest Nassau County Qualified Products List and be approved by NCDPW. Model 2070L controllers will be paid under a separate item.

2. Qualification

   1.1 All Model 336S components supplied under this specification shall be listed on the CalTrans Qualified Product List (QPL) that is in effect on the issue date of this invitation. In the case of the modified 336S Cabinet, the vendor's standard model shall be listed on the CalTrans QPL that is in effect on the issue date of this invitation. All auxiliary equipment shall be listed on the CalTrans QPL that is in effect on the issue date of this invitation. Equipment that is not defined by the CalTrans "Traffic Signal Control Equipment Specifications" (TSCES) or "Transportation Electrical Equipment Specifications" (TEES) that is in effect on the issue date of this invitation is not covered by this requirement. For each piece of equipment that is covered by this requirement, the vendor shall submit a notarized certification the equipment is listed on the QPL that was in effect as of the date of issue of this invitation. Failure to provide this certification shall cause the bid to be rejected as unresponsive. If during the course of the contract, any piece of equipment ceases to be listed on the current QPL, the County may, at its option, require the vendor to provide a suitable replacement that is listed on the current QPL at no additional cost.

3. Requirements

   3.1 All materials furnished, assembled, fabricated and installed shall be new, corrosion resistant and in strict accordance with the latest provisions set forth by the California Department of Transportation (CalTrans) Specifications.
   The specifications for the Model 336S Cabinet and auxiliary equipment shall conform to the requirements in CalTrans documents TSCES and TEES, and to all addenda thereto current on the issue date of this invitation.

   3.2 This specification shall consist of a wired Model 336S Cabinet with all auxiliary equipment, and cable harnesses required to control the site specific project intersections and interface with the communications systems shown on the plans, as specified in these specifications, and as ordered by the Engineer. Model 2070L Controller Units shall not be furnished under this item.

3.3 As a minimum, this item shall include, but not be limited to, the following equipment:

Model No.	Quantity	Description
336S	1	Model 336 Stretch Cabinet
2010 ECLip Kit	1	Enhanced Conflict Monitor Unit with Red Monitoring
200	*	Solid State Switchpack
204	2	Solid State Flasher
222	*	Dual Loop Vehicle Detector Module
242	*	Dual Isolation Module (DC)
430	*	Flash Transfer Relays
-	12	Flash Program Plugs (8 red, 2 yellow, 2 white)
-	10	2w/4k bleeding resistors for unused outputs
-	1	Mounting Bracket Assembly (Pole Mt. Only)
- Only)	1	Aluminum Cover Plate for Cabinet Bottom (Pole Mt.
-	1	Fiber Optic Distribution Panel

* The contractor shall supply the appropriate quantity of the noted components in accordance with the signal design plans and cabinet wiring diagram.

3.4 Model 336S Cabinet

3.4.1 Dimensions

The cabinet shall be a Model 336 Stretch type with a minimum height of 46” and maximum height of 48”, width of 24”, and a depth of 22”.

The unoccupied rack space of the Model 336 Stretch Cabinet shall be provided at the bottom of the cabinet.

3.4.2 Traffic Signal Identification

The traffic signal number shall be painted on both sides of the cabinet as directed by the Engineer. It shall be painted in black with the letters 3” high in type “C” series.

3.4.3 Locks

The cabinet doors shall be equipped with a brass cylinder lock keyed for a Number Two Corbin Key, with a dust cover. Two (2) keys for each cabinet shall be furnished and provided in the cabinet drawer. Cabinet shall be equipped with a removable handle that shall be provided with the cabinet.

3.4.4 Finish

All surfaces of the cabinet shall be bare, unpainted aluminum.

3.4.5 Police Door

The front door of the cabinet shall be equipped with an auxiliary police access door. The police access door shall include a Signal ON/OFF switch, Flash/Auto switch, and an Auto/Manual switch with hardwired police cord. One (1) police master key shall be provided in the cabinet drawer.

3.4.6 Cabinet Light

Fluorescent lamps shall be installed in the top of the front and rear of the cabinets. Switches shall be installed on the front and rear doors. Opening of either door shall illuminate both lights.

Each fluorescent lamp and switch shall be equipped with noise suppression devices. Activation of the fluorescent lamps and associated switches shall not cause any disruption of the Model 2070L Controller or any other electrical device in the cabinet. The vendor shall install sufficient RFI and surge suppression equipment to assure that operation of the fluorescent lamps will not disrupt the operation of other equipment in the cabinet.

Fluorescent lamps and associated ballast transformers shall be rated for high output in cold environments, providing high light output in ambient temperature of -13˚ F.

The cabinet lamp circuit shall be fused. The fuse holder shall be easily accessible from the front the cabinet. It shall not be necessary to reach into the cavity above the 2070L controller in order to access the fuse holder for the cabinet lamps.

3.4.7 Interconnect Terminal Block

Two twelve (12) position terminal blocks for interconnection shall be installed. The Contractor shall submit the proposed terminal block schematic and mounting location to the County for approval prior to installation in the cabinet. The cabinet shall be furnished with a plug-in Data/Signal 2 pair surge suppressor device, EDCO Model PC642 series, mounted on Socket PCB1B or approved equal. The voltage clamp value for the protector shall be selected to be appropriate for the communication equipment used in the cabinet.

3.4.8 Cabinet Drawer

An aluminum pullout drawer hinged at the top and having sliding tracts shall be provided in the cabinet. The drawer shall have the approximate dimensions of 1.75

inches in height, 13 inches deep and 16 inches wide and be capable of holding 40 pounds in weight when the drawer is extended. This drawer should be located between the Model 2070L Controller and the power distribution assembly. Provide a top for the storage compartment that has a non-slip plastic laminate attached, which covers a minimum of 90% of the surface area of the top.

3.4.9 Door Alarm

A door ajar alarm switch shall be installed on front and back doors. Each switch shall be of heavy duty, spring- loaded design with single pole normally closed contacts. Each switch circuit shall be closed whenever the corresponding door is open at an angle of 15 degrees or more. The switches shall be installed so that they will not restrict removal of the cabinet rack assembly in any way. The door ajar switches shall only be used to support the door ajar alarm function; they shall not be used to support any other function (such as cabinet illumination or conflict monitor interlocking).

Each switch shall be wired to 2 point barrier style terminal block on the input side of the cabinet. One point of the terminal block shall also be connected to pin C1-75 of the controller's C1 connector. The other point of the terminal strip shall be connected to controller logic ground.

3.4.10 Input File Slot 14

Input File Slot 14 shall be disabled by means of jumping Channel 1 Out (F) to Channel 1 In (D), and Channel 2 In (W) to Channel 2 Out (J). The front opening of Input File Slot 14 shall be covered with a faceplate constructed of the same material as the input file housing.

3.4.11 Cabinet Filters

The cabinets shall have vents on both the front and back doors and metal water deflection panels mounted inside the vents. A disposable paper filter element shall be provided in lieu of a metal filter.

3.4.12 Surge Protection

The cabinet shall be furnished with a plug-in RFI filter and surge protection device, EDCO MODEL SHA 1250, mounted on the cabinet service panel assembly on Socket BEAU S-5412 SB or approved equal.

3.5 Conflict Monitor

3.5.1 The conflict monitor shall meet the requirements of the CalTrans specifications, plus the additional requirements as specified below:

3.5.2 The conflict monitor shall provide a guaranteed minimum flash time on power-up, brownout restore, and short AC Line interrupts to allow the 2070L controller time to boot and set signal outputs.

3.5.3 The conflict monitor shall provide red monitoring and the Model 336S Cabinet shall be adapted for red signal monitoring. All required cables, wiring and equipment for red signal monitoring shall be included under this item.

3.5.4 The conflict monitor display on the front panel shall clearly indicate the following tripped conditions: 24VDC Fail, Conflict, Watchdog Error, Switch or Dual Indication, Red Fail, and Yellow or Sequence Fail.

3.5.5 The conflict monitor shall have an Ethernet port installed on the front panel for communicating with a laptop computer, or for communications to a network switch. The conflict monitor shall be compatible with Siemens Se-PAC software. The software for communicating with the conflict monitor shall be provided.

3.5.6 The conflict monitor shall be capable of storing in non-volatile memory a minimum of 100 events. Each event shall be marked with the time and date of the event. These events consist of fault events, AC Line events, reset events, and configuration change events.

3.5.7 An Ethernet cable shall be provided with each conflict monitor furnished.

3.6 Model 200 Solid State Switchpack

3.6.1 The Model 200 Solid State Switchpack shall conform to the requirements in the latest Transportation Management Equipment Specifications and be on the NYSDOT Qualified Products List on the issue date of this invitation.

3.7 Model 204 Flasher Unit

3.7.1 The Model 204 Flasher Unit shall conform to the requirements in the latest Transportation Management Equipment Specifications and be on the NYSDOT Qualified Products List on the issue date of this invitation.

3.8 Model 222 Dual Channel Loop Vehicle Detector

3.8.1 The Model 222 Dual Channel Loop Vehicle Detector shall conform to the requirements in the latest Transportation Management Equipment Specifications and be on the NYSDOT Qualified Products List on the issue date of this invitation.

3.9 Model 242 Dual DC Isolation Module

3.9.1 The Model 242 Dual DC Isolation Module shall conform to the requirements in the latest Transportation Management Equipment Specifications and be on the NYSDOT Qualified Products List on the issue date of this invitation.

3.10 Model 430 Flash Transfer Relays

3.10.1 The Model 430 Flash Transfer Relays shall conform to the requirements in the latest Transportation Management Equipment Specifications and be on the NYSDOT Qualified Products List on the issue date of this invitation.

3.11 Fiber Optic Distribution Panel

3.11.1 Fiber optic distribution panels shall be provided in each cabinet specified for the termination and optical continuation of the fiber optic cables as required. The unit shall act as an interface between the fiber optic drop cable and the fiber optic patch cables located within the cabinet. In addition, the distribution panel shall facilitate the reassignment of the fibers within and testing of the optical fiber cable plant. The rack shall be configured in connector fields consisting of rack mounted bulkhead connectors. The fields shall contain a sufficient quantity of connectors to accommodate the maximum number of fibers entering the equipment cabinet. Each connector field shall consist of up to 12 type LC single mode connectors per row, with the connector fields clearly identified by function. The distribution panel shall be capable of mounting in the standard 19" rack assembly of the cabinet. The patch panel shall be provided with a minimum of forty eight (48) LC style fiber optic bulkhead connectors. The distribution panel shall have sufficient room for slack fiber and shall have multiple entrances. All connections to active optical transmission equipment within the cabinet shall be via this panel. If the 332 Cabinet is being used as a communications hub cabinet, then the contractor must provide two (2) forty eight (48) port fiber optic patch panels at no extra charge.

