STATE OF NEW JERSEY
DEPARTMENT OF TRANSPORTATION
TRENTON, NEW JERSEY

NOTICE TO CONTRACTORS
FEDERAL PROJECT FUNDED BY SANDY RESTORATION FUNDS

Notice is hereby given that bid proposals will be received via the Internet until 10:00:59 A.M. on 6/13/13, downloaded, and publicly opened and read, from Bidders classified under N.J.S.A. 27:7-35.1 et seq.; in the FACILITY CONFERENCE ROOM-1134N, 1st Floor MOB Building, New Jersey Department of Transportation, 1035 Parkway Avenue, Trenton, NJ 08625; for:

Route 35, Restoration, Berkeley Twp. To Toms River Twp. (MP 0-4), Sandy Restoration Contract No. 000950319; Grading, Paving, Drainage, and Sign Structures; Berkeley Township, Seaside Park Borough, Seaside Heights Borough and Toms River Township; Ocean County; Federal Project No: ER-7044(103), UPC No: 950319, PE No: 1506507**, CE No:** 1506518**, DP No:** 13130**.**

Project Advertisement Date	**5/23/13**
Project Bid Date	**6/13/13**
Estimated Completion Date on	**10/01/15**
Estimated Range	**Range between $50,000,001 to $100,000,000**
Cost of Plans and Contract Documents	**Available at www.bidx.com.**
Contractors Prequalified in one of these Work Types are eligible to bid this project:	**3, 3A or 5**

The principal items of work consist of:

Roadway

Quantity	Unit	Description
202,882	CY	Excavation Unclassified
135,406	T	Hot Mix Asphalt 19 M 64 Base Course
6, 807	LF	36" Ductile Iron Pipe
5	LS	Storm Water Pumping Station

Bidders are required to comply with the requirements of P.L. 1975, c. 127 N.J.A.C 17:27. For Federal projects, Bidders must register with both the New Jersey Department of Treasury, Division of Revenue pursuant to N.J.S.A 52:32-44 AND the "Public Works Contractor Registration Act", N.J.S.A. 34:11-56.48 et seq. (P.L.2003, c. 91) prior to contract execution. Appropriate proof of these registrations should be provided to NJDOT as soon as possible.

Bids for the above project will be downloaded from the Bid Express website on the Project Bid date (subject to change by addenda) at 10:00:59 a.m. prevailing time, and will be read immediately thereafter. The Bidder must upload their bid prior to the hour named so that it is included in the letting download. Late bids can not be accepted. This is the only vehicle to bid this project; paper bids will not be accepted.

Minimum wage rates for this project shall be as specified in the "Prevailing Wage Determination of the New Jersey Department of Labor and Industry" on file with this Department. The attention of bidders is directed to the provisions covering subletting or assigning the contract. The entire work is to be completed on or before the ESTIMATED COMPLETION DATE STATED ABOVE.

Plans, specifications, and bidding information for the proposed work are available at Bid Express website www.bidx.com. You must subscribe to use this service. To subscribe, follow the instructions on the web site. Fees apply to downloading documents and plans and bidding access. The fee schedule is available on the web site. All fees are directly payable to Bid Express.

PLEASE CHECK THE EXPIRATION DATE OF YOUR ASSIGNED CLASSIFICATION

Copies of the current Standard Specifications may be acquired from the Department at the prevailing fee. Drawings and supplementary specifications may also be inspected (BUT NOT OBTAINED) by contracting organizations at our Design Field Offices at the following locations:

200 Stierli Court
Mt. Arlington, NJ 07856
Phone: 973-601-6690

One Executive Campus Rt. 70 West
Cherry Hill, NJ 08002
Phone: 856-486-6623

New Jersey Department of Transportation
Division of Procurement
Bureau of Construction Services
1035 Parkway Avenue
PO Box 600
Trenton, NJ 08625

DP# 1313
Bid Date: 06/13/2013
0 Plan Sheets

ROUTE 35, RESTORATION,
BERKELEY TWP. TO TOMS RIVER TWP. (MP 0-4)
SANDY RESTORATION
CONTRACT NO. 000950319
FEDERAL PROJECT NO. ER-7044(103)

ADDENDUM NO. 1

The following CHANGE is made to the NJDOT Special Provisions:

107.01.01 Applicable Law

THE FOLLOWING IS ADDED AFTER THE FIRST PARAGRAPH:

Pursuant to Executive Order 125, the Contractor must ensure that the attached fraud prevention notice is prominently displayed at the project site for the duration of the Contract. Ensure the size of the notice is a minimum of 8 ½" X 11".

SANDY REBUILDING
AND RECONSTRUCTION
FRAUD PREVENTION HOTLINE

TO PREVENT FRAUD PLEASE REPORT ANY SUSPICION OF:

- FRAUDULENT ACTIVITY
- THEFT
- WASTE
- BRIBES OR KICKBACKS
- UNETHICAL OR ILLEGAL CONDUCT

CALL TOLL FREE

1-855-OSC-TIPS

(1-855-672-8477)

OR CONTACT US AT

comptrollertips@osc.state.nj.us

ALL COMMUNICATIONS WILL BE KEPT CONFIDENTIAL

State of New Jersey/Office of the State Comptroller

DP# 1313
Bid Date: 06/13/2013
0 Plan Sheets

ROUTE 35, RESTORATION,
BERKELEY TWP. TO TOMS RIVER TWP. (MP 0-4)
SANDY RESTORATION
CONTRACT NO. 000950319
FEDERAL PROJECT NO. ER-7044(103)

ADDENDUM NO. 2

The following CHANGE is made to the Proposal:

Sequence No. 78 has been revised from Item No. 40133M Tack Coat 64-22 to Item No. 401030M Tack Coat

These PROPOSAL CHANGES are available from the NJDOT Bid Express web site as Amendment 1.

Revised Estimate- Distribution of Quantity Plan Sheets reflecting these changes will not be issued at this time, but all corrections will be made during the preparation of the As-Built plans.

The following CHANGE is made to the NJDOT Special Provisions:

Under Subsection 108.12

THE FOLLOWING IS CHANGED TO

The Department has not obtained the following Right-of-Way parcels; the anticipated availability dates are provided:

Properties and Vacation/Availability Dates

Parcel	Status	ROW Available	ROW REQUIRED	Remarks
ER12	In Negotiations	9/2013	12/2013	Existing Pipe location
ER8C	In Negotiations	9/2013	2/2014	Pump Station #2 Location
TER6B	In Negotiations	9/2013	2/2014	Pump Station #3 Location
ER8G	In Negotiations	9/2013	2/2014	Pump Station #4 Location
E13	In Negotiations	9/2013	11/2013	Existing Pipe location
TE153	In Negotiations	9/2013	11/2013	Existing Pipe location
E154	In Negotiations	9/2013	11/2013	Existing Pipe location
E155	In Negotiations	9/2013	11/2013	Pump Station #5 Location

DP# 1313
Bid Date: 06/13/2013
0 Plan Sheets

ROUTE 35, RESTORATION,
BERKELEY TWP. TO TOMS RIVER TWP. (MP 0-4)
SANDY RESTORATION
CONTRACT NO. 000950319
FEDERAL PROJECT NO. ER-7044(103)

ADDENDUM NO. 2

The following are questions received from plan holders and the responses to those questions:

Question 1 from Metro-Tech Sales: Bid Items #274 & #287 are for sign lighting. Contract drawing #579, Note #1 states "When Sign Lighting is required, an approved sign lighting system shall be provided." Contract drawing #580 does not indicate anything about Lumi-Trak. Please confirm if the Lumi-Trak sign light retrieval system is to be supplied.

Response: The standard fixed lighting system (no retrieval system) is to be used on this project and is to be provided by the Contractor.

Question 2 from JBL Electric: In the JCP&L Specifications, the work request for the distribution is noted as 54547646. The transmission work is noted to be on a seperate work order, but this work order is not shown in this file. Is the transmission work elsewhere or has it not been posted yet?

Response: The JCP&L Transmission Work Package is now posted on BIDX.

Question 3 from Allan Britreway Electric: I don't see the Transmission portion (prints and or Plan and profile) of the JCP&L package included. It is referenced by work request # 55937735

Response: The JCP&L Transmission Work Package is now posted on BIDX.

Question 4 from Northeast Remsco Construction: Planset. Plans are very difficult to read. We kindly ask for plans that make the proposed work more distinguishable.

Response: No changes will be made.

Question 5 from Northeast Remsco: Construction Staging. Due to the nature of the project and subsequent staging we kindly request quantities per staging on drawings TC-4 & TC-5.

Response: As per NJDOT standard, the quantities are calculated and prepared on the individual plan sheet and are not broken up for each stage of construction.

DP# 13130
Bid Date: 06/13/2013
0 Plan Sheets

ROUTE 35, RESTORATION,
BERKELEY TWP. TO TOMS RIVER TWP. (MP 0-4)
SANDY RESTORATION
CONTRACT NO. 000950319
FEDERAL PROJECT NO. ER-7044(103)

ADDENDUM NO. 3

The following CHANGES are made to the NJDOT Special Provisions:

Under Section 201.03.01

THE FOLLOWING IS ADDED:

E. Removing Pipe, Inlets, and Manholes.

THE FOLLOWING IS ADDED:

1. Asbestos-Cement Pipe (ACP).

Remove pipe sections in an "intact" condition where possible or, in a manner that prevents the material from being crumbled and the asbestos fibers becoming airborne (friable). Wet and containerize waste materials as work progresses. Ensure that work safety requirements, controls and practices are in compliance with OSHA's Subpart Z, 29 CFR 1926.1101 – Asbestos. Load, transport, and dispose of the ACP according to Federal, State, and local laws, rules and regulations. Pay fees associated with removal and disposal of the ACP.