CONSTRUCTION DETAILS

4. Installation

4.1 Mounting

4.1.1 Base Mount

When base mounted, the Model 336S Cabinet shall be mounted on a foundation with an "M" base adapter as prescribed by the plans or item sheet. The Contractor shall supply all bolts, nuts, lockwashers, mounting plates, and other material required to secure the cabinet properly to the "M" Base Adapter and foundation in accordance with the Traffic Signal Standard Drawings.

4.1.2 The M Base Adaptor will be paid for under another Item when required.

4.1.3 Pole Mount

When pole mounted, the Model 336S Cabinet shall be mounted on a pole as prescribed by the plans and as directed by the Engineer. Pole mounted cabinets shall be furnished with two (2) exterior pole mounting brackets and an aluminum plate to cover the opening on the bottom of the cabinet. The manufacturer shall reinforce the cabinet sidewalls/bracket mounting holes with metal plates of adequate size and strength, welded longitudinally across the inside depth of the cabinet. The cabinet

shall provide sufficient resistance to flexing and shall withstand pole mounting without warping the cabinet when doors are opened or closed.

The installation shall include the drilling and welding of posts or poles and the fastening of supports. The Contractor shall supply all bolts, nuts, straps, condulets with screw on covers, nipples, lock washers, mounting plates, and other material required to secure the cabinet properly to the pole in accordance with the Traffic Signal Standard Drawings. The condulet shall be 3" or 4" in diameter as required and as directed by the Engineer.

4.2 The Contractor shall make all field cable connections in the cabinet with approved insulated solderless lugs. All cabinet wiring shall be neat and firm.

4.3 The controller and cabinet assembly with auxiliary equipment shall be tested in the field with the prescribed timing schedules for forty-eight (48) trouble-free hours prior to on-line activation.

5. Installation Details

5.1 The Contractor shall install the Model 2070L Controller Unit and all related hardware in the Model 336S Cabinets at locations specified on the plans.

5.2 The County will provide the signal control software and the Contractor shall be required to program and test the Controller prior to installation in the field.

5.3 After all cables entering the cabinet are installed and tested, the Contractor shall seal all conduits using duct seal and/or steel wool to deter rodent entry in the cabinet.

5.4 The cabinet doors shall be perpendicular and open away from the curb as specified on the plans. If the plans do not indicate this information, the Contractor shall confirm with the Engineer regarding the orientation of the cabinet.

5.5 All wiring connected to terminal blocks, flashers, relays, switches, radio interference suppressor, etc. shall be identified by use of insulated pre-printed tags over the wire including, but not limited to, signal control wires, loop detector lead-in, etc. The wire markers shall carry the legend in plain words with sufficient details so that a translating sheet will not be required.

Cabinets shall be wired to accept and implement all of the features of the specified equipment.

6. Documentation Requirements

6.1 One (1) complete set of operation and maintenance manuals shall be placed in each field cabinet and ten (10) complete sets shall be delivered to the County. The manuals shall, as a minimum, include the following:

6.1.1 Complete cabinet and equipment layout drawings for all cabinet mounting configurations.

6.1.2 Complete cabinet wiring and harness drawings.
6.1.3 Complete installation procedures.
6.1.4 Complete parts list including names of vendors for parts not identified by universal part numbers such as JEDEC, RETMA, or EIA.
6.1.5 Pictorial of components layout on circuit board.
6.1.6 Complete maintenance and trouble-shooting procedures.
6.1.7 Complete stage-by-stage explanation of circuit theory and operation.

6.2 The cabinet wiring diagram provided by the manufacturer shall reflect the C1 wiring/pin assignment in accordance with the C1 pin/assignment of the Siemens Se-PAC program.

6.3 The cabinet/equipment layout and cabinet wiring diagram shall be submitted for review and approval prior to actual cabinet fabrication.

7. Testing Requirements

At a minimum the following cabinet tests shall be performed on all cabinets, with a designated representative from the County. Test procedures shall be submitted for approval prior testing.

7.1 48 hour hot and cold for cabinet and controller - documented and certified.

7.2 Run STEP (Self Test Evaluation Program) on controller - documented and certified.

7.3 Run 336 Cabinet test on cabinet. - documented and certified. It should test the following:

7.3.1 Input file wiring
7.3.2 Output file wiring
7.3.3 Timing of all possible conflict combinations
7.3.4 Watchdog error

7.4 Test proper brownout voltage calibration between conflict monitor and controller. Manufacturer to submit procedure for approval. Documentation and certification to be shipped with cabinet.

7.5 Perform conflict monitor unit (CMU) testing as follows:

7.5.1 Test all channel to channel conflicts
7.5.2 Test all voltage threshold levels
7.5.3 Test all auxiliary functions (watchdog, 24 VDC, program card ajar, etc.)
7.5.4 Test all enhanced (absence of red, sequence, etc.)
7.5.5 A printed record of each test to be provided; in particular all threshold voltages shall be documented.

METHOD OF MEASUREMENT

This work will be measured as the number of Model 336S Cabinets and Auxiliary Equipment that are satisfactorily furnished and installed.

ITEM 680.336001NA - MODEL 336S CABINET AND AUXILIARY EQUIPMENT

BASIS OF PAYMENT

The unit price bid to furnish and install a Model 336S Cabinet and auxiliary equipment shall include the cost of furnishing all labor, materials, tools and equipment necessary to satisfactorily complete the work in accordance with the Contract Documents.

ITEM 680.813108NA LED PEDESTRIAN SIGNAL WITH COUNTDOWN TIMER ASSEMBLY, 16" X 18"

DESCRIPTION

The work of this item shall consist of furnishing and installing LED Pedestrian Signal Assemblies with Countdown timers and mounting brackets in accordance with the contract documents and as directed by the Engineer.

MATERIALS

The pedestrian signal shall be a single unit housing for both the symbol messages and the countdown pedestrian signal display. It shall be designed to illuminate the alternate symbol message "WALKING PERSON"/"UPRAISED HAND," and "COUNTDOWN TIMER" in conformance with ITE standards.

The illumination shall be supplied by light emitting diodes (LEDs) in a uniform appearance. The LED Pedestrian Countdown Module shall be rated for a minimum useful life of 60 months and meet all parameters of this specification during this period.

Pedestrian Signal mounting brackets, attachments, and fittings shall be designed in accordance with AASHTO standard specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals.

Housing

The Pedestrian signal housing shall be a one piece corrosion resistant aluminum alloy die casting complete with integrally cast top, bottom, sides, and back, or polished sheet aluminum.

Four integrally cast hinge lugs, two at the top and two at the bottom, shall be provided for the operation of a swing-down door.

A mounting hole shall be provided in the top and bottom of the housing for connection to standard pipe fittings as indicated in the standard drawings. The mounting holes shall be reinforced with an integral casting.

The door frame shall be a one piece corrosion resistant aluminum alloy die casting, complete with cast hinge lugs and latch lugs.

Latching or unlatching of the door shall require no tools.

The housing shall be dust proof, weather proof, and corrosion resistant. The housing shall provide for easy access and replacement of all components.
Each signal shall be provided with a visor approximately 8 inches in depth.

LED Countdown Pedestrian Module

Basic Requirements:

The LED Countdown Pedestrian Module shall be a single, self-contained device (16" High x 18" Wide), not requiring on-site assembly for installation into existing traffic signal housings.

ITEM 680.813108NA LED PEDESTRIAN SIGNAL WITH COUNTDOWN TIMER ASSEMBLY, 16" X 18"

The LED Countdown Pedestrian Module shall conform to the current version of the MUTCD Chapter 4E - Pedestrian Control Features for operation, shape, size and color.

The LED Countdown Pedestrian Module shall have a no glare lens and be UV treated for protection from the sun.

The standard colors, as defined in the MUTCD, for the LED Countdown Pedestrian Module shall be white for the "WALKING PERSON" and Portland orange for the "UPRAISED HAND" and "COUNTDOWN TIMER".

The LED Countdown Pedestrian Module shall consist of a double overlay message combining the graphic symbols of a "WALKING PERSON" and "UPRAISED HAND," and two seven segment digits for the "COUNTDOWN TIMER".

In the graphic symbols, the LEDs shall be arranged in a manner to form a solid icon symbol.

The countdown numbers shall be 9" in height.

The graphic symbols and the countdown numbers shall be located on a black opaque background.

The Portland Orange LED shall be of the latest ALLnGaP technology and the white LED shall be of the latest GaN technology.

The individual LED light source shall be interconnected so that a catastrophic failure of a single LED will result in a total loss of not more than 5% of the signal light output.

When not energized, the symbols and countdown timer shall be dark with no phantom image regardless of solar intensity or alignment.

Countdown Functionality

The LED Pedestrian Countdown Module shall be operationally compatible with currently used Model 2070L microcomputer controller and cabinet assemblies (solid state load switches, flashers, and conflict monitors).

The countdown timer section shall have a microprocessor capable of learning or recording the clearance timing when connected to a traffic controller.

When first connected, the module shall blank out the digital display during the initial countdown display "learning phase" while it records the countdown time using the Don't Walk signal indications.

This "learning phase" shall be two cycles or less.

The countdown timer module shall continuously monitor the traffic controller for any changes to the pedestrian phase time and reprogram itself automatically if needed.

The countdown timer display shall start only at the beginning of the pedestrian change interval.

After the countdown timer displays zero, the display shall remain dark until the beginning of the next countdown.

The countdown timer shall be able to follow the controller through any NEMA defined operations.

The countdown timer display remains synchronized with the signal indications and always reaches zero at the end of the flashing hand.

The countdown module shall prevent any possible conflicts between the "WALKING PERSON"/"UPRAISED HAND" signal indications at the time display.

It shall be impossible for the display to countdown during a solid hand indicator.

The countdown display shall be located immediately adjacent to the associated hand icon.

Electrical Requirements

Power Consumption

Maximum power consumption for LED Pedestrian Countdown Module shall be in accordance with the following:

		HAND	PERSON	COUNTDOWN
Operating Voltage	@ 77 F	11 watts	8 watt	6 watts

The modules shall operate from a 60Hz +3Hz AC line over a voltage ranging from 80 V to 135 V. The fluctuations of line voltage shall have no visible effect on the luminous intensity of the LED modules.

Operating voltage of the modules shall be 120 VAC. All parameters shall be measured at this voltage.

Power Factor

The LED Pedestrian Countdown Module shall have a power factor of 0.90 or greater.

Total Harmonic Distortion

Total harmonic distortion (current and voltage) induced into an AC power line by a LED Pedestrian Countdown Module shall not exceed 20%.

Surge Suppression

The LED Pedestrian Countdown Module on-board circuitry shall include voltage surge protection to withstand high-repetition noise transients as stated in Section 2.1.8 of NEMA Standard TS-2, 2003.

The LED circuitry shall prevent perceptible flicker to the unaided eye over the voltage range specified above.

All wiring and terminal blocks shall meet the requirements of Section 13.02 of the ITE VTCSH standard.

ITEM 680.813108NA LED PEDESTRIAN SIGNAL WITH COUNTDOWN TIMER ASSEMBLY, 16" X 18"

Compatibility

The LED Pedestrian Countdown Module shall be operationally compatible with currently used Model 2070L microcomputer controller and cabinet assemblies (solid state load switches, flashers, and conflict monitors).

When a current of 20mA (or less) is applied to the unit, the voltage read across the two leads shall be 15 VAC or less.

The modules and associated onboard circuitry shall meet Class A emission limits referred in Federal Communications Commission (FCC) Title 47, Sub Part B, Section 15 regulations concerning the emissions of electronic noise.

Each symbol/number shall reach 90% of their illumination (turn-on) within 75 msec. of the application of the nominal operating voltage. The module shall not be illuminated (turn-off) after 75 msec. of the removal of the nominal operating voltage.

Photometric Requirements

The minimum maintained luminous intensity values for the LED Countdown Pedestrian Module shall be in accordance with the ITE "Pedestrian Traffic Control Signal Indications – Part 2: Light Emitting Diode (LED)," latest edition throughout the useful life based on normal use in a traffic signal operation over the operating temperature range.

The measured chromaticity coordinates of the LED Countdown Pedestrian Module shall conform to the chromaticity requirements of ITE "Pedestrian Traffic Control Signal Indications – Part 2: Light Emitting Diode (LED)," latest edition throughout the useful life based on normal use in a traffic signal operation over the operating temperature range.

Environmental Requirements

The LED Countdown Pedestrian Module shall be rated for use in the operating temperature range of -40 F to +165 F. The modules shall meet all specifications throughout this range.

The LED Countdown Pedestrian Module shall be protected against dust and moisture intrusion per the requirements of NEMA Standard 250-1991 for Type 4 enclosures to protect all internal components.

Module Construction

The LED Countdown Pedestrian Module shall not require special tools for installation.

The circuit board and power supply shall be contained inside the module.

The assembly and manufacturing process for the LED Countdown Pedestrian Module shall be designed to assure all internal components are adequately supported to withstand mechanical shock and vibration from high winds and other sources.

ITEM 680.813108NA LED PEDESTRIAN SIGNAL WITH COUNTDOWN TIMER ASSEMBLY, 16" X 18"

Module Identification

Each LED Countdown Pedestrian Module shall have the manufacturer's name, trademark, model number, serial number, date of manufacture, and lot number as identification permanently marked on the back of the module.

The following operating characteristics shall be permanently marked on the back of the module: rated voltage and rated power in Watts and volt-ampere.

Documentation Requirements

Each LED Countdown Pedestrian Module unit shall be provided with a complete and accurate installation wiring guide.

Complete name, address, and telephone number for the representative, manufacturer, or distributor for warranty repair.

Painting

The cast aluminum or sheet aluminum shall be painted with two coats of silver aluminum paint. The interior of the visor shall be finished with two coats of high quality, synthetic resin flat enamel paint, black in color, baked after application.

Drawings and Certifications

The Contractor shall provide descriptions and drawings of each type of pedestrian signal for approval

The Manufacturer shall provide a certified report that the pedestrian signal is in compliance with this specification.

Units or parts found damaged or imperfect when inspected after delivery and/or installation shall be replaced by the Contractor at his own expense, including all subsequent delivery, shipping, and reinstallation charges.

CONSTRUCTION DETAILS

Shop drawing and/or catalog cuts shall be submitted to the Engineer for approval. The Contractor is not to order materials until the shop drawings are approved.

The pedestrian signal shall be installed on steel, wood, or aluminum poles as indicated on the plans.

Post Top Mount

The lower supporting assembly of the pedestrian signal shall consist of an aluminum slipfitter assembly with an approved locking device. A close nipple with locknuts or equivalent shall be utilized to secure the slipfitter to the pedestrian signal. The top of the signal face shall be sealed with a threaded cap assembly

When two or more signals are installed on a pedestal an approved bracket assembly shall be utilized for the top and bottom of the signals and secured to the side of the post.

The bracket shall have as many arms as the number of signal faces to be installed. A locking device shall firmly and positively hold the signal face in the required alignment shall be furnished and installed.

Shaft Mount

The upper and lower support assembly shall consist of two cast aluminum pole mounting brackets. The pole mounting brackets shall be cast with a threaded hub to receive a pipe and two guides for stainless steel bands.

The bracket shall be secured to the pole with stainless steel bands, steel conduit and elbows shall be used to secure the top and bottom of the pedestrian signal to the brackets. Steel lock nuts shall be installed on all conduits at the juncture of the conduit, bracket or elbow.

Locking devices, which shall firmly and positively hold the signal head in the required alignment, shall be furnished and installed.

The Pedestrian signal shall be installed and aligned in accordance with the plans or as ordered by the Engineer.

The electrical cable for the pedestrian signal shall be routed through the bracket assembly and conduit, and connected to the proper terminal block within the signal housing.

When the pedestrian signal is mounted on the side of a pole, the lower portion of the pedestrian signal support shall provide a vertical clearance as indicated on the Contract Documents. No portion of any pedestrian signal shall be closer than the clearance indicated in the Contract Documents.

METHOD OF MEASUREMENT

This work will be measured by the number of LED Pedestrian Signals with Countdown Timer assemblies that are furnished and installed as shown on the plans or as directed by the Engineer.

BASIS OF PAYMENT

The unit price bid to furnish and install each LED Pedestrian Signal with Countdown Timer Assembly shall include the cost of the 16" X 18" LED pedestrian signal and countdown module, the pedestrian signal housing, all necessary internal wiring, mounting hardware including all post top and shaft mount brackets, elbows, strapping, and all labor, incidental materials, tools, transportation, and equipment necessary to complete this work to produce a fully functional pedestrian display including all tests to the satisfaction of the Engineer.

680.51050010- RECTANGULAR REINFORCED CONCRETE PULLBOX
(26 inches X 18 inches)

DESCRIPTION

Under this item the Contractor shall furnish and install a rectangular reinforced concrete pullbox in accordance with this specification and the directions of the Engineer.

MATERIALS

Subsections 680-2.01, 680-2.02, and 680-2.05 shall apply.

CONSTRUCTION DETAILS

The requirements of Subsections 680-3.01, 680-3.04, 680-3.06, 680-3.09 and 680-3.14 shall apply with the following modifications:

The pullbox cover text shall read "NYS TRAFFIC" on the first line and "SIGNALS" on the second line in place of the text "TRAFFIC SIGNALS" as shown on the State Standard Sheet titled "Precast Standard Rectangular Pullboxes, Frames and Covers."

METHOD OF MEASUREMENT

This work will be measured for payment as the number of rectangular reinforced concrete pullboxes installed in accordance with the contract documents to the satisfaction of the Engineer.

BASIS OF PAYMENT

Subsection 680-5.05 shall apply.

ITEM 680.76610010 - POWER SERVICE CONNECTION (NASSAU COUNTY)

DESCRIPTION

Under this item the Contractor shall furnish and install a power service connection.

MATERIALS

The power connection assembly shall be a fused insulated connector kit. The kit shall be adaptable for use with No. 14 through No. 4 AWG cable. The power connection shall be two piece.

The length of the power connection shall be 4 ¼ inch. The cable shall be attached to the power connection assembly with standard crimping tools. The jacket of the power connection shall be rubber. The fuse shall be sized to the existing load not to exceed the capacity or rating of the cables. The power connection shall be approved by the Department of Public Works, County of Nassau, prior to installation. The circuit shall be energized only after approval has been received from the electric utility company.

CONSTRUCTION DETAILS

The power connection shall be installed and located in accordance with the electric utility company requirements and shall be connected to the No. 8 AWG power conductor installed under another item.

The power connection shall be installed in a designated pull box or as ordered by the Engineer.

METHOD OF MEASUREMENT

This work will be measured as the number of power connections furnished and installed in accordance with the plans, specifications and orders of the Engineer.

BASIS OF PAYMENT

The unit price bid for this item shall include the cost of the fuse, the power connection assembly, all tools, labor, equipment and transportation necessary to complete the work.

ITEM 680.77000010 - MODIFY TRAFFIC SIGNAL EQUIPMENT
ITEM 680.79000010 - REMOVE TRAFFIC SIGNAL EQUIPMENT

DESCRIPTION.
This work shall consist of modifying existing traffic signal equipment and removing existing traffic signal equipment, in accordance with the plans, specifications, or directions of the Engineer.

MATERIALS.
When the existing system is to be modified, the existing material shall be reused in the revised system, removed, salvaged, or disposed of as shown on the plans, as specified in the special provisions, or as directed by the Engineer.

New material required shall conform to the requirements of Subsection 680-2 of the Standard Specifications.

CONSTRUCTION DETAILS.
Where shown on the Contract Plans or directed by the Engineer, existing traffic signal equipment shall be either modified or removed and disposed of as specified in the Contract Documents.

The requirements of Subsections 680-3.01, 680-3.03, 680-3.04, 680-3.06, 680-3.07, 680-3.08, 680-3.09, 680-3.10, 680-3.12, 680-3.14, 680-3.16, 680-3.22, 680-3.30, and 680-3.32, as applicable, shall apply.