Under Subsection 602.01

THE FOLLOWING IS CHANGED TO:

Manufactured Treatment Device

602.01 Description.

This work shall consist of fabrication and installation of non-standard precast Manufactured Treatment Device selected by the Contractor and approved by the Engineer, for a design treatment capacity as shown follows:

DP# 13130
Bid Date: 06/13/2013
0 Plan Sheets

ROUTE 35, RESTORATION,
BERKELEY TWP. TO TOMS RIVER TWP. (MP 0-4)
SANDY RESTORATION
CONTRACT NO. 000950319
FEDERAL PROJECT NO. ER-7044(103)

ADDENDUM NO. 3

No.	Route	Station	Flow (cfs) (25-yr storm)	Flow (cfs) (WQ Storm)
1	35	280+76 (LT)	9.85	5.56
2	Bayview Ave	16+12 (RT)	4.70	2.38
3	Bayview Ave	19+08 (LT)	10.57	5.54
4	35	292+82 (LT)	21.70	11.13
5	35	293+84 (LT)	21.32	11.78
6	35	325+29 (RT)	22.43	12.60
7	35	325+56 (RT)	22.43	12.60
8	35	326+43 (RT)	14.40	8.62
9	Bayview Ave	56+20 (LT)	7.45	4.08
10	35	348+88 (RT)	20.28	11.74
11	35	349+15 (RT)	20.28	11.74
12	35	350+07 (RT)	14.59	8.57
13	35	350+29 (RT)	14.59	8.57
14	Bayview Ave	80+78 (LT)	2.31	1.83
15	35	378+05 (RT)	23.15	12.57
16	35	378+29 (RT)	23.15	12.57
17	35	379+00 (RT)	21.19	12.52
18	35	379+16 (RT)	21.19	12.52
19	35	378+55	6.22	4.99
20	L Street	16+82 (LT)	3.22	1.85
21	35	403+46 (RT)	16.03	11.54
22	35	406+67 (RT)	24.94	12.42
23	35	420+95 (RT)	6.39	4.07
24	35	422+04 (LT)	8.50	5.20
25	Ramp NW	18+10 (LT)	13.96	7.49
26	35	445+87 (LT)	14.11	6.32
27	35	448+60 (LT)	24.71	12.52
28	Eisenhower Ave	34+41 (LT)	1.73	1.28
29	Eisenhower Ave	26+05 (LT)	2.43	1.22
30	Bay Blvd	23+92 (LT)	17.80	10.15
31	Bay Blvd	23+96 (LT)	17.80	10.15
32	Bay Blvd	24+22 (RT)	17.80	10.15
33	Bay Blvd	24+16 (RT)	17.80	10.15

DP# 13130
Bid Date: 06/13/2013
0 Plan Sheets

ROUTE 35, RESTORATION,
BERKELEY TWP. TO TOMS RIVER TWP. (MP 0-4)
SANDY RESTORATION
CONTRACT NO. 000950319
FEDERAL PROJECT NO. ER-7044(103)

ADDENDUM NO. 3

The following CHANGE is made to the Proposal:

Sequence No.	Item No.	Item	Remarks
111	601760P	PIPE BEDDING	Quantity Change

Revised Estimate- Distribution of Quantity Plan Sheets reflecting this change will not be issued at this time, but all corrections will be made during the preparation of the As-Built plans.

This proposal change is available from NJDOT Bid Express website as Amendment # 2

The following are questions received from plan holders and the responses to those questions:

Question 1 from FAI-GON Electric Inc.: Electrical Service for Pump Stations. Is there a drawing showing the length of the Electrical Service conduit for all pump stations?

Response: See notes on sheets 608-612, which state Contractor to coordinate with JCP&L to provide new electrical service to new pump station. Assume distance from the pump station to the poles will be approximately 100 feet.

Question 2 from Union Paving Construction Co. Inc: Asbestos Pipe Removal: How will the contractor be compensated for asbestos pipe removal?

Response: Refer to SPECIAL PROVISION CHANGES in this Addendum.

Question 3 from Union Paving Construction Co. Inc: MTDs. There are 33 MTDs shown on the plans but flow rates for only 19 indicated in the supplemental specs. Please provide flow rates for additional 14 units allowing the vendors to quote on all units.

Response: Refer to SPECIAL PROVISION CHANGES in this Addendum.

SPECIAL PROVISIONS

ROUTE 35, RESTORATION,
BERKELEY TWP. TO TOMS RIVER TWP. (MP 0-4)
SANDY RESTORATION
CONTRACT NO. 000950319
GRADING, PAVING, DRAINAGE, AND SIGN STRUCTURES
BERKELEY TOWNSHIP, SEASIDE PARK BOROUGH, SEASIDE HEIGHTS BOROUGH AND TOMS RIVER TOWNSHIP OCEAN COUNTY
FEDERAL PROJECT NO. ER-7044(103)

AUTHORIZATION OF CONTRACT

The Contract is authorized by the provisions of Title 27 of the Revised Statutes of New Jersey and supplements thereto, and Title 23 of the United States Code - Highways.

SPECIFICATIONS TO BE USED

The 2007 Standard Specifications for Road and Bridge Construction, of the New Jersey Department of Transportation as amended herein will govern the construction of this Project and the execution of the Contract.

These Special Provisions consist of the following:

Pages 1 to 116 inclusive.

General wage determinations issued under Davis-Bacon and related acts, published by US Department of Labor, may be obtained from the Web Determinations online web site at http://www.wdol.gov/dba.aspx#0 Select state, county and construction type heading: HIGHWAY where the Project is to be performed then click Search.

Pay the prevailing wage rates determined by the United States Secretary of Labor and the New Jersey Department of Labor. If the prevailing wage rate prescribed for any craft by the United States Secretary of Labor is not the same as the prevailing wage rate prescribed for that craft by the New Jersey Department of Labor, pay the higher rate.
State wage rates may be obtained from the New Jersey Department of Labor & Workforce Development (Telephone: 609-292-2259) or by accessing the Department of Labor & Workforce Development's web site at http://lwd.dol.state.nj.us/labor/wagehour/wagehour_index.html. The State wage rates in effect at the time of award are part of this Contract, pursuant to Chapter 150, Laws of 1963 (NJSA 34:11-56.25, et seq.).

If an employee of the Contractor or subcontractor has been paid a rate of wages less than the prevailing wage, the Department may suspend the Work, and declare the Contractor in default.
The following FHWA funded project Attachments that are located at the end of these Special Provisions:"

1. Required Contract Provisions, Federal-Aid Construction Contracts (Form FHWA-1273).
2. Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246).
3. Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246).
4. State of New Jersey Equal Employment Opportunity for Contracts Funded by FHWA.
5. Disadvantaged Business Enterprise Utilization Attachment, FHWA Funded Contracts

5(A) The Incentive Program, Disadvantaged Business Enterprise Utilization Attachment for FHWA Funded Contracts.

6. Equal Employment Opportunity Special Provisions.
7. Special Contract Provisions for Investigating, Reporting, and Resolving Employment Discrimination and Sexual Harassment Complaints.

The following additional project specific Attachments are located at the end of these Special Provisions:

1. Stormwater Pumping Station Specifications – Birdsall Services Group, Inc (Construction)
2. Stormwater Pumping Station Specifications – Ronald A. Sebring (Architect)
3. Stormwater Pumping Station Specifications – Keystone Engineering Group, Inc. (Electrical)

DIVISION 100 – GENERAL PROVISIONS

SECTION 101 – GENERAL INFORMATION

101.03 TERMS
THE FOLLOWING TERMS ARE CHANGED.

pavement structure. The combination of pavement, base courses, and when specified, a subbase course, placed on a subgrade to support the traffic load and distribute it to the roadbed (see Figure 101-1). These various courses are defined as follows:

1. **pavement.** One or more layers of specified material of designed thickness at the top of the pavement structure.
2. **base course.** One or more layers of specified material of designed thickness placed on the subgrade or subbase.
3. **subbase.** One or more layers of specified material of designed thickness placed on the subgrade.

101.04 INQUIRIES REGARDING THE PROJECT

1. **Before Award of Contract.**

THE FIRST PARAGRAPH IS CHANGED TO:

Submit inquiries and/or view other questions/answers by following the format prescribed on the project's electronic bidding web page.

THE SECOND PARAGRAPH IS CHANGED TO:

The deadline for submitting inquiries is 12:00 noon, 7 days before the opening of bids.

2. **After Award of Contract.**

Central Region
Mr. Snehal Patel, Regional Construction Engineer
1035 Parkway Avenue
Trenton, NJ 08625
Telephone: 732-625-4207

SECTION 102 – BIDDING REQUIREMENTS AND CONDITIONS

102.02 BIDDER REGISTRATION AND DOWNLOADING OF THE PROPOSAL DOCUMENTS
THE LAST SENTENCE OF THE FIRST PARAGRAPH IS CHANGED TO:

The Bidder shall not alter or in any way change the software.

102.03 REVISIONS BEFORE SUBMITTING A BID
THE SECOND PARAGRAPH IS CHANGED TO:

The Bidder shall acknowledge all addenda posted through the Department's website. The addenda acknowledgement folder is included in the Department's electronic bidding file. The Department has the right to reject the bid if the Bidder has not acknowledged all addenda posted.

NEW JERSEY DEPARTMENT OF TRANSPORTATION
PAVEMENT CORE RECORD

PROJECT/ROUTE & SECTION: Route 35, Restoration, Berkeley Twp. to Toms River Twp. (MP 0-4)

DRILLER: Advanced Infrastructure Design, Inc. (AID)

INSPECTOR: Advanced Infrastructure Design, Inc. (AID)

COUNTY/TOWNSHIP: Ocean County

DATE STARTED: March 2000 **DATE COMPLETED:** December 2002

CORE NUMBER	**1**	**2**	**3**	**4**	**5**
ROUTE	Route 35	Route 35	Route 35	Route 35	Route 35
DIRECTION (N, E, S, W)	N	N	N	N	N
MILE POST (MP or Station)	0.04	0.04	0.28	0.63	0.86
LANE NO. (Left to Right)	Parking Lot	Mainline	Mainline	Right Mainline	Right Mainline
SHOULDER (Inside or Outside)	-	-	-	-	-
CORE DIAMETER (Inches)	6	6	6	6	6
TOTAL CORE DEPTH (Inches)	12	12	12	12	12
CORE DRILLED TO	Dark Brownish Sand	Yellowish Gravelly Sand	Yellowish Sand	Dark Brownish Sand	Dark Brownish Sand
SURFACE TYPE (AC/PC)	AC	AC	AC	PC	PC
AC THICKNESS (Inches)	7	4	6 3/4	-	-
PC THICKNESS (Inches)	-	-	-	8 1/2	8

* Lane 1 is the left lane in the direction of travel.