Care shall be exercised in removing and salvaging electrical equipment so that it will remain in its original form and existing condition wherever possible. The Contractor will be required to replace, at his expense, any traffic signal equipment which is determined by the Engineer to have been damaged or destroyed by reason of the Contractor's operations.

Existing material required to be modified and found to be unsatisfactory by the Engineer shall be replaced by new material and the cost therefor will be paid for as extra work.

METHOD OF MEASUREMENT.
The items will be measured for payment on a lump sum basis for the work completed in accordance with the Contract Documents and as directed by the Engineer.

BASIS OF PAYMENT.
The lump sum price bid shall include the cost of furnishing all labor, materials, tools, equipment, safety requirements as determined by U.S. Department of Labor's Occupational Safety and Health Standards, and incidentals necessary to complete the work including excavation, backfill, concrete, and restoration of surfaces.

Monthly payments will be made in proportion to the amount of work done under each item as determined by the Engineer.

ITEM 680.81330010 – AUDIBLE PEDESTRIAN SIGNAL
ITEM 680.81340010 – AUDIBLE PEDESTRIAN SIGNAL - WITH POST

DESCRIPTION
Under this item the contractor shall furnish, install and configure an ADA compliant pedestrian push button station with audio capability, and its control unit, at each location as indicated in the contract documents or where directed by the Engineer.

MATERIALS
Each installed location shall have the following:

1. Pedestrian Push Button Station
The station housing shall be no larger than 14.25 inch high, 5.50 inch wide and 2.50 inches in depth.

The station housing shall be constructed of cast aluminum, have a powder coated paint finish and be dark green in color.

The station shall include a weather proof speaker to emit the audible sounds. This speaker shall be recessed and located in back of the unit

The station shall include a weatherproof ADA compliant 2" diameter push button that is pressure activated and includes a raised direction arrow. The push button shall be constructed of cast aluminum, have a powder coated paint finish and be dark green in color.

The station shall include a 9 inches x 15 inches aluminum pedestrian message sign. The sign supplied shall have the following information included on it: “To Cross Push Button” statement and explanations of the pedestrian signal indications controlling the intersection crossing - “Illuminated Person”, “Flashing Hand” and “Steady Hand”.

2. Control Unit
Each pedestrian push button station shall be controlled by a control unit. The control unit shall be designed so that it fits into any pedestrian signal head used by NYS. The control unit will be installed inside of the pedestrian signal head that is associated with the station, unless otherwise indicated by the contract documentation or directed by the Engineer. The input side of the control unit will be connected in parallel to the Walk and

Don’t Walk AC signals that control the hand/person pedestrian LED’s installed in the pedestrian signal head. The output side of the control unit will connect and control the push button station. Mounting hardware, to facilitate mounting of the control unit inside

of the pedestrian signal head, shall also be provided.

3. Programming Device
If an external device is needed to set up, configure and program the pedestrian push station, one device, unless this requirement is waived by the contract documents or by the Engineer, shall be supplied for each intersection that a pedestrian push button station is installed in.

ITEM 680.81330010 – AUDIBLE PEDESTRIAN SIGNAL
ITEM 680.81340010 – AUDIBLE PEDESTRIAN SIGNAL - WITH POST

OPERATIONAL FEATURES
The stations push button shall be capable of providing the following:

An LED light indication and an audible tone for confirmation of push button activation.

A vibrating push button during the pedestrian walk cycle.

The audio sounds and messages emitted during the pedestrian walk cycle and in any combination shown below:

- A Standard pre-programmed voice walk message stating that the walk sign is on.
- Custom (programmed by vendor) walk messages as a substitute for the standard walk message.
- Audible chirp (for East/west intersection crossings) and cuckoo (for North/South intersection crossings).
- A minimum of one non-custom (pre-programmed and field configurable) voice informational message stating direction of intersection crossing.
- Custom (programmed by vendor) voice information messages.

Sounds/tones or the clearance countdown time remaining verbally during the pedestrian clearance cycle.

A standard pre-programmed station "locate" tone during the pedestrian don't walk phase. Custom (programmed by vendor) tones shall be available as a substitute for the standard locate tone.

The ability to detect and measure ambient sounds and make volume adjustments for all sounds so that they are produced above this ambient sound.

AUDIO SPECIFICATIONS
Speaker Ratings – 15 Watts, 8 Ohms.

Volume Settings – Independent minimum and maximum volume settings for locate sounds, clearance sounds, walk sounds. Minimum volume setting informational messages. Sounds played will not be less than the minimum setting or more than the maximum setting.

Maximum Output Level - Locate sounds, clearance sounds and informational messages shall be capable of producing 60db of audio output.

Volume Over Ambient – All sounds shall be capable of being played relative to the measured ambient sound at the intersection, but restricted to the minimum and maximum volume settings of each sound. The adjustment range of volume over ambient should be from at least from 0db to 20db over ambient in increments of at least 5db steps.

Audible Station Locating Tone – 880Hz plus harmonic, 0.1 second duration, 1 second interval.

Audible Chirp Sound – From 2700 to 1700 Hz, 0.2 second duration, 1 second interval.

Audible Cuckoo Sound – From 1250 to 1000 Hz, 0.6 second duration, 1.8 second interval.

ENVIRONMENTAL SPECIFICATIONS

ITEM 680.81330010 – AUDIBLE PEDESTRIAN SIGNAL
ITEM 680.81340010 – AUDIBLE PEDESTRIAN SIGNAL - WITH POST

The push button station and push button control unit shall operate over the temperature range of -40 deg F to +165 deg F.

POST – Post installed shall be in accordance with the standard sheet for *Pedestrian Signal Details*.

CONSTRUCTION DETAILS

The contractor shall install pedestrian push button station(s), any associated control unit(s), and furnish per the requirements of this specification any programming device as shown in the contract. Unless otherwise waived, the Contractor shall submit to the Regional Director, within 30 days following the award of contract, detailed specifications and catalog cuts of all equipment that is to be installed or furnished.

The post and sign shall be installed in accordance with the details specified on the standard sheet.

METHOD OF MEASUREMENT

This item will be measured by the number of pedestrian push button stations, control units and programming devices furnished and installed in accordance with the contract.

BASIS OF PAYMENT

The unit price bid shall include the cost of all labor, material and equipment necessary to complete the work.

Where the pushbutton and sign assembly is installed on its own post, the unit price bid shall also include the cost of post, sawcutting, excavation, backfill, concrete, restoration of surfaces, and conduit bend and fittings.

ITEM 680.81422010 - AUXILIARY POLE AND FOUNDATION

DESCRIPTION

The Contractor shall furnish and install auxiliary steel poles as shown by the plans and as directed by the Engineer. Auxiliary poles are intended for use to provide overhead connections to and support pedestrian push buttons and/or other traffic control devices.

MATERIALS

Auxiliary pole and foundation shall meet all the materials requirements of section 680-2 with the same requirements as span wire traffic signal poles.

CONSTRUCTION DETAILS

Auxiliary pole and foundation shall meet the construction details of section 680-3. The auxiliary pole shall be raked so that it appears vertical when loads are applied.

BASIS OF ACCEPTANCE

Acceptance for auxiliary poles covered by this specification will be based on the following:

- Submission of fabrication details for each pole intended for a worst case configuration of the load as specified in the contract documents, approved, stamped and signed by a Professional Engineer licensed and registered to practice in New York State.
- Submission of the manufacturer's certificate of compliance with these specification requirements and the approved fabrication details.
- Appearance of the manufacturer's name on the Department's list of approved manufacturers.

METHOD OF MEASUREMENT

This work shall be measured for payment by the number of auxiliary poles furnished and installed in accordance with the contract documents and as directed by the Engineer.

BASIS OF PAYMENT

The unit price bid shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work.

REV 12/02/09E
12/26/08E 8/7/97 M

ITEM 680.82254110 (MODIFIED) - RECTANGULAR RAPID FLASHING BEACON (RRFB) ASSEMBLY

1.0 DESCRIPTION

This work shall consist of furnishing and installing a Rectangular Rapid Flashing Beacon (RRFB) assembly in accordance with the contract documents or as directed by the Engineer. All materials and labor required to provide a complete functioning system are to be included.

1.1 General Requirements

1.1.1 RRFB unit shall consist of two rapidly flashed, rectangular-shaped yellow indications with an LED-array-based light source. It shall be designed, located, and operated in accordance with the detailed requirements of the contract and as specified below.

1.1.2 Each RRFB shall conform to all provisions of the MUTCD.

1.1.3 Each RRFB shall be a complete assembly consisting of supporting structure (pole, breakaway transformer base, sign and cabinet), indications, signage, cabinet and electrical components (wiring, solid-state circuit boards, etc.).

1.1.4 Each RRFB shall be supplied with all required hardware to install assembly.

1.1.5 Each RRFB shall be ADA compliant.

1.1.6 Each RRFB shall be rated for 90 mph wind conditions.

1.1.7 All components shall be designed to operate under ambient temperature conditions from -30 to 165 °F.

1.2 Functional Requirements

1.2.1 The RRFB shall be normally dark, shall initiate operation only upon pedestrian actuation, and shall cease operation after a predetermined period of operation. The predetermined period of operation shall be based on the procedures provided in Section 4E.06 of the current MUTCD for the timing of pedestrian clearance times for pedestrian signals.

1.2.2 When actuated, all RRFB units associated with a given crosswalk shall simultaneously commence operation of their rapid-flashing indications within 120 milliseconds. All RRFB units associated with a given crosswalk shall simultaneously cease operation of their rapid-flashing indications within 120 milliseconds.

1.2.3 During activation, a small light, directed at and visible to pedestrians in the crosswalk, shall be installed integral to the RRFB to give confirmation that the RRFB is in operation. The pedestrian indication shall flash concurrently with one of the vehicle indications to give confirmation that the RRFB is in operation.

1.2.4 Upon actuation, the two or four yellow indications in each RRFB unit shall flash in a sequence of 75 cycles per minute. The left and right RRFB indications shall operate using the following sequence during each 800-millisecond cycle:

The RRFB indication on the left-hand side shall be illuminated for approximately 50 milliseconds.

Both RRFB indications shall be dark for approximately 50 milliseconds.

The RRFB indication on the right-hand side shall be illuminated for approximately 50 milliseconds.

Both RRFB indications shall be dark for approximately 50 milliseconds.

The RRFB indication on the left-hand side shall be illuminated for approximately 50 milliseconds.

Both RRFB indications shall be dark for approximately 50 milliseconds.

The RRFB indication on the right-hand side shall be illuminated for approximately 50 milliseconds.

Both RRFB indications shall be dark for approximately 50 milliseconds.

Both RRFB indications shall be illuminated for approximately 50 milliseconds.

Both RRFB indications shall be dark for approximately 50 milliseconds.

Both RRFB indications shall be illuminated for approximately 50 milliseconds.

Both RRFB indications shall be dark for approximately 250 milliseconds.

1.2.5 The flash rate of each individual RRFB indication, as applied over the full flashing sequence, shall not be between 5 and 30 flashes per second to avoid frequencies that might cause seizures in anyone viewing the activated RRFB.

1.2.6 The light intensity of the yellow indications during daytime conditions shall meet the minimum specifications for Class 1 yellow peak luminous intensity in the current

Society of Automotive Engineers (SAE) Standard J595 (Directional Flashing Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles).

1.2.7 To minimize excessive glare, an automatic signal dimming device shall be used to reduce the brilliance of the RRFB indications during nighttime conditions.

2.0 MATERIALS

All provisions of §709-01, §715, §723, §724 and §730 shall apply except as detailed below:

2.1 Indicators:

2.1.1 Each RRFB facing shall consist of two rectangular-shaped yellow indications each with an LED-array-based light source. The size of each RRFB indication shall be at least 5 inches wide by at least 2 inches high and shall be aligned horizontally, with the longer dimension horizontal and with a minimum space between the two indications of at least 7 inches, measured from the nearest edge of one indication to the nearest edge of the other indication.

2.1.2 The outside edges of the RRFB indications, including any housings, shall not project beyond the outside edges of the signage of the RRFB.

2.1.3 Indicators shall be mounted in a housing constructed of durable, corrosion resistant, powder-coated aluminum with stainless steel fasteners.

2.1.4 Mounting hardware shall be stainless steel.

2.1.5 The indicator housing shall be located between and immediately adjacent to the bottom of the crossing warning sign and the top of the supplemental downward diagonal arrow plaque (or, in the case of a supplemental advance sign, the AHEAD or distance plaque).

2.1.6 All RRFB light bars shall be field adjustable to maximize the field of view on each vehicle approach.

2.1.7 Shall be rated for a minimum 15-year life span.

2.2 Radio Network Controller and Cabinet:

2.2.1 The local equipment controlling the components of the beacon assembly shall be housed in a lockable, weatherproof, vandal and tamper resistant NEMA 3R rated aluminum enclosure, intended for outdoor use, primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, hosedirected water, and damage from ice formation.

2.2.2 The cabinet shall be mounted on the pole and a work pad shall be provided, in accordance with signal system details. Cabinet shall not intrude into sidewalk or obstruct the pedestrian push button.

2.2.3 The cabinet shall be mounted on the side of the pole away from approaching traffic at a height between 3.5 – 4.5 feet from the bottom of the cabinet to the ground. In unpaved areas a concrete work pad shall be installed in front of the cabinet door not to exceed 5 feet by 5 feet by 4 inches deep and shall abut the pole foundation.

2.2.4 The cabinet shall be of sufficient size to house all required equipment.

2.2.5 Cabinet locking mechanisms shall meet NYSDOT standards currently used by the regional traffic signal groups. All keys to installed locking mechanisms shall be supplied to the Engineer upon acceptance of the work. The cabinet shall be secured with a Corbin lock and keyed as directed by the Regional Traffic Engineer for securing the cabinet door.

2.2.6 The controller shall be replaceable independently of other components.

2.3 Controls:

2.3.1 Controls shall include integrated constant current LED drivers with a minimum of two output channels for driving one or two assemblies.

2.3.2 Controls shall be completely programmable:

2.3.2.1 To run for a user specified time period when activated via switch, button contact closure, or when triggered from an external sensor such as a wireless transmitter, radar detector, presence detector, or wireless walk through bollard with a compatible sensor output.

2.3.3 Controls shall be capable of being programmed for alternate flash rates and patterns with a minimum resolution of 0.25s per trigger action.

2.3.4 Controls shall seamlessly integrate with the wireless transceiver to form a network of connected devices.

2.3.5 Controls shall allow adjustable and programmable light intensity levels for the beacons. Intensity level programming shall allow for manual and automatic modes. Manual mode shall allow the light intensity to be configured for a constant output on every available intensity level. Automatic mode shall allow for automatic intensity adjustment based upon assembly's ambient light conditions. Assemblies shall have a minimum of two brightness intensities available, exclusive of any unlit condition.

2.3.6 Controls shall include data-logging capabilities with selectable interval from one minute to one day with at least a 60-day logging period.

2.3.7 Controls shall include an RS232 serial interface and ethernet interface for local programming. Controls mays include USB cable interfaces for supplemental data connections.

2.3.8 Controls shall be locally programmable using software for Microsoft Windows 2007 or later or web based program.

2.3.9 The controller software shall allow programmable operation of the Assembly. Direct control of functions such as lighting controls shall be possible.

2.4 Transceiver:

2.4.1 Shall provide wireless communication between the assemblies to integrate the pushbutton activation of indications.
2.4.2 Shall seamlessly integrate with the controller to ensure sequential activation of other radio-equipped devices in the system.
2.4.3 Shall synchronize the system components to activate the indications within 120 ms of one another and remain synchronized throughout the duration of the flash (timeout) cycle.
2.4.4 Shall include network-wide modification of sign controller settings and output durations using programmability from any networked transceiver without the use of additional equipment or software.
2.4.5 Shall be capable of operating as a parent (gateway) or child (node or repeater).
2.4.6 Shall be capable of providing site-survey data for verification of signal strength between network devices.
2.4.7 Shall operate on the license-free ISM band.

2.4.8 Radio control shall operate on an FCC approved 900 MHz frequency, hopping spread spectrum network with a normal operating range of ~1000 feet.
2.4.9 Shall operate from 3.3 to 15 VDC input.
2.4.10 Shall comply with 47 CFR Part 15.
2.4.11 Shall be replaceable independently of other components.
2.4.12 The product must be FCC certified to comply with all 47 CFR Part 15 Subpart B Emission requirements.

2.5 Emergency Shutoff:

2.5.1 One toggle-type power switch, for either the AC or solar power source, shall be provided for emergency shutoff at the local cabinet on the pole.

2.6 Power Supply:

2.6.1 The power supply shall be 120 VAC and meet all applicable codes.
2.6.2 With the exception of conduits run for service entrance cables as detailed in NFPA 70: National Electric Code, the assembly shall contain no externally mounted wiring or wiring conduits.
2.6.3 Autonomy with a fully charged battery shall be at least 30 days of continuous operation without charging at an ambient temperature of 70 °F with at least ten actuations per hour.
2.6.4 Battery:
2.6.4.1 Shall have a nominal output voltage of 12 VDC and a capacity of 48 Ah at a C100 discharge rate.
2.6.4.2 Shall be sealed and spill proof.

2.6.4.3 Shall have terminals that accept screws or bolts for secure wiring connections.
2.6.4.4 Shall be replaceable independently of other components.
2.6.4.5 Shall be fused for short circuit protection.

2.7 Electrical Power:

2.7.1 The AC input terminals shall be equipped with a 210 J (joule) capacity power line surge suppressor. The suppressor shall have noise blanking capability.
2.7.2 Where required by the contract documents, or as required by the utility company, a meter shall be included.
2.7.3 All electrical components and wiring shall be approved to CSA or UL standards as applicable.
2.7.4 AC Power shall have electrical service disconnect.

2.8 Pole Shaft:

2.8.1 Shall be a Nassau County Auxiliary Pole
2.8.2 Shall meet MUTCD height requirements.

2.9 Pole Pedestal Base:

2.9.1 Shall conform to all of the requirements of Nassau County Item 411 Concrete Foundation Detail.
2.9.2 Shall meet or exceed AASHTO break-away requirements for traffic signal supports.

2.11 Pedestrian Push Buttons:

2.11.1 A piezo pushbutton shall be ADA compliant, and shall operate as normally open (n/o) circuit.

2.12 Static Signs:

2.12.1 All signs shall conform to the MUTCD and the NYS Supplement to the MUTCD.
2.12.2 All sign panels and plaques shall conform to the requirements of §645-2.02 of the NYS Standard Specifications.
2.12.3 Sign sheeting shall conform to the requirements in §645-2.02.
2.12.4 All sign assemblies shall use anti-vandal fasteners and tools to mount components to sign and sign to fixture.

2.12.5 Crossing sign assemblies shall consist of one of the following with the appropriate plaque: Pedestrian Crossing (W11-2), ~~a~~ School Crossing (S1-1), or ~~a~~ Trail Crossing (W11-15).

2.12.6 R10-25 shall be furnished, at least a size of 9 by 12 inches, to be mounted adjacent to and above each pedestrian pushbutton.

3.0 CONSTRUCTION DETAILS

3.1 All provisions of §645 and §680 shall apply except for all electrical wiring and as modified below.

3.2 Electrical and communication wires shall be run in separate conduits.

3.3 Prior to any fabrication or installation of any of the components of the Flashing Beacon Assembly, the Contractor shall submit detailed specifications, parts lists, manufacturer's cut sheets, instruction sheets, and wiring diagrams to the Engineer for approval at least 14 calendar days before installation.

3.4 The Contractor shall install and position the beacon assembly in such a manner as to optimize visibility for roadway traffic, and optimize incident light for the solar assembly, using the manufacturer's recommendations and instructions for installation.

3.5 If the Engineer determines that the unit is not functioning properly, the Contractor shall secure the services of the manufacturer's representative for installation and testing.

3.6 Where new work is to meet existing infrastructure, the Contractor's methods shall provide for neat lines, to achieve a satisfactory installation.

4.0 METHOD OF MEASUREMENT

This work will be measured as the number of RRFB assemblies furnished and installed in accordance with the Contract Documents, or as directed by the Engineer.