The pavement information shown herein was used by the Department for design and estimate purposes.

NEW JERSEY DEPARTMENT OF TRANSPORTATION
PAVEMENT CORE RECORD

PROJECT/ROUTE & SECTION: Route 35, Restoration, Berkeley Twp. to Toms River Twp. (MP 0-4)

DRILLER: Advanced Infrastructure Design, Inc. (AID)

INSPECTOR: Advanced Infrastructure Design, Inc. (AID)

COUNTY/TOWNSHIP: Ocean County

DATE STARTED: March 2000 **DATE COMPLETED:** December 2002

CORE NUMBER	**6**	**7**	**8**	**9**	**10**
ROUTE	Route 35	Route 35	Route 35	Route 35	Route 35
DIRECTION (N, E, S, W)	N	N	N	N	N
MILE POST (MP or Station)	1.25	2.00	2.01	3.86	0.04
LANE NO. (Left to Right)	Right Mainline	Right Mainline	Center Mainline	Right Mainline	Right Shoulder
SHOULDER (Inside or Outside)	-	-	-	-	Outside
CORE DIAMETER (Inches)	6	6	6	6	6
TOTAL CORE DEPTH (Inches)	12	12	12	12	12
CORE DRILLED TO	Dark Brownish Sand	Yellowish Gravelly Sand	Yellowish Gravelly Sand	Dark Brownish Sand	Dark Brownish Gravelly Sand
SURFACE TYPE (AC/PC)	PC	AC	AC	PC	AC
AC THICKNESS (Inches)	-	4	3	-	6
PC THICKNESS (Inches)	8 1/2	-	-	8 1/2	-

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NEW JERSEY DEPARTMENT OF TRANSPORTATION
PAVEMENT CORE RECORD

PROJECT/ROUTE & SECTION: Route 35, Restoration, Berkeley Twp. to Toms River Twp. (MP 0-4)

DRILLER: Advanced Infrastructure Design, Inc. (AID)

INSPECTOR: Advanced Infrastructure Design, Inc. (AID)

COUNTY/TOWNSHIP: Ocean County

DATE STARTED: March 2000 **DATE COMPLETED:** December 2002

CORE NUMBER	**11**	**12**	**13**	**14**	**15**
ROUTE	Route 35	Route 35	Route 35	Route 35	Route 35
DIRECTION (N, E, S, W)	N	N	N	N	N
MILE POST (MP or Station)	0.28	0.63	1.25	2.00	3.85
LANE NO. (Left to Right)	Right Shoulder	Right Shoulder	Right Shoulder	Right Shoulder	Right Shoulder
SHOULDER (Inside or Outside)	Outside	Outside	Outside	Outside	Outside
CORE DIAMETER (Inches)	6	6	6	6	6
TOTAL CORE DEPTH (Inches)	12	12	12	12	12
CORE DRILLED TO	Yellowish Sand	Dark Brownish Sand	Dark Grayish Gravelly Sand	Yellowish Sand	Yellowish Sand with Silt
SURFACE TYPE (AC/PC)	AC	AC	AC	AC	AC
AC THICKNESS (Inches)	4	3	2	4	3
PC THICKNESS (Inches)	-	-	-	-	-

* Lane 1 is the left lane in the direction of travel.

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NEW JERSEY DEPARTMENT OF TRANSPORTATION
PAVEMENT CORE RECORD

PROJECT/ROUTE & SECTION: Route 35, Restoration, Berkeley Twp. to Toms River Twp. (MP 0-4)

DRILLER: Advanced Infrastructure Design, Inc. (AID)

INSPECTOR: Advanced Infrastructure Design, Inc. (AID)

COUNTY/TOWNSHIP: Ocean County

DATE STARTED: March 2000 **DATE COMPLETED:** December 2002

CORE NUMBER	**16**	**17**	**18**	**19**	**20**
ROUTE	Route 35	Route 35	Route 35	Route 35	Route 35
DIRECTION (N, E, S, W)	N	N	N	N	S
MILE POST (MP or Station)	2.34	2.71	3.13	3.42	3.51
LANE NO. (Left to Right)	Left Mainline	Left Mainline	Left Mainline	Left Mainline	Left Mainline
SHOULDER (Inside or Outside)	-	-	-	-	-
CORE DIAMETER (Inches)	6	6	6	6	6
TOTAL CORE DEPTH (Inches)	12	12	12	12	12
CORE DRILLED TO	Yellowish Gravelly Sand	Yellowish Gravelly Sand	Dark Brownish Sand	Yellowish Gravelly Sand	Yellowish Gravelly Sand
SURFACE TYPE (AC/PC)	AC	AC	AC	AC	AC
AC THICKNESS (Inches)	9	8 3/4	8 1/4	7 1/2	8
PC THICKNESS (Inches)	-	-	-	-	-

* Lane 1 is the left lane in the direction of travel.

The pavement information shown herein was used by the Department for design and estimate purposes.

NEW JERSEY DEPARTMENT OF TRANSPORTATION
PAVEMENT CORE RECORD

PROJECT/ROUTE & SECTION: Route 35, Restoration, Berkeley Twp. to Toms River Twp. (MP 0-4)

DRILLER: Advanced Infrastructure Design, Inc. (AID)

INSPECTOR: Advanced Infrastructure Design, Inc. (AID)

COUNTY/TOWNSHIP: Ocean County

DATE STARTED: March 2000 **DATE COMPLETED:** December 2002

CORE NUMBER	**21**	**22**	**23**	**24**	**25**
ROUTE	Route 35	Route 35	Route 35	Route 35	Route 35
DIRECTION (N, E, S, W)	S	S	S	S	S
MILE POST (MP or Station)	3.14	2.68	2.47	2.34	3.98
LANE NO. (Left to Right)	Left Mainline	Left Mainline	Left Mainline	Left Mainline	Right Shoulder
SHOULDER (Inside or Outside)	-	-			Outside
CORE DIAMETER (Inches)	6	6	6	6	6
TOTAL CORE DEPTH (Inches)	12	12	12	12	12
CORE DRILLED TO	Yellowish Gravelly Sand	Yellowish Sand	Yellowish Gravelly Sand	Yellowish Gravelly Sand	Yellowish Gravelly Sand
SURFACE TYPE (AC/PC)	AC	AC	AC	AC	AC
AC THICKNESS (Inches)	8	7 3/4	9 1/4	10	2 1/4
PC THICKNESS (Inches)	-	-	-	-	-

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NEW JERSEY DEPARTMENT OF TRANSPORTATION
PAVEMENT CORE RECORD

PROJECT/ROUTE & SECTION: Route 35, Restoration, Berkeley Twp. to Toms River Twp. (MP 0-4)

DRILLER: Advanced Infrastructure Design, Inc. (AID)

INSPECTOR: Advanced Infrastructure Design, Inc. (AID)

COUNTY/TOWNSHIP: Ocean County

DATE STARTED: March 2000 **DATE COMPLETED:** December 2002

CORE NUMBER	**26**	**27**	**28**	**29**	**30**
ROUTE	Route 35	Route 35	Route 35	Route 35	Route 35
DIRECTION (N, E, S, W)	S	S	S	S	S
MILE POST (MP or Station)	3.95	3.53	2.98	1.77	1.76
LANE NO. (Left to Right)	Left Mainline	Right Shoulder	Right Shoulder	Right Shoulder	Left Mainline
SHOULDER (Inside or Outside)	-	Outside	Outside	Outside	-
CORE DIAMETER (Inches)	6	6	6	6	6
TOTAL CORE DEPTH (Inches)	12	12	12	12	12
CORE DRILLED TO	Yellowish Gravelly Sand	Yellowish Gravelly Sand	Yellowish Gravelly Sand	Yellowish Gravelly Sand	Dark Grayish Gravelly Sand
SURFACE TYPE (AC/PC)	AC	AC	AC	AC	AC
AC THICKNESS (Inches)	7	3 1/4	3 3/4	2 1/2	3 3/4
PC THICKNESS (Inches)	-	-	-	-	-

* Lane 1 is the left lane in the direction of travel.

The pavement information shown herein was used by the Department for design and estimate purposes.

NEW JERSEY DEPARTMENT OF TRANSPORTATION
PAVEMENT CORE RECORD

PROJECT/ROUTE & SECTION: Route 35, Restoration, Berkeley Twp. to Toms River Twp. (MP 0-4)

DRILLER: Advanced Infrastructure Design, Inc. (AID)

INSPECTOR: Advanced Infrastructure Design, Inc. (AID)

COUNTY/TOWNSHIP: Ocean County

DATE STARTED: March 2000 **DATE COMPLETED:** December 2002

CORE NUMBER	**31**	**32**	**33**	**34**	**35**
ROUTE	Route 35	Route 35	Route 35	Route 35	Route 35
DIRECTION (N, E, S, W)	S	S	S	S	S
MILE POST (MP or Station)	1.51	0.95	0.81	0.58	0.45
LANE NO. (Left to Right)	Right Mainline	Left Mainline	Right Mainline	Left Mainline	Mainline
SHOULDER (Inside or Outside)	-	-	-	-	-
CORE DIAMETER (Inches)	6	6	6	6	6
TOTAL CORE DEPTH (Inches)	12	12	12	12	12
CORE DRILLED TO	Dark Brownish Gravelly Sand	Yellowish Gravelly Sand	Yellowish Gravelly Sand	Yellowish Gravelly Sand	Yellowish Gravelly Sand
SURFACE TYPE (AC/PC)	AC	AC	AC	AC	AC
AC THICKNESS (Inches)	3 1/2	8	3 1/2	4 1/4	6 1/2
PC THICKNESS (Inches)	-	-	-	-	-

* Lane 1 is the left lane in the direction of travel.

The pavement information shown herein was used by the Department for design and estimate purposes.

NEW JERSEY DEPARTMENT OF TRANSPORTATION
PAVEMENT CORE RECORD

PROJECT/ROUTE & SECTION: Route 35, Restoration, Berkeley Twp. to Toms River Twp. (MP 0-4)

DRILLER: Advanced Infrastructure Design, Inc. (AID)

INSPECTOR: Advanced Infrastructure Design, Inc. (AID)

COUNTY/TOWNSHIP: Ocean County

DATE STARTED: March 2000 **DATE COMPLETED:** December 2002

CORE NUMBER	**36**	**37**	**38**	**39**	**40**
ROUTE	Route 35	Route 35	Route 35	Route 35	Route 35
DIRECTION (N, E, S, W)	S	S	N	N	N
MILE POST (MP or Station)	0.16	0.10	0.45	0.95	2.53
LANE NO. (Left to Right)	Right Shoulder	Left Mainline	Right Shoulder	Left Mainline	Right Shoulder
SHOULDER (Inside or Outside)	Outside	-	Outside	-	Outside
CORE DIAMETER (Inches)	6	6	6	6	6
TOTAL CORE DEPTH (Inches)	12	12	12	12	12
CORE DRILLED TO	Yellowish Gravelly Sand	Yellowish Gravelly Sand	Yellowish Gravelly Sand	Dark Brownish Gravelly Sand	Yellowish Gravelly Sand
SURFACE TYPE (AC/PC)	AC	AC	AC	AC	AC
AC THICKNESS (Inches)	2 1/4	4	6 1/2	6	4 1/4
PC THICKNESS (Inches)	-	-	-	6	-

* Lane 1 is the left lane in the direction of travel.

The pavement information shown herein was used by the Department for design and estimate purposes.

NEW JERSEY DEPARTMENT OF TRANSPORTATION
PAVEMENT CORE RECORD

PROJECT/ROUTE & SECTION: Route 35, Restoration, Berkeley Twp. to Toms River Twp. (MP 0-4)

DRILLER: Advanced Infrastructure Design, Inc. (AID)

INSPECTOR: Advanced Infrastructure Design, Inc. (AID)

COUNTY/TOWNSHIP: Ocean County

DATE STARTED: March 2000 **DATE COMPLETED:** December 2002

CORE NUMBER	**41**	**42**	**43**		
ROUTE	Route 35	Route 35	Route 35		
DIRECTION (N, E, S, W)	N	N	N		
MILE POST (MP or Station)	3.09	3.65	3.71		
LANE NO. (Left to Right)	Right Shoulder	Right Mainline	Left Shoulder		
SHOULDER (Inside or Outside)	-	-	-		
CORE DIAMETER (Inches)	6	6	6		
TOTAL CORE DEPTH (Inches)	12	12	12		
CORE DRILLED TO	Yellowish Gravelly Sand	Gravelly Sand	Gravelly Sand		
SURFACE TYPE (AC/PC)	AC	AC	AC		
AC THICKNESS (Inches)	2 3/4	3	9		
PC THICKNESS (Inches)	-	8 1/2	-		

* Lane 1 is the left lane in the direction of travel.

The pavement information shown herein was used by the Department for design and estimate purposes.

3. Existing Plans and As-Builts.

Existing Plans and As-builts used are as follows:

a. As-built plans of NJDOT Route 37, Section 16, from Mathis Bridge to Seaside Heights; Dual Roadway, Bridges, and Interchange at Seaside Heights; October 1960
b. As-built plans of Ocean County, Section 2 of the Shore Highway, from Point Pleasant to Seaside Heights, Part of State Highway Route 37; August 1928
c. As-built plans of NJDOT Route 35 (1953), Section 2B, Intersection Revisions at Bay Boulevard and Central Avenue and Ramp Connection; August 1964
d. As-built plans of NJDOT Route 35 (1953), Section 2A, from Eisenhower Avenue to Curtis Point Drive; Grading and Paving; March 1962
e. As-built plans of NJDOT Route 37 (1953), Sections 8C, 9C, & 1C, from Garden State Parkway to Bash Road; Widening and Dualization; September1967
f. Construction plans of Borough of Seaside Park, Water Main Distribution and Sanitary Sewer Improvements, Phase 1 – (Central Avenue - N.J.S.H. 35 Corridor); November 2008

102.10 SUBMISSION OF BIDS

THE FOLLOWING IS ADDED TO THE LIST INCLUDED IN THE SECOND PARAGRAPH:

8. On the Disclosure of Investment Activities in Iran (Form DC-16) provided by the Department, certify pursuant to N.J.S.A. 52:32-58, that neither the bidder, nor one of its parents, subsidiaries, and/or affiliates (as defined in N.J.S.A. 52:32-56(e)(3)), is listed on the Department of the Treasury's List of Persons or Entities Engaging in Prohibited Investment Activities in Iran and that neither is involved in any of the investment activities set forth in N.J.S.A. 52:32-56(f). If the bidder is unable to so certify, the bidder shall provide a detailed and precise description of such activities to the Department.

SECTION 104 – SCOPE OF WORK

104.03.03 Types of Changes

3. Changes in the Character of Work.

a. Differing Site Condition.

THE SECOND PARAGRAPH IS CHANGED TO:

The Department will make payment for increased costs resulting from a Type 1 or Type 2 Differing Site Condition as a change in the character of work; however, the Department will not consider making payment for a differing site condition unless the resulting change in cost exceeds $7,500. Except, if the Contractor incurs cost as the result of multiple differing site conditions, with the cost of each separate differing site condition having a value of at least $1,500 but not more than $7,500, the Department will consider making payment for such costs if the aggregate cost of the multiple differing site conditions exceeds $7,500. If the change in cost exceeds these amounts, the Department will base the modification on the total cost of the change, and the Department will not deduct the threshold amount of $7,500 from the cost of the change.

104.03.04 Contractual Notice

THE SECOND PARAGRAPH IS CHANGED TO:

Immediately provide written notice to the RE of a circumstance that is believed to be a change to the Contract. If notice is not provided on Contractual Notice (Form DC-161), include the following in the initial written notice:

1. A statement that this is a notice of a change.
2. The date when the circumstances believed to be a change were discovered.
3. A detailed and specific statement describing the nature and circumstances of the change.
4. If the change will or could affect costs to the Department.

5. If the change will or could affect Contract Time as specified in 108.11.01.C.

In addition to the hard copy of the notice, email the notice to the RE. It is not necessary to attach listed documents to the email.

104.03.08 Force Account

7. Equipment.

a. Contractor-Owned Equipment.

PART 1 IS CHANGED TO:

1 The Department will calculate the "rental" hourly rates by dividing the monthly rate by 176. The Department will not use weekly, daily, or hourly rates. The Department will apply rental hourly rates for every hour the equipment is in active use, except that for any 30-day period, the Department will limit the total amount paid for each piece of equipment to a maximum of the monthly rate.

THE FOLLOWING PART IS ADDED:

6. The Department will make payment for costs for transporting equipment to and from the work site, if said costs are solely required as a direct result of the Force Account activity.

THE SECOND PARAGRAPH IS CHANGED TO:

The payment established is full payment for all equipment costs, including the cost of fuel, repairs, maintenance, depreciation, storage and incidentals.

10. Subcontractors.

THE SECOND PARAGRAPH IS CHANGED TO:

The Department will make payment for markup on subcontracted work at the rate of 5 percent applied on the total amount of all costs for subcontracted force account work up to $500,000 and 2% applied on the total amount of all costs for subcontracted force account work over $500,000.

104.03.09 Delay Damages

1. Non-Productive Activity.

e. Equipment.

THE FIRST SENTENCE IS CHANGED TO:

If as the result of the delay, equipment cannot be used for any active work, and is directed by the RE to remain on the work site during the delay, the Department will make payment as specified in 104.03.08.7.a.5.

SECTION 105 – CONTROL OF WORK

105.05 WORKING DRAWINGS

THE SECOND PARAGRAPH IS CHANGED TO:

Ensure that working drawing submissions also conform to the Department design manuals and other Department standards for the proposed work. Ensure that working drawings are signed and sealed by a Professional Engineer. After Award, the Department will provide additional formatting information, the number of copies required, and the address of the receiving designated design unit.

1. Certified Working Drawings.

THE LAST SENTENCE OF THE FIRST PARAGRAPH IS CHANGED TO:

The Department will require 30 days for review and certification or rejection and return of certified working drawings.

2. Approved Working Drawings.

THE LAST SENTENCE OF THE FIRST PARAGRAPH IS CHANGED TO:

The Department will require 30 days for review and approval or rejection and return of working drawings.