5.0 BASIS OF PAYMENT

5.1 The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including the signs shown in the associated details.

ITEM 680.82254110 (MODIFIED) - RECTANGULAR RAPID FLASHING BEACON (RRFB) ASSEMBLY

5.2 Note:

X = 2 = two forward beacons

4 = four beacons, two forward facing beacons, and two rearward facing beacons;

Y = 1 = AC powered (overhead supply)

2 = AC powered (underhead supply)

ITEM 680.95010415 - SERVICE CABLE 1 CONDUCTOR, NO. 04 AWG
ITEM 680.95010615 - SERVICE CABLE 1 CONDUCTOR, NO. 06 AWG
ITEM 680.95010815 - SERVICE CABLE 1 CONDUCTOR, NO. 08 AWG
ITEM 680,95011015 - SERVICE CABLE 1 CONDUCTOR, NO. 10 AWG
ITEM 680.95020415 - SERVICE CABLE 2 CONDUCTOR, NO. 04 AWG
ITEM 680.95020615 - SERVICE CABLE 2 CONDUCTOR, NO. 06 AWG
ITEM 680.95020815 - SERVICE CABLE 2 CONDUCTOR, NO. 08 AWG
ITEM 680.95021015 - SERVICE CABLE 2 CONDUCTOR, NO. 10 AWG

Description. Under this item the Contractor shall furnish and install in a raceway or conduit service entrance cable which is suitable for wet or dry locations at the location indicated on the plans and as directed by the Engineer. This cable will transmit current from the power source to the signal controller cabinet.

Material. The cable shall conform to the requirements for service entrance cable of the National Electrical Code and be Underwriters Laboratory approved. The cable shall be rated for 600 volt service and the conductors shall be stranded copper wire or as specified in the contract documents.

Construction Details. Service cable shall be installed in accordance with Details: the contract documents and as directed by the Engineer. A sufficient length of cable, not less than 24 inches, shall be left at the end of the run to allow for the tap to be made by the utility company at the power source entrance. The Contractor shall make all connections at the fused disconnect and the ground bar in the signal controller cabinet.

Method of Measurement. Service cable will be measured as the number of linear feet actually installed in accordance with the contract documents or as directed by the engineer.

Basis Of Payment. The unit price bid per linear foot shall include the cost of all materials, labor, connections, incidental fittings, equipment, tools, and all necessary tests to complete the installation.

ITEM 685.0715XX10 - EPOXY REFLECTORIZED PAVEMENT MARKINGS 15 MILS THICK (WET NIGHT VISIBILITY SPHERES)
ITEM 685.0720XX10 - EPOXY REFLECTORIZED PAVEMENT MARKINGS 20 MILS THICK (WET NIGHT VISIBILITY SPHERES)

DESCRIPTION:

Under this work the contractor shall furnish and apply epoxy reflectorized pavement markings in accordance with these specifications, the Contract Documents, the NYSMUTCD, or as ordered by the Engineer. Items for Special Markings include stop bars and crosswalks.

Yield line symbols are isosceles triangles with height equaling 1.5 times the base dimension:
A small yield line symbol shall have a base dimension of one foot.
A large yield line symbol shall have a base dimension of two feet.
Yield line symbols are to be installed with the Apex of the triangle oriented towards oncoming traffic.

The epoxy marking material shall be hot-applied by spray methods onto bituminous and portland cement concrete pavement surfaces at the thickness and width shown on the Contract Documents. Following a simultaneous application of Standard Glass Beads (Type 2) and Wet/Night Visibility Beads (Type 1), the cured epoxy marking shall be an adherent reflectorized stripe that will provide wet night retro-reflectivity.

MATERIALS REQUIREMENTS:

Epoxy Paint	727-03
Glass Beads for Pavement Markings	727-05

Reflective Glass Spheres

Retro-reflective beads shall be a double drop system of glass spheres consisting of Standard Beads (Type 2) and Wet/Night Visibility Beads (Type 1) as defined in §727-05 Glass Beads for Pavement Markings.

EPOXY APPLICATING EQUIPMENT

In general, a mobile applicator shall be a truck mounted, self-contained pavement marking machine, specifically designed to apply epoxy resin materials and reflective glass spheres in continuous line patterns. The applicating equipment shall be maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. In addition, the truck mounted unit shall be provided with accessories to allow for the marking of cross hatching and other special patterns as directed by the Engineer.

At any time throughout the duration of the project, the Contractor shall provide free access to his epoxy applicating equipment for inspection by the Engineer or his authorized representative.

The Engineer may approve the use of a portable applicator in lieu of mobile truck mounted accessories for use in applying special markings only, provided such equipment can demonstrate satisfactory application of reflectorized epoxy markings in accordance with these specifications.

ITEM 685.0715XX10 - EPOXY REFLECTORIZED PAVEMENT MARKINGS 15 MILS THICK (WET NIGHT VISIBILITY SPHERES)
ITEM 685.0720XX10 - EPOXY REFLECTORIZED PAVEMENT MARKINGS 20 MILS THICK (WET NIGHT VISIBILITY SPHERES)

Mobile applicating equipment shall be capable of installing up to 19 miles of epoxy reflectorized pavement markings in an eight hour day and shall include the following features:

1. Individual tanks for the storage of Part A and Part B of the epoxy resin.

2. Individual tanks for the storage of Standard (Type 2) and Wet/Night Visibility (Type 1) glass spheres. Each tank shall have a minimum capacity of 3000 lbs.

3. Heating equipment of sufficient capacity to maintain the individual epoxy resin components at the manufacturer's recommended temperature for spray application.

4. Individual dispensers for the simultaneous application of Standard (Type 2) and Wet/Night Visibility (Type 1) glass spheres. Each dispenser shall be capable of applying spheres at a minimum rate of 10 lbs/gal of epoxy resin composition.

5. Metering devices or pressure gauges on the proportioning pumps, positioned to be readily visible to the Engineer.

6. All necessary spray equipment, mixers, compressors, and other appurtenances for the placement of epoxy reflectorized pavement markings in a simultaneous sequence of operations as described in Construction Details, D. Application of Epoxy Reflectorized Pavement Markings.

CONSTRUCTION DETAILS

A. General

All pavement markings shall be placed as shown on the Contract Documents and in accordance with the New York State, Manual of Uniform Traffic Control Devices (MUTCD).

Before any pavement marking work is begun, a schedule of operations shall be submitted for the approval of the Engineer.

At least five (5) days prior to starting striping, the Contractor shall provide the Engineer with the epoxy manufacturer's written instructions for use. These instructions shall include, but not be limited to, material mixing ratios and application temperatures.

When pavement markings are applied under traffic, the Contractor shall provide all necessary flags, markers, signs, etc. in accordance with the MUTCD to maintain and protect traffic, and to protect marking operations and the markings until thoroughly set.

The application of pavement markings shall be done in the general direction of traffic. Striping against the direction of traffic flow shall not be allowed.

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

When necessary the Contractor shall establish marking line points at 30 foot intervals throughout the length of the pavement or as directed by the Engineer.

B. Atmospheric Conditions

Epoxy pavement markings shall only be applied during conditions of dry weather and on substantially dry pavement surfaces. At the time of installation the pavement surface temperature shall be a minimum of 50°F and the ambient temperature shall be a minimum of 50°F and rising. The Engineer shall be the sole determiner as to when atmospheric conditions and pavement surface conditions are such to produce satisfactory results.

C. Surface Preparation

The Contractor shall clean the pavement and existing durable markings to the satisfaction of the Engineer.

Surface cleaning and preparation work shall be performed only in the area of the epoxy markings application.

At the time of application all pavement surfaces and existing durable markings shall be free of oil, dirt, dust, grease and similar foreign materials. The cost of cleaning these contaminants shall be included in the bid price of this item.

In addition, concrete curing compounds on new portland cement concrete surfaces and existing painted pavement markings on both concrete and bituminous pavement surfaces shall be cleaned and paid for in accordance with §635 Cleaning and Preparation of Pavement Surfaces for Pavement Markings.

D. Application of Epoxy Reflectorized Pavement Markings

Epoxy reflectorized pavement markings shall be placed at the width, thickness, and pattern designated in the Contract Documents.

Marking operations shall not begin until applicable surface preparation work is completed and approved by the Engineer, and the atmospheric conditions are acceptable to the Engineer.

Pavement markings shall be applied by the following simultaneous operation:

1. The pavement surface is air-blasted to remove dirt and residues.

2. The epoxy resin, mixed and heated in accordance with the manufacturer's

recommendations, is uniformly hot-sprayed onto the pavement surface at the minimum specified thickness.

3. Standard (Type 2) and Wet/Night Visibilty (Type 1) reflective glass spheres are injected into or dropped onto the liquid epoxy marking. Standard beads (Type 2) shall be applied first immediately followed by the application of Wet/Night Visibilty beads (Type 1). Each type shall be applied at a minimum rate of 10 lbs/gal of epoxy resin (minimum total application = 20 lbs/gal).

E. Defective Epoxy Pavement Markings

Epoxy reflectorized pavement markings, which after application and curing are determined by the Engineer to be defective and not in conformance with this specification, shall be repaired. Repair of defective markings shall be the responsibility of the Contractor and shall be performed to the satisfaction of the Engineer as follows:

1. Insufficient film thickness and line width; insufficient glass bead coverage or inadequate glass bead retention.

   Repair Method. Prepare the surface of the defective epoxy marking by grinding or blast cleaning. No other cleaning methods will be allowed. Surface preparation shall be performed to the extent that a substantial amount of the reflective glass spheres are removed and a roughened epoxy marking surface remains.

   Immediately after surface preparation remove loose particles and foreign debris by brooming or blasting with compressed air.

   Repair shall be made by restriping over the cleaned surface in accordance with the requirements of this specification and at the full thickness indicated on the Contract Documents.

2. Uncured or discolored epoxy*; insufficient bond (to pavement surface or existing durable marking).

   Repair Method. The defective epoxy marking shall be completely removed and cleaned to the underlying pavement surface in accordance with the requirements of Section 635 - Cleaning and Preparation of Pavement Surfaces, at the Contractor's expense.

   The extent of removal shall be the defective area plus any adjacent epoxy pavement marking material extending three feet in any direction.

   After surface preparation work is complete, repair shall be made by reapplying epoxy over the cleaned pavement surface in accordance with the requirements of this specification.