105.07.01 Working in the Vicinity of Utilities

A. Initial Notice.

Verizon - New Jersey, Inc.
Tom Reber
10 Tansboro Rd., Floor 2
Berlin, NJ 08009
Tel: 856 753 0795
Fax 888 474 50.55

New Jersey American Water Company
Michael Wolan
Senior Engineering Project Manager
120 Raider Boulevard
Hillsborough, NJ 08844
Tel: 908 431 3225
Fax: 908 431 3260
Cell: 908 482 4702

Borough of Seaside Park Water and Sewer
Felipe Contreras, P.E.
Remington & Vernick
9 Allen Street
Toms River, NJ 08753
Tel: 732 286 9220
Fax: 732 505 8416
Cell: 609 680 0100

Shore Water Co.
George Krammer
105 23RD Avenue,
Seaside Park Borough, NJ 08752-2129
Tel: 732 793 0767

Jersey Central Power & Light (JCP&L)
Harvey Lockely
One River Centre, Building 3
331 Newman Spring Road
Red Bank, New Jersey 07701
Tel: 732 212 4246

Berkeley Township Sewerage Authority
Greg De Paul,
Superintendent
255 Atlantic City Boulevard
Bayville, NJ 08721
Tel: 732 269-1093

Toms River Municipal Utilities Authority
Nick Otten, Engineer
340 Water Street
Toms River, NJ 08753
Tel: 732 240 3500

Ocean County Utilities Authority
Michael Willis, Engineer
501 Hickory Lane
Bayville, NJ 08721
Tel: 732 269-4500

New Jersey Natural Gas Company
Dave Menaker
1415 Wycoff Road
P. O. Box 1464
Wall, NJ 07719
Tel: 732 919- 8066

Cablevision
Paul Kostyz
40 Pine Street
Tinton Falls, NJ 07753
Tel: 732 922-6700, ext. 3285

B. Locating Existing Facilities.

2.

Bureau of Traffic Operations, South Region (TOCS)
1 Executive Campus-Route 70 West
Cherry Hill, NJ 08002-4106
Telephone: 856-486-6650

3.

Bureau of Electrical Maintenance, Central Region
100 Daniels Way
Freehold, NJ 07728-2668
Telephone: 732-625-4350

THE FOLLOWING IS ADDED:

Existing utilities shown on the Plans are based upon available records and limited subsurface utility engineering investigations. Prior to initiating any work, conduct a comprehensive subsurface utility investigation including markouts and test pits to record the horizontal and vertical locations of all underground utility infrastructure. The Department will make payment for test pits under EXCAVATION, TEST PIT. Based on the results of the utility investigation, evaluate all proposed utility alignments shown on the Plans for conflicts and develop recommended adjustments. Submit recommended adjustments to the RE for approval.

C. Protection of Utilities.

THE SECOND PARAGRAPH IS CHANGED TO:

Protect and support existing Department electrical and ITS facilities and ensure that there is no interruption of service. Use hand tools only while working within two feet of the fiber optic network. At least 30 days before beginning the work, submit a plan to the RE for approval showing the method of support and protection.

105.07.02 Work Performed by Utilities

Company Name & Address	Contact Person	Number of Day/s Advance Notice
Verizon - New Jersey, Inc. 10 Tansboro Rd., Floor 2 Berlin, NJ 08009	Tom Reber Tel: 856 753 0795 Fax 888 474 50.55	30
New Jersey American Water Company 120 Raider Boulevard Hillsborough, NJ 08844	Michael Wolan Tel: 908 431 3225 Fax: 908 431 3260 Cell: 908 482 4702	21
Borough of Seaside Park Water and Sewer 9 Allen Street Toms River, NJ 08753	Felipe Contreras, P.E. Remington & Vernick Tel: 732 286 9220 Fax: 732 505 8416 Cell: 609 680 0100	21
Shore Water Co. 105 23RD Avenue, Seaside Park Borough, NJ 08752-2129	George Krammer Tel: 732 793 0767	21
Jersey Central Power & Light (JCP&L) One River Centre, Building 3 331 Newman Spring Road Red Bank, New Jersey 07701	Harvey Lockely Tel: 732 212 4246	30
Berkeley Township Sewerage Authority 255 Atlantic City Boulevard Bayville, NJ 08721	Greg De Paul, Superintendent Tel: 732 269-1093	14
Toms River Municipal Utilities Authority 340 Water Street Toms River, NJ 08753	Nick Otten, Engineer Tel: 732 240 3500	14
Ocean County Utilities Authority 501 Hickory Lane Bayville, NJ 08721	Michael Willis, Engineer Tel: 732 269-4500	14
New Jersey Natural Gas Company 1415 Wycoff Road P. O. Box 1464 Wall, NJ 07719	Dave Menaker Tel: 732 919- 8066	30
Cablevision 40 Pine Street Tinton Falls, NJ 07753	Paul Kostyz Tel: 732 922-6700, ext. 3285	21

Stage # ____1___

Utility Company Name	Work Description	Work Duration (Day/s)	Restrictions
New Jersey Natural Gas Company	L Street Baseline Sta. 16+74.00, 12' Lt.- Relocate. Vertical Offset. Install 20 L.F. of 2" Stl.	2	None

Stage # ____2___

Utility Company Name	Work Description	Work Duration (Day/s)	Restrictions
New Jersey Natural Gas Company	Rt. 35 Sta. 304+63.00, 27' Rt.- Relocate. Vertical and Horizontal Offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 Sta. 304+63.00, 27' Rt.- Relocate. Horizontal offset. Install 20 L.F. of 2" Stl.	2	None

New Jersey Natural Gas Company	Rt. 35 Sta. 309+63.00, 10' Rt. - Relocate. Vertical offset. Install 20 L.F. of 4" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 Sta. 309+63.00, 12' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None

Stage # ____3___

Utility Company Name	Work Description	Work Duration (Day/s)	Restrictions
New Jersey Natural Gas Company	Rt. 35 SB Sta. 385+79.00, 33' Lt. - Relocate. Vertical & Horizontal offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 386+56.00, 34' Lt. - Relocate. Vertical & Horizontal offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 390+88.00, 32' Rt. - Relocate. Vertical & Horizontal offset. Install 20 L.F. of 2" Pl.	2	None
New Jersey Natural Gas Company	Ramp Baseline Sta. 393+83.00, 91' Lt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 393+85.00, 47' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 398+47.00, 34' Rt. - Relocate. Horizontal offset. Install 20 L.F. of 2" Pl..	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 400+58.00, 16' Lt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 398+28.00, 2' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 398+41.00, 45' Lt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Stockton Avenue Baseline Sta. 13+60.00, 39' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 395+46.00, 32' Lt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Decatur Avenue Baseline Sta. 13+94.00, 33' Lt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Lafayette Avenue Baseline Sta. 14+81.00, 13' Rt. - Relocate.	2	None

	Vertical offset. Install 20 L.F. of 2" Stl.		
New Jersey Natural Gas Company	Rt. 35 SB Sta. 468+81.00, 16' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 476+28.00, 30' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Pl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 482+63.00, 17' Rt. to Sta. 482+74.00, 37' Lt. - Relocate. Vertical offset. Install 100 L.F. of 2" Stl	5	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 482+63.00, 25' Lt. to Sta. 482+74.00, 37' Lt. - Relocate. Vertical offset. Install 100 L.F. of 2" Stl	5	None
Cablevision of Monmouth, Inc.	Rt. 35 NB Sta. 385+95, 34' Rt. – Relocate Aerial Cable TV/Fiber Optic Facilities to new pole.	2	None
Cablevision of Monmouth, Inc.	Rt. 35 NB Sta. 390+05, 34' Rt. – Relocate Aerial Cable TV/Fiber Optic Facilities to new pole.	2	None
Cablevision of Monmouth, Inc.	Rt. 35 NB Sta. 394+03, 34' Rt. – Relocate Aerial Cable TV/Fiber Optic Facilities to new pole.	2	None
Cablevision of Monmouth, Inc.	Rt. 35 NB Sta. 429+80, 56' Rt. – Relocate Aerial Cable TV/Fiber Optic Facilities to new pole.	2	None
Verizon-New Jersey, Inc.	Route 35 from Sta. 390+00 to 491+50 – Relocate existing Aerial Telephone Facilities and shift three poles.	2	None

Stage # ____4___

Utility Company Name	Work Description	Work Duration (Day/s)	Restrictions
New Jersey Natural Gas Company	Rt. 35 NB Sta. 281+38.00, 17' Lt. - Relocate. Vertical & Horizontal offset, Install 20 L.F. of 2" Pl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 283+12.00, 17'Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
Cablevision of Monmouth, Inc.	Rt. 35 NB, Sta. 285+65.00, Rt. - Relocate Aerial Cable TV/ Fiber Optic Facilities to new pole.	2	None
Cablevision of Monmouth, Inc.	Rt. 35 SB Sta. 287.59, Lt. - Relocate Aerial Cable TV/ Fiber Optic Facilities to new pole.	2	None
Cablevision of Monmouth, Inc.	Rt. 35 SB, Sta. 290. , Lt. - Relocate Aerial Cable TV/ Fiber Optic Facilities to new pole.	2	None
Cablevision of Monmouth, Inc.	Rt. 35 NB, Sta. 292+6.00, ' Rt. - Relocate Aerial Cable TV/ Fiber	2	None

	Optic Facilities to new pole.		
Verizon-New Jersey, Inc.	Rt. 35 Sta. 284+00 to 293+50 – Relocate existing Aerial Telephone Facilities.	2	None

Stage # ____5___

Utility Company Name	Work Description	Work Duration (Day/s)	Restrictions
New Jersey Natural Gas Company	Rt. 35 NB Sta. 317+98.00, 20' Lt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 326+09.00, 47' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 328+94.00, 35' Lt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 329+75.00, 88' Lt. - Relocate. Vertical offset. Install 20 L.F. of 2" Pl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 331+62.00, 51' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Pl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 334+97.00, 17' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 336+19.00, 17' Rt. - Relocate. Vertical & Horizontal offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 336+88.00, 48' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 339+65.00, 48' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 347+33.00, 33' Lt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 347+08.00, 34' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 347+33.00, 32' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 354+65.00, 48' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None

New Jersey Natural Gas Company	Rt. 35 NB Sta. 359+83.00, 52' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 364+96.00, 50' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 370+20.00, 47' Rt. To Sta. 370+42.00, 27Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 375+62.00, 27' Lt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 376+44.00, 29' Lt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 376+35.00, 37' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Pl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 376+43.00, 29' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 376+17.00, 48' Rt. To Sta. 370+42.00, 27’ Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 378+46.00, 25' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 378+78.00, 48' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 379+25.00, 29' Lt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 380+72.00, 27' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.To Sta. 380+82.00, 27’ Rt.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 381+27.00, 48' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 381+59.00, 26' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 381+74.00, 29' Lt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None

New Jersey Natural Gas Company	Rt. 35 NB Sta. 383+25.00, 22' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 383+28.00, 31' Lt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 383+76.00, 47' Rt. - Relocate. Vertical offset. Install 20 L.F. of 2" Stl.	2	None
New Jersey Natural Gas Company	Rt. 35 NB Sta. 383+83.00, 28' Rt. - Relocate. Vertical & Horizontal offset. Install 20 L.F. of 2" Pl.	2	None
New Jersey Natural Gas Company	Rt. 35 SB Sta. 384+07.00, 33' Lt. - Relocate. Vertical & Horizontal offset. Install 20 L.F. of 2" Stl.	2	None
Verizon-New Jersey, Inc.	Rt. 35 Sta. 337+00 to 350+00 – Relocate existing Aerial Telephone Facilities.	2	None
Cablevision of Monmouth	Rt. 35 NB, Sta. 337+05.00, 36' Rt. - Relocate Aerial Cable TV/ Fiber Optic Facilities to new pole.	2	None
Cablevision of Monmouth	Rt. 35 SB Sta. 342+09.00, 44'Lt. - Relocate Aerial Cable TV/ Fiber Optic Facilities to new pole.	2	None
Cablevision of Monmouth	Rt. 35 SB Sta. 345+ 45.00, 'Lt. - Relocate Aerial Cable TV/ Fiber Optic Facilities to new pole.	2	None
Cablevision of Monmouth	Rt. 35 SB Sta. 346+65.00, 35' Lt. - Relocate Aerial Cable TV/ Fiber Optic Facilities to new pole.	2	None
Cablevision of Monmouth	Rt. 35 NB Sta. 349+72.00, 43' Rt. - Relocate Aerial Cable TV/ Fiber Optic Facilities to new pole.	2	None

SECTION 106 – CONTROL OF MATERIAL

106.03 FOREIGN MATERIALS

THE FOLLOWING IS ADDED AFTER THE FIRST PARAGRAPH:

For steel and iron products incorporated into the Project, provide a certification from the manufacturer stating the country where the steel or iron product was melted and manufactured including application of coatings which protect or enhance the value of the material. Ensure that 4 copies of the manufacturer's certification are provided with each delivery of steel and iron products. Retain 1 copy and submit 3 copies to the RE. Ensure that the certification includes, materials description, quantity of material represented by the certification, country of manufacture, and notarized signature of a person having legal authority to bind the supplier. If a Certification of Compliance as specified in 106.07 contains a statement regarding the country of manufacture, a separate certification is not necessary.

106.04 MATERIALS QUESTIONNAIRE
THE LAST SENTENCE OF THE FIRST PARAGRAPH IS CHANGED TO:

For ITS systems as specified in Section 704, obtain approval of system working drawings including individual components and Electrical material instead of submitting a materials questionnaire.

SECTION 107 – LEGAL RELATIONS

107.04 NEW JERSEY CONTRACTUAL LIABILITY ACT
THE FOURTH PARAGRAPH IS CHANGED TO:

For purposes of determining the date of "completion of the contract" pursuant to N.J.S.A. 59:13-5, "completion of the contract" occurs on the date that the Contractor provides written notice to the Department of Acceptance or conditional Acceptance of the Proposed Final Certificate or the 30th day after the Department issues the Proposed Final Certificate, whichever event occurs first.

107.09 INDEPENDENT CONTRACTOR
THE ENTIRE SUBSECTION IS CHANGED TO:

The relationship of the Contractor to the State is that of an independent contractor. Conduct business consistent with such status. Do not hold out or claim to be an officer or employee of the Department by reason hereof. Do not make a claim, demand, or application to or for the rights or privileges applicable to an officer or employee of the Department, including, but not limited to, Workers Compensation Insurance, unemployment insurance benefits, social security coverage, or retirement membership or credit.

107.12.01 Satisfying the Notice Requirements
THE FOLLOWING IS ADDED TO THE SECOND PARAGRAPH:

Upon request, provide the RE with 3 copies of all documentation submitted in support of the claim.

107.12.02 Steps

3. Step III, Claims Committee.
THE SECOND PARAGRAPH IS CHANGED TO:

The Claims Committee will not review a claim or combination of claims valued less than $250,000 until after the receipt of conditional release as specified in 109.11. If the Contract is 75 percent complete or greater as measured by Contract Time or Total Adjusted Contract Price, the Claims Committee will not review a claim or combination of claims valued more than $250,000 until after receipt of conditional release as specified in 109.11. If the Claims Committee does not review a claim or combination of claims before Completion, the Claims Committee will review the claim or combination of claims at a single session of the Claims Committee after the receipt of the conditional release as specified in 109.11 and all claims have been reviewed at Steps I and II of the Claims Resolution Process. When reviewing a combination of claims, the Claims Committee will not review any individual claim valued less than $20,000.

THE FOLLOWING SUBSECTION IS ADDED

107.17 COMMUNICATION WITH THE NEWS MEDIA

Do not communicate with the news media or issue a news release without obtaining a prior written approval from the Department.

SECTION 108 – PROSECUTION AND COMPLETION

108.01 SUBCONTRACTING

1. Values and Quantities.

THE FOLLOWING IS ADDED TO FIRST PARAGRAPH

1.

Specialty Items are as listed below:

Above ground highway lighting items.

Above ground sign lighting items.

Electrical wire items.

ITS items, except for foundations, standards, and junction boxes
Waterline Relocations
Sanitary Sewer Force Main
Traffic Signal Adaptive Image Detector System
Traffic Signal Optical Emergency Pre-Emption System
Stormwater Pump Stations

THE THIRD PARAGRAPH IS CHANGED TO:

If a partial quantity of work for a unit price Item is subcontracted, the Department will determine the value of the work subcontracted by multiplying the price of the Item by the quantity of units to be performed by the subcontractor.

THE FOURTH PARAGRAPH IS CHANGED TO:

If only a portion of work of an Item is subcontracted, the Department will determine the value of work subcontracted based on the value of the work subcontracted as indicated in the subcontract agreement and as shown in a breakdown of cost submitted by the Contractor.

108.02 COMMENCEMENT OF WORK
THE SUBPART 4 IN THE FIRST PARAGRAPH IS CHANGED TO:

4. Progress schedule as specified in 153.03

108.06 NIGHT OPERATIONS

2. Visibility Requirements for Workers and Equipment.
THE FIRST PARAGRAPH IS CHANGED TO:

Ensure that workers wear a 360° high-visibility retroreflective safety garment meeting ANSI/ISEA Class 3, Level 2 standards.

108.08 LANE OCCUPANCY CHARGES
THE SECOND PARAGRAPH IS CHANGED TO:

The RE will keep record of each occurrence as well as the cumulative amount of time that a lane is kept closed beyond the lane closure schedule and provide the record to the Contractor. The Department will calculate the lane occupancy charge by multiplying the length of time of the delayed opening, in minutes, by the rate of $10 per minute per lane, unless otherwise specified in the Special Provisions. The total amount per day for the lane occupancy charge that the Department will collect will not exceed $10,000.00.

THE FOLLOWING IS ADDED:

The rate to calculate the Lane Occupancy Charge is as follows:

Description	Rate
Overrun of "Single Lane Closure" Time Limits	$10/minute
Overrun of "Alternating Traffic Pattern" Time Limits	$10/minute

108.09 MAINTENANCE WITHIN THE PROJECT LIMITS

THE FOLLOWING IS ADDED TO THE FIRST PARAGRAPH:

6. Access to ITS devices and their respective controllers and meter cabinets is maintained throughout the duration of the project.

108.10 CONTRACT TIME

A. Complete all work required for Interim Completion (End of Stage 3) on or before May 15, 2014. The Contractor is not allowed to perform any work in Route 35 corridor from ROW line to ROW line except for maintenance as required in Section 108.09 and shall make the entire Route 35 corridor from ROW line to ROW line available for safe public use including all parking facilities (parallel and median), vehicular/bicycle movements (lanes and shoulders), and pedestrian facilities (curbs, sidewalks, ramps) and free of all traffic control devices between June 26, 2014 and September 9, 2014.

B. Complete all work required for Substantial Completion on or before May 15, 2015. The Contractor is not allowed to perform any work in Route 35 corridor from ROW line to ROW line except for maintenance as required in Section 108.09 and shall make the entire Route 35 corridor from ROW line to ROW line available for safe public use including all parking facilities (parallel and median), vehicular/bicycle movements (lanes and shoulders), and pedestrian facilities (curbs, sidewalks, ramps) and free of all traffic control devices between June 25, 2015 and September 8, 2015.

C. Achieve Completion on or before October 1, 2015.

THE FOLLOWING IS ADDED:

The Contractor is advised that the Department has established a compressed schedule for this Contract. Extended work weeks, multiple crews, and multiple daily shifts may be required to meet the interim and substantial completion dates.

108.11.01 Extensions to Contract Time

B. Types of Delays.

1. Non-Excusable Delays.

THE FOLLOWING IS ADDED:

For work performed by Utilities, delays up to 30 percent of the estimated duration specified in 105.07.02 are considered non-excusable. The duration includes both the advance notice and the completion of the work by the Utility.

For delays caused by Railroads, delays up to 30 percent of the estimated availability specified in 105.07 are considered non-excusable.

2. Excusable, Non-Compensable Delays.

b. Utilities.

THE FOLLOWING IS ADDED:

For delays caused by Railroads, when the availability to access is reduced by more than 30 percent greater than the estimated availability specified in 105.07.

THE LAST PARAGRAPH IS CHANGED TO:

If approved excusable, non-compensable delays exceed a total of 90 days, the time in excess of 90 days will become excusable and compensable as specified in 108.11.01.B.3.