ITEM 685.0715XX10 - EPOXY REFLECTORIZED PAVEMENT MARKINGS 15 MILS THICK (WET NIGHT VISIBILITY SPHERES)
ITEM 685.0720XX10 - EPOXY REFLECTORIZED PAVEMENT MARKINGS 20 MILS THICK (WET NIGHT VISIBILITY SPHERES)

*Uncured epoxy shall be defined as applied material that fails to cure (dry) in accordance with the requirements of §727-03 Epoxy Paint; or applied material that fails to cure (dry) within a reasonable time period under actual field conditions, as defined by the Engineer.

Discoloration shall be defined as localized areas or patches of brown, grayish or black colored epoxy marking material. These areas often occur in a cyclic pattern and often are not visible until several days or weeks after markings are applied.

Other defects not noted above, but determined by the Engineer to need repair, shall be repaired or replaced as directed by and to the satisfaction of the Engineer.

All work in conjunction with the repair or replacement of defective epoxy reflectorized pavement markings shall be performed by the Contractor at no additional cost to the State.

METHOD OF MEASUREMENT

Pavement striping (regular lines, cross hatching and special markings) will be measured in feet along the centerline of the pavement stripe and will be based on a 4 inch wide stripe. Measurement for striping with a width greater than the basic 4 inches, as shown on the plans or directed by the Engineer, will be made by the following method:

$$\frac{\text{Plan Width of Striping (inches) X Feet}}{\text{4 inches}}$$

BASIS OF PAYMENT

The accepted quantities of markings will be paid for at the contract unit price, 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 marking operations shall be included in the price bid. The cost of removal of concrete curing compounds and existing pavement markings will be paid under separate items and are not included in this item.

No payment will be made for the repair or replacement of defective epoxy reflectorized pavement markings.

PAY ITEM NO.	***DESCRIPTION***	***PAY UNIT***
685.07150110	White Epoxy Reflectorized Pavement Stripes – 15 mils	Foot

ITEM 685.0715XX10 - EPOXY REFLECTORIZED PAVEMENT MARKINGS 15 MILS THICK (WET NIGHT VISIBILITY SPHERES)

ITEM 685.0720XX10 - EPOXY REFLECTORIZED PAVEMENT MARKINGS 20 MILS THICK (WET NIGHT VISIBILITY SPHERES)

	(Wet Night Visibility Spheres)	
685.07150210	White Epoxy Reflectorized Pavement Letters - 15 mils (Wet Night Visibility Spheres)	Each
685.07150310	White Epoxy Reflectorized Pavement Symbols – 15 mils (Wet Night Visibility Spheres)	Each
685.07150410	White Epoxy Reflectorized Cross Hatching -15 mils Thick (Wet Night Visibility Spheres)	Foot
685.07150510	White Epoxy Reflectorized Pavement Stripes (Special Markings) 15 mils Thick (Wet Night Visibility Spheres)	Foot
685.07150610	Yellow Epoxy Reflectorized Pavement Stripes – 15 mils (Wet Night Visibility Spheres)	Foot
685.07150710	Yellow Epoxy Reflectorized Pavement Stripes (Cross Hatching) 15 mils Thick (Wet Night Visibility Spheres)	Foot
685.07150810	White Epoxy Reflectorized Pavement Yield Line Symbols - Small - 15 mils (Wet Night Visibility Spheres)	Each
685.07150910	White Epoxy Reflectorized Pavement Yield Line Symbols - Large - 15 mils (Wet Night Visibility Spheres)	Each
685.07200110	White Epoxy Reflectorized Pavement Stripes – 20 mils (Wet Night Visibility Spheres)	Foot
685.07200210	White Epoxy Reflectorized Pavement Letters – 20 mils (Wet Night Visibility Spheres)	Each
685.07200310	White Epoxy Reflectorized Pavement Symbols – 20 mils (Wet Night Visibility Spheres)	Each
685.07200410	White Epoxy Reflectorized Pavement Stripes (Cross Hatching) 20 mils Thick (Wet Night Visibility Spheres)	Foot
685.07200510	White Epoxy Reflectorized Pavement Stripes (Special Markings) 20 mils Thick (Wet Night Visibility Spheres)	Foot

ITEM 685.0715XX10 - EPOXY REFLECTORIZED PAVEMENT MARKINGS 15 MILS THICK (WET NIGHT VISIBILITY SPHERES)

ITEM 685.0720XX10 - EPOXY REFLECTORIZED PAVEMENT MARKINGS 20 MILS THICK (WET NIGHT VISIBILITY SPHERES)

685.07200610	Yellow Epoxy Reflectorized Pavement Stripes – 20 mils (Wet Night Visibility Spheres)	Foot
685.07200710	Yellow Epoxy Reflectorized Pavement Stripes (Cross Hatching) 20 mils Thick (Wet Night Visibility Spheres)	Foot
685.07200810	White Epoxy Reflectorized Pavement Yield Line Symbols - Small - 20 mils (Wet Night Visibility Spheres)	Each
685.07200910	White Epoxy Reflectorized Pavement Yield Line Symbols - Large - 20 mils (Wet Night Visibility Spheres)	Each

ITEM 685.03XX0018 - RAISED REFLECTORIZED SNOWPLOWABLE PAVEMENT MARKERS

DESCRIPTION

Under this work, the Contractor shall furnish and install new raised reflectorized snowplowable pavement markers and replacement retroreflectors in existing snowplowable pavement marker castings, at the locations and in accordance with the patterns indicated in the plans or as directed by the Engineer.

A raised reflectorized snowplowable pavement marker shall consist of a one-way or a two-way plastic prismatic retroreflector that is mounted in a durable iron casting. The raised reflectorized snowplowable pavement marker shall be designed to provide nighttime visibility in wet weather conditions and to resist damage from snowplowing operations.

Replacement retroreflectors for existing raised reflectorized snowplowable pavement markers shall meet the requirements of these specifications and shall be designed for use with the iron castings in which they will be installed.

MATERIALS

1. **Raised Reflectorized Snowplowable Pavement Marker.** Raised reflectorized snowplowable pavement markers shall be furnished by the manufacturer as complete units which shall consist of a one-way or two-way retroreflector that is firmly adhered to a snowplow resistant iron casting. The iron casting shall be designed to protect the retroreflector from damage by snowplowing operations. The raised reflectorized snowplowable pavement marker shall be designed so that the lower portion of the iron casting is installed below the pavement surface and adhered with an epoxy resin adhesive.

   Materials for raised reflectorized snowplowable pavement markers and for replacement retroreflectors shall meet the following requirements.

   a. **Retroreflector.** Retroreflectors shall be a prismatic type, molded of acrylic plastic, polycarbonate, or other suitable material designed to provide strength, abrasion resistance, impact resistance, resilience, and adhesion. The retroreflector shall be a transparent, ultraviolet stabilized grade material that provides resistance to color change over long periods of outdoor exposure.

      The retroreflector shall contain one or two prismatic reflective face(s) to reflect incident light from one or two directions. The surface of the reflective face(s) shall be protected by a permanently bonded glass face or other transparent, abrasion-resistant material.

      The minimum required reflective surface area of each reflective face shall be 1.43 in^2.

The initial minimum coefficient of luminous intensity (R_I) of each retroreflector shall be as shown in Table 1. Measurements shall be conducted in accordance with ASTM D 4383 or the following test procedure:

> The retroreflector to be tested shall be located with the center of the reflective face at a distance of 5 ft from a uniformly bright light source having an effective diameter of 0.20 inches. The return of light shall be measured using an annular ring photocell having a 0.37 in I.D. x 0.47 in O.D. The photocell shall be shielded to eliminate stray light. The distance from the light source center to the center of the photo active area shall be 0.21 inches. If a test distance of other than 5 ft is used, the source and receiver dimensions and the distance between the source and receiver shall be modified in the same proportion as the test distance.

Table 1
Coefficient Of Luminous Intensity (R_I)
Minimum Values (cd/fc)

Entrance Angle	Observation Angle	White	Yellow	Red
0°	0.2°	3.0	1.8	0.75
20°	0.2°	1.2	0.72	0.30

When tested in accordance with ASTM D4383, the coefficient of luminous intensity (R_I) of the retroreflective face(s), after abrasion and when measured in accordance with this specification, shall not be less than the values in Table 1.

When tested in accordance with ASTM D4383 the lens impact strength of the prismatic retroreflector face(s) shall show no more than two radial cracks longer than ¼ in. There shall be no radial cracks extending to the edge of the abrasion resistant area. There shall be no delamination.

The finished retroreflector shall be laminated to an approximately 40 mils thick elastomeric pad which is designed to absorb impact and to permit attachment of the retroreflector to the raised reflectorized snowplowable pavement marker iron casting.

b. **Iron Casting**. The iron casting shall be ductile iron hardened to Rockwell Hardness 51-55

HRC. The iron casting shall be designed so that the final installation height of the top of the iron casting is a maximum ⅓ inches above the pavement surface, and the leading edges of the iron casting are installed below the pavement surface. Iron castings with ramps shall have a maximum 4½° ramp angle. The ramp angle shall be the angle formed by the pavement surface and a straight line drawn from the intersection of the ramp with the pavement surface to the top of the ramp.

c. **Epoxy Resin Adhesive**. Adhesive for bonding the iron casting to the pavement surface shall be a two-component epoxy resin which meets the requirements of AASHTO M 237, Type IV, or ASTM D 4383. Containers of epoxy resin adhesive in storage shall be protected from moisture and direct sunlight, and maintained at a temperature above 40 °F.

d. **Replacement Retroreflector Adhesive**. Adhesive for bonding the replacement retroreflector to the existing iron casting shall meet the requirements of ASTM D 3498, or the adhesive shall be as recommended by the manufacturer of the replacement retroreflector.

2. Basis of Acceptance.

a. **Raised Reflectorized Snowplowable Pavement Markers**. Raised reflectorized snowplowable pavement markers shall be considered for acceptance at the project site based on the appearance of the product on the Department's Approved List. The retroreflector and iron casting shall be identified with the manufacturer's name and product name.

The manufacturer shall certify that the raised reflectorized snowplowable pavement marker meets the requirements of these specifications.

Raised reflectorized snowplowable pavement markers shall be approved by the Materials Bureau based on laboratory and field testing. Detailed requirements and procedures for the approval of raised reflectorized snowplowable pavement markers are available from the Materials Bureau.

b. **Replacement Retroreflectors**. Replacement retroreflectors shall be considered for acceptance at the project site based on the appearance of the product on the Department's Approved List. Replacement retroreflectors shall be identified with the manufacturer's name and product name.