108.12 RIGHT-OF-WAY RESTRICTIONS

The Department has not obtained the following Right-of-Way parcels; the anticipated availability dates are provided:

Properties and Vacation/Availability Dates

Parcel	Status	ROW Available	ROW REQUIRED	Remarks
ER12	Plans being reviewed	9/2013	12/2013	Existing Pipe location
TE6A-TE6	Plans being reviewed	9/2013	11/2013	Pump Station #1 Location
ER8C	Plans being reviewed	9/2013	2/2014	Pump Station #2 Location
TER6B	Plans being reviewed	9/2013	2/2014	Pump Station #3 Location
ER8G	Plans being reviewed	9/2013	2/2014	Pump Station #4 Location
ER14	Plans being reviewed	9/2013	11/2013	Existing Pipe location
TE153	Plans being reviewed	9/2013	11/2013	Existing Pipe location
E154	Plans being reviewed	9/2013	11/2013	Existing Pipe location
E155	Plans being reviewed	9/2013	11/2013	Pump Station #5 Location
1	Previously Acquired	-	-	

108.14 DEFAULT AND TERMINATION OF CONTRACTOR'S RIGHT TO PROCEED

LIST (1) OF THE FIRST PARAGRAPH IS CHANGED TO:

1. Fails to begin construction operations within 30 days of execution of the Contract.

THE FOLLOWING IS ADDED AFTER THE 2ND PARAGRAPH:

If the Department directs the Surety to complete the Contract, and the Surety elects to use a completion-contractor to perform the Work, the Surety must promptly submit to the Department a request for approval of the proposed completion-contractor as a subcontractor as per Section 108.01. The Department has the right to reject a request by the Surety to use the Contractor as the completion-contractor, either directly or under the direction of a consultant to the Surety. In addition, the Department has the right to reject a request by the Surety to contract with employees of the Contractor, directly or under the direction of a consultant to the Surety, to complete the Contract. The Department's right to reject contained in this paragraph is based on the sole discretion of the Department.

108.19 COMPLETION AND ACCEPTANCE

THE FOLLOWING IS ADDED:

No Incentive Payment for Early Completion is specified for this project.

108.20 LIQUIDATED DAMAGES

Liquidated damages are as follows:

A. For each day that the Contractor fails to complete the work as specified in Subpart A of Subsection 108.10 of these Special Provisions, for Interim Completion No.1, the Department will assess liquidated damages in the amount of $ 4,900.

B. For each day that the Contractor fails to complete the work as specified in Subpart C of Subsection 108.10 of these Special Provisions, for Substantial Completion, the Department will assess liquidated damages in the amount of $ 14,300.

C. For each day that the Contractor fails to achieve Completion as specified in Subpart D of Subsection 108.10 of these Special Provisions, the Department will assess liquidated damages in the amount of $ 4,700.

THE FOLLOWING IS ADDED:

When the Contractor may be subjected to more than one rate of liquidated damages established in this Section, the Department will assess liquidated damages at the higher rate.

SECTION 109 – MEASUREMENT AND PAYMENT

109.01 MEASUREMENT OF QUANTITIES
THE SECOND PARAGRAPH IS CHANGED TO:

The Department will designate Items as Measured Items or as Proposal Items by having a suffix of M or P in the Item number respectively. The Department will measure quantities of Measured Items for payment.

109.02 SCOPE OF PAYMENT
THE THIRD SENTENCE OF THE FIRST PARAGRAPH IS CHANGED TO:

The Department will not make additional or separate payment for work or portion of work unless specifically provided for in the "Measurement and Payment" Subsection.

109.05 ESTIMATES
THE SECOND PARAGRAPH IS CHANGED TO:

The RE will provide a summary of the Estimate to the Contractor. Before the issuance of each payment, certify, on forms provided by the Department, that:

1. Each subcontractor or supplier has been paid the amount due from the previous progress payment and shall be paid the amount due from the current progress payment and that full payment for any retainage withheld from a subcontractor has been or will be made within 30 days after the subcontractor's work has been satisfactorily completed; or

2. There exists a valid basis under the terms of the subcontractor's or supplier's contract to withhold payment from the subcontractor or supplier, and therefore payment is withheld.

THE TENTH PARAGRAPH IS CHANGED TO:

The RE has the right to not process an Estimate when, in the judgment of the RE, the Work is not performed or proceeding as specified in the Contract or following the Department giving the Contractor and Surety notice of default as specified in 108.14.

109.07 BONDS POSTED IN LIEU OF RETAINAGES
THE FIRST PARAGRAPH IS CHANGED TO:

The Contractor may deposit negotiable bonds of the State or any of its political subdivisions, which have been approved by the Department, in an escrow account to secure release of all or a portion of the retainage withheld as specified in 109.05. Establish the account under the provisions of an escrow agreement to be entered into between the Contractor, the Department, and a bank located in the State that is an authorized depository with a trust department. Pay the charges of the bank for services rendered according to the terms and conditions of the escrow agreement.

109.09 AUDITS
THE FOLLOWING IS ADDED:

Pursuant to N.J.S.A. 52:15C-14(d), relevant records of private vendors or other persons entering into contracts with the Department are subject to audit or review by the New Jersey Office of the State Comptroller. Therefore, the Contractor shall maintain all documentation related to products, transactions or services under the Contract for a period of five years from the date of final payment. Such records shall be made available to the New Jersey Office of the State Comptroller upon request.

DIVISION 150 – CONTRACT REQUIREMENTS

SECTION 151 – PERFORMANCE BOND AND PAYMENT BOND

151.03.01 Performance Bond and Payment Bond
THE LAST SENTENCE OF THE FIRST PARAGRAPH IS CHANGED TO:

Submit the broker's fees, the certified rate schedule, paid invoices and the report of execution for the bond to the RE.

151.04 MEASUREMENT AND PAYMENT
THE FOLLOWING ITEM'S PAY UNIT IS REVISED TO:

Item	*Pay Unit*
PERFORMANCE BOND AND PAYMENT BOND	DOLLAR

SECTION 152 – INSURANCE

152.03.01 Owner's and Contractor's Protective Liability Insurance

A. Policy Requirements.
THE FOURTH SENTENCE OF THE FIRST PARAGRAPH IS CHANGED TO:

Ensure that policies are underwritten by companies with a current A.M. Best rating of A- with a Financial Size Category of VII or better.

B. Types

1. Comprehensive General Liability Insurance.
THE FOLLOWING IS ADDED:

Ensure the policy names JCP&L, its officers, employees and agents as additional insured.

2. Comprehensive Automobile Liability Insurance.
THE FOLLOWING IS ADDED:

Ensure the policy names JCP&L, its officers, employees and agents as additional insured.

3. Owner's and Contractor's Protective Liability Insurance.
THE ENTIRE TEXT IS CHANGED TO:

Procure a separate Owner's and Contractor's Protective Liability Insurance Policy with a minimum limit of liability in the amount of $4,000,000 per occurrence as a combined single limit for bodily injury and property damage. Ensure the policy is endorsed to include Severability of Interest/Separation of Insureds clause. Ensure the policy names the State, its officers, employees, and agents as additional insured. Provide documentation from the insurance company that indicates the cost of the Owner's and Contractor's Protective Liability Insurance Policy.

Ensure the policy is endorsed to include per project aggregate.

5. Excess Liability Insurance.
THE FOLLOWING IS ADDED:

Ensure the policy names JCP&L, its officers, employees and agents as additional insured.

6. Marine Liability Insurance.
THE ENTIRE TEXT IS CHANGED TO:

If construction operations require marine operations, procure Marine Liability Insurance with a minimum limit of liability in the amount of $2,000,000 per occurrence. Ensure the policy is endorsed to include:

1. Personal injury.

2. Contractual liability.

3. Waiver of Subrogation for all claims and suits, including recovery of any applicable deductibles.

4. Per project aggregate.

Ensure the policy names the State, its officers, employees, and agents as additional insured.

152.03.03 Pollution Liability Insurance
SUBPART 9 IS ADDED TO THE THIRD PARAGRAPH:

9. Per project aggregate.

152.04 MEASUREMENT AND PAYMENT
THE FOLLOWING ITEMS' PAY UNITS ARE REVISED TO:

Item	*Pay Unit*
OWNER'S AND CONTRACTOR'S PROTECTIVE LIABILITY INSURANCE	DOLLAR
POLLUTION LIABILITY INSURANCE	DOLLAR

THE LAST PARAGRAPH IS CHANGED TO:

The Department will make initial payment for OWNER'S AND CONTRACTOR'S PROTECTIVE LIABILITY INSURANCE and POLLUTION LIABILITY INSURANCE at the lesser of the bid amount, or actual costs as documented from paid invoices. If the Bid amount is greater than the amount indicated on the documented paid invoices, the Department will make payment for any remainder, up to the Bid amount, with the final monthly Estimate.

SECTION 153 – PROGRESS SCHEDULE

153.03.01 CPM PROGRESS SCHEDULE
THE THIRD PARAGRAPH IS CHANGED TO:

The Contractor may propose alternate staging. Ensure that proposed alternate staging does not interfere with work done by Others without written concurrence from the affected Others. The Department may reject the proposed alternate staging if it causes an increase to the cost of work done by Others. The Contractor is responsible for the cost of changes or additional work required as a result of completing the work according to the proposed alternate staging.

1. Preliminary Schedule Submission.
THE SECOND PARAGRAPH IS CHANGED TO:

The RE may require 3 color paper copies of the preliminary schedule, Gantt Chart, as specified in 153.03.02.2.e, and a network diagram (PERT) printed on 36 × 22-inch plans detailing the activity relationships.

2. Baseline Schedule Submission.
THE LAST SENTENCE OF THE FIRST PARAGRAPH IS CHANGED TO:

The RE may require the Contractor to submit 3 color paper copies of the baseline schedule.

THE SECOND PARAGRAPH PART 3 IS CHANGED TO:

3. The RE may require 3 color paper copies of the tabular reports, as specified in 153.03.02.2, and a printed network diagram (PERT) on 36 × 22-inch sheets detailing the activity relationships.

153.03.02 CPM Progress Schedule Updates
THE LAST PARAGRAPH IS CHANGED TO:

If the project falls behind schedule for nonexcusable delays, so that the schedule indicates that the Work will not be completed by the Completion date, as specified in 108.10, take the necessary steps to improve progress. Under such circumstances, the RE may direct the Contractor to increase the number of shifts, begin overtime operations, work extra days including weekends and holidays, and supplement its construction plant. Furthermore, the RE may require the Contractor to submit for approval a recovery schedule showing how the Contractor proposes to meet the directed acceleration.

2. Tabular Reports.

THE FIRST SENTENCE OF THE FIRST PARAGRAPH IS CHANGED TO:

The RE may require 3 color paper copies of the longest path sort, total float sort, responsibility sort, area sort, and Gantt chart.

153.03.03 Bar Chart Progress Schedule and Updates

A. Schedule.

THE THIRD SENTENCE OF THE THIRD PARAGRAPH IS CHANGED TO:

Provide 3 color paper copies of a bar chart progress schedule or similar type that is acceptable to the RE for approval as follows:

THE FOLLOWING IS ADDED:

If the project falls behind schedule for nonexcusable delays, so that the schedule indicates that the Work will not be completed by the Completion date, as specified in 108.10, take the necessary steps to improve progress. Under such circumstances, the RE may direct the Contractor to increase the number of shifts, begin overtime operations, work extra days including weekends and holidays, and supplement its construction plant. Furthermore, the RE may require the Contractor to submit for approval a recovery schedule showing how the Contractor proposes to meet the directed acceleration.

153.04 MEASUREMENT AND PAYMENT

THE THIRD PARAGRAPH IS CHANGED TO:

If the Contractor's CPM Progress Schedule update is not approved by the date of the progress meeting for the following update, the Department will assess liquidated damages to recover the Department's increased administrative costs. The Department will assess damages for each delinquent update as follows:

SECTION 155 – CONSTRUCTION FIELD OFFICE

155.03.01 Field Office

4. Communication Equipment.

a. Telephones. Provide _4_ cordless phones with auto-switching.

c. Cell Phones. Provide _9_ cellular phones. Ensure the cellular phone plan provides for unlimited mobile to mobile in-network usage, unlimited push-to-talk/ walkie-talkie usage and an anticipated monthly usage of 900 any-time minutes for each phone. Ensure the phones are on the same plan. Ensure the cellular phone plan has a home rate with no roaming charges within the state. Ensure each cellular phone has the following features:

1. Push to Talk / Walkie-Talkie capable
2. Camera with 1 megapixel picture capability
3. Battery life capable of 180 minutes of continuous use and 72 hours of standby use
4. Equipped with a hands-free headset
5. Base charger and car charger

d. Computer System. Provide a computer system meeting the following requirements:

_5_ computer configurations each meeting the following:

1. Processor having a clock speed of _3.5_ GHz or faster, _8_ GB RAM, _512_ MB Video RAM, _250_ Gigabyte hard drive designated as drive C, one DVD (+/-) Writer Drive, one CD-R Recordable Drive. Ensure the system is USB 2.0 compatible and has at least two front USB ports. Include Keyboard, optical mouse and 2 piece desktop speakers.
2. Wired Router with appropriate number of ports and cables and a print server. Ensure there is at least one wired Ethernet switch.
3. High-speed broad band connection and service with a minimum speed of _3_ Megabits per second (mbps) with dynamic IP address for the duration of the project.
4. 19 inch or larger Flat Screen LCD monitor with tilt/swivel capabilities.
5. _250_ Gigabyte or larger external drive with backup software for MS-Windows.
6. _1_ Flatbed USB version 2.0 or greater Color Scanner with automatic document feed.
7. Uninterruptible power supply (UPS).
8. Surge protector for the entire computer configuration to be used in conjunction with the UPS.
9. Computer workstation, chair, printer stand, and/or table having both appropriate surface and chair height.
10. One can of compressed air and screen cleaning solution every other month of the duration of the contract.

If more than one computer configuration is specified, provide one network interface card for the base computer configuration and hardwire connections between computer configurations as directed by the RE.

Also provide:
_8_ USB _32_ GB Flash/Jump memory drives
_50__ CD-R _700_ MB (or larger) recordable CD's compatible with the CD drive and _0__ recordable DVD's.
__1_ CD/DVD Holder (each holds 50)

_1__ color laser printers and supplies as follows:

1. Minimum of 192 Megabytes of expanded memory, printer cable, and legal size paper tray.
2. One set of printer ink cartridges every other month for the duration of the construction project for each printer.

Software as follows:

1. Microsoft Windows, latest version with future upgrades for the duration of the entire project.
2. Microsoft Office Professional, latest version.
3. Norton's System Works for Windows, latest version, or compatible software package with future upgrades and latest virus patches.
4. Anti-Virus software, latest version with monthly updates for the duration of the contract.
5. Visio Professional Graphics Software for Windows, latest version
6. Primavera Project Management, latest version
7. Adobe Acrobat Professional, latest version, or compatible software for Scanner

THE THIRD PARAGRAPH IS CHANGED TO:

When the computer system is no longer required by the RE, the Department will remove and destroy the hard drive, and return the computer system to the Contractor. The Department will retain other data storage media.

6. Office Equipment. Provide the following:

PART (1) IS CHANGED TO:

1. A copier with automatic document feed, 15 pages per minute copy speed, variable reduce/enlarge capability, and letter, legal, and ledger size capabilities. Erase the copier hard drive before removing the copier from the field office and provide the RE with a certification stating that the copier hard drive has been erased.

PART (1) AND (2) ARE CHANGED TO:

2. _1_ digital camera(s). Ensure each digital camera has auto-focus, with rechargeable batteries and charger, _256_ MB memory card, USB Memory Card Reader compatible with camera and field office computer, 1.5 inch LCD monitor, _5__ mega pixel resolution, _10_ X optical zoom lens, built in flash, image stabilization, computer connections, and a carrying case
3. __0_ video camcorder(s). Ensure each video camcorder is a mini DVD camcorder with _10x_ optical zoom, 2" LCD monitor, USB 2.0 compatible and includes USB 2.0 connections.
4. __0_ Mini DVD 2.8 GB (or larger) recordable DVD's compatible with the camcorder

7. Inspection Equipment.

1. _5_ Calculators with trigonometric capability
2. _2_ Date/ Received stamp and ink pad
3. _2_ Electronic Smart level, 4 foot
4. _2_ Electronic Smart level, 2 foot
5. _9_ Carpenter rulers
6. _3_ Steel tape, 100 feet
7. _3_ Cloth tape, 100 feet
8. _2_ Illuminated measuring wheel
9. _2_ Plumb bob and cord
10. _2_ Line level and cord
11. _2_ Surface thermometer
12. _2_ Concrete thermometer
13. _2_ Digital infrared asphalt thermometer
14. _0_ Direct Tension Indicator (DTI) Feeler Gage, 0.005 inch
15. _0_ Sledge hammer, 8lb
16. _2_ Self leveling laser level with range of 100 feet and an accuracy of ¼ inch per 100 feet
17. _9_ Hard hats - orange, reflectorized hard hats according to ANSI Z89.1.
18. _9_ Safety garments – orange, reflectorized, 360º high visibility safety garments according to ANSI/ISEA Class 3, Level 2 standards. To be replaced yearly for the duration of the contract.
19. _9_ Sets of orange rain gear with reflective sheeting
20. _9_ Sets of hearing protection with a NRR rating of 22 dB
21. _9_ Sets of eye protection according to ANSI Z87.1
22. _0_ Sets of fall arrest equipment according to ANSI Z359.1 standards consisting of a full body harness, lanyard and anchor.
23. _1_ Light meter - capable of measuring the level of luminance in foot-candles
24. _9_ Lantern flashlight, 6V with monthly battery replacements
25. _0_ Digital Psychrometer
26. _0_ Chain Drag according to ASTM D4580-86
27. _1_ Testing equipment and apparatus conforming to AASHTO T23, T119, T152
28. _9_ Hard Bound Daily Diaries, 5-½" X 8" minimum with one day per page. To be provided yearly for the duration of the contract.
29. _300_ Legal size hanging folders
30. _300_ Legal size manila file folders – three tab

155.03.03 Telephone Service

THE CONTENT OF THIS SUBSECTION IS DELETED

155.04 MEASUREMENT AND PAYMENT

THE FOLLOWING ITEM IS DELETED:

Item	*Pay Unit*
TELEPHONE SERVICE	LUMP SUM

THE THIRD PARAGRAPH IS DELETED.

SECTION 156 – MATERIALS FIELD LABORATORY AND CURING FACILITY

156.03 PROCEDURE

156.03.01 Materials Field Laboratory

4. Communication Equipment.

c. Cell Phones. Provide _4___ cellular phones. Ensure the cellular phone plan provides for unlimited mobile to mobile in-network usage, unlimited push-to-talk/ walkie-talkie usage and an anticipated monthly usage of 900 any-time minutes for each phone. Ensure the phones are on the same plan. Ensure the cellular phone plan has a home rate with no roaming charges within the state. Ensure each cellular phone has the following features:

1. Push to Talk / Walkie-Talkie capable
2. Camera with 1 megapixel picture capability
3. Battery life capable of 180 minutes of continuous use and 72 hours of standby use
4. Equipped with a hands-free headset
5. Base charger and car charger

d. Computer System. Provide a computer system meeting the following requirements:

__1_ computer configurations each meeting the following:

1. Processor having a clock speed of _1__ GHz or faster, _2__ GB RAM, _896__ MB Video RAM, _20__ Gigabyte hard drive designated as drive C, one DVD (+/-) Writer Drive, one CD-R Recordable Drive. Ensure the system is USB 2.0 compatible and has at least two front USB ports.
2. Wireless Ethernet