The manufacturer shall certify that the replacement retroreflector(s) meet the requirements of this specification.

Replacement retroreflectors shall be approved by the Materials Bureau based on laboratory and field testing. Detailed requirements and procedures for the approval of

replacement retroreflectors are available from the Materials Bureau.

Adhesive for bonding replacement retroreflectors to existing iron castings shall be accepted based on the manufacturer's certification that the product meets the requirements of these specifications.

c. **Epoxy Resin Adhesive**. Epoxy resin adhesives shall be considered for acceptance at the project site on the basis of the manufacturer's certification that the adhesive meets the requirements of AASHTO M 237, Type IV or ASTM D 4383. Containers of epoxy resin adhesive shall be labeled with the manufacturer's name, the product name, the date of manufacture, and the shelf life.

CONSTRUCTION DETAILS

1. General. Before work begins, the Contractor shall submit a schedule of operations for approval by the Engineer. In addition, the Contractor shall supply the Engineer with the manufacturer's written installation and usage instructions for all materials to be used on the project.

All raised reflectorized snowplowable pavement markers and replacement retroreflectors shall be installed and located as shown in the contract documents or as directed by the Engineer and in accordance with the Manual of Uniform Traffic Control Devices (MUTCD).

When raised reflectorized snowplowable pavement markers and replacement retroreflectors are installed under traffic, the Contractor shall provide all necessary traffic control devices including flaggers, signs, channelizing devices, mobile construction zone impact attenuators, shadow vehicles with flashing arrow boards, flashing arrow boards, etc. to maintain and protect traffic, to protect the work operation, and to protect raised reflectorized snowplowable pavement markers or retroreflectors until thoroughly serviceable. No additional payment will be made for this work.

The installation of raised reflectorized snowplowable pavement markers and replacement retroreflectors shall be performed in such a manner so as not to cause damage to the surrounding pavement. The Contractor shall be responsible for repairing damaged pavement surfaces that result from improper installation, or installation of raised reflectorized snowplowable pavement markers in unauthorized areas. Removal and repair work shall be done as directed by and to the satisfaction of the Engineer, at no cost to the State.

2. Installation of Raised Reflectorized Snowplowable Pavement Markers. All raised reflectorized snowplowable pavement markers shall be installed in accordance with the manufacturer's written instructions for installation, in accordance with these specifications, and as directed by the Engineer.

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Raised reflectorized snowplowable pavement markers installed in broken line patterns shall be placed in the gaps between the existing broken lines and in the same longitudinal alignment as the existing broken lines.

Raised reflectorized snowplowable pavement markers installed in full or partial barrier line patterns shall be installed between the two existing full or partial barrier lines except that raised reflectorized snowplowable pavement markers shall not be installed across longitudinal or transverse pavement joints. If a longitudinal pavement joint exists between full or partial barrier lines, two raised reflectorized snowplowable pavement markers shall be placed opposite each other, located on the outside of and 2 inches away from each of the double yellow lines. A pavement joint shall be defined as either a sawed or formed joint in a concrete pavement that separates two pavement slabs or lanes, or as a construction (paving) joint or sawed and sealed joint in an asphalt pavement.

When possible, the edges of the raised reflectorized snowplowable pavement marker shall be located 4 to 6 inches away from pavement joints and cracks.

Raised reflectorized snowplowable pavement markers shall not be installed at locations that show visible evidence of pavement deterioration such as cracking and spalling. If the typical longitudinal spacing of the raised reflectorized snowplowable pavement marker falls at a location of pavement deterioration the raised reflectorized snowplowable pavement marker shall be relocated to another location as directed by the Engineer. In general, the distance that the raised reflectorized snowplowable pavement marker may be relocated away from the original location should not exceed ± 10% of the specified longitudinal spacing. If the raised reflectorized snowplowable pavement marker cannot be relocated within the ± 10% tolerance, the raised reflectorized snowplowable pavement marker should not be installed.

Raised reflectorized snowplowable pavement markers shall be installed by the following operation:

a. **Pavement Cutting and Cleaning**. The pavement shall be cut to the dimensions and depth recommended by the manufacturer of the raised reflectorized snowplowable pavement marker. The Contractor shall conduct pavement cutting operations and pavement cleaning work in such a manner as to minimize airborne dust and similar debris so as to prevent a hazard to workers, motor vehicle operation, or nuisance to property. On new portland cement concrete pavements, pavement cutting operations shall not begin until a minimum of 30 days after placement of the concrete, unless otherwise allowed by the Engineer.

All debris resulting from the pavement cutting operation shall be collected by vacuuming the pavement cut and adjacent pavement surface. Collected debris shall be disposed of uncontaminated solid waste or construction and demolition debris. The Contractor shall ensure that all operations associated with the handling, transporting, and disposal of the construction and demolition debris are in compliance with the New York State Solid Waste Management Regulations 6 NYCRR, Part 360 as well as all applicable Federal,

State and local regulations.

b. **Installation of Raised Reflectorized Snowplowable Pavement Marker**. No raised reflectorized snowplowable pavement markers shall be installed when the ambient or pavement temperatures are below 50°F.

At the time of installation, the cut pavement shall be clean, dry, and free of loose material. The minimum surface temperature of the iron casting shall be 50°F and surfaces of the iron casting shall be substantially free of scale, dirt, rust, oil, grease, or any other contaminant which may reduce the bond between the iron casting and the epoxy adhesive. Iron castings that require removal of contaminants shall be cleaned as directed by and to the satisfaction of the Engineer.

If necessary, to facilitate installation of the epoxy resin adhesive the two components (Part A and Part B) may be heated, by indirect heat, in accordance with the manufacturer's written recommendations. The minimum temperature of the epoxy resin adhesive shall be 50 °F.

The epoxy resin adhesive shall be proportioned and mixed in accordance with the epoxy resin adhesive manufacturer's written recommendations. The mixed epoxy resin adhesive shall be dispensed into the pavement cut in such quantity that the cavity is filled with epoxy resin adhesive to within approximately ½ inch of the pavement surface.

The raised reflectorized snowplowable pavement marker shall be immediately placed into the filled pavement cut. Extreme care shall be taken to ensure that the tabs located on the sides of the iron casting are in direct contact with the pavement surface, and the leading edges of the iron casting are below the pavement surface.

That portion of the iron casting installed in the pavement cavity shall be completely encased in the epoxy resin adhesive. Additional epoxy adhesive shall be added as necessary so that the adhesive is approximately flush with the pavement surface. Excess epoxy shall not be allowed to remain in front of the retroreflector or on the face of the retroreflector.

The installed raised reflectorized snowplowable pavement marker shall be protected from traffic until the epoxy resin adhesive has hardened to a condition that will not allow the
iron casting to move.

3. Installation of Replacement Retroreflectors for Existing Raised Reflectorized Snowplowable Pavement Markers. No replacement retroreflectors shall be installed when the ambient temperature is less than 50 °F, when the surface temperature of the iron casting is less than 50 °F, when the iron casting is wet, or during periods of rain.

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Prior to installing replacement retroreflectors, the Contractor shall remove existing retroreflectors and clean the existing iron castings. Retroreflectors that are removed from existing iron castings shall be collected and disposed of in a manner approved by the Engineer. All visible adhesive residue, salt, dirt, rust, and other contaminants that are detrimental to the adhesion of the replacement retroreflector shall be removed from the existing iron casting by either abrasive blasting, hand and power wire brushing, or by other methods approved by the Engineer. Surfaces of the iron casting shall be clean and dry at the time of installation of the replacement retroreflector and adhesive.

If present, the release paper or protective liner shall be removed from the laminated elastomeric pad on the bottom of the new retroreflector. If recommended by the manufacturer of the replacement retroreflector, adhesive (approximate ½ inch diameter bead) shall be applied lengthwise to the center of the elastomeric pad or to the center of the iron casting surface that will receive the retroreflector. The replacement retroreflector shall be immediately installed into the iron casting and a minimum load of 100 lb shall be applied to the top of the retroreflector to seat and secure the replacement retroreflector.
Properly applied adhesive shall cover the entire contact area of the bottom of the retroreflector and a slight excess of adhesive will be evident around the edges of the retroreflector. The Contractor shall remove excess adhesive from the retroreflector face or excess build up of adhesive on the iron casting in front of the retroreflector face.

METHOD OF MEASUREMENT

Raised reflectorized snowplowable pavement markers will be measured as the number of complete raised reflectorized snowplowable pavement marker units satisfactorily furnished and installed.

Replacement retroreflectors will be measured as the number of retroreflector units satisfactorily furnished and installed.

BASIS OF PAYMENT

The accepted quantities of raised reflectorized snowplowable pavement markers and replacement retroreflectors will be paid for at the contract unit price, which shall include the cost of furnishing all labor, materials and equipment to satisfactorily complete the work. The cost for maintenance and protection of traffic, construction signs, mobile construction zone impact attenuators, shadow vehicles with flashing arrow boards, flashing arrow boards, etc. shall be included in the price bid under this item. The cost of collection and disposal of uncontaminated solid waste and existing retroreflectors shall be included in the price bid under this item.

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Payment will be made under:

Item No.	Item	Pay Unit
685.03100018	Raised Reflectorized Snowplowable Pavement Marker (One-way White)	Each
685.03110018	Raised Reflectorized Snowplowable Pavement Marker (One-way Yellow)	Each
685.03120018	Raised Reflectorized Snowplowable Pavement Marker (Two-way Yellow)	Each
685.03130018	Raised Reflectorized Snowplowable Pavement Marker (Two-way White/Red)	Each
685.03140018	Raised Reflectorized Snowplowable Pavement Marker (Two-way Yellow/Red)	Each
685.03150018	Replacement Retroreflector for Existing Raised Reflectorized Snowplowable Pavement Marker (One-way White)	Each
685.03160018	Replacement Retroreflector for Existing Raised Reflectorized Snowplowable Pavement Marker (One-way Yellow)	Each
685.03170018	Replacement Retroreflector for Existing Raised Reflectorized Snowplowable Pavement Marker (Two-way Yellow)	Each
685.03180018	Replacement Retroreflector for Existing Raised Reflectorized Snowplowable Pavement Marker (Two-way White/Red)	Each
685.03190018	Replacement Retroreflector for Existing Raised Reflectorized Snowplowable Pavement Marker (Two-way Yellow/Red)	Each

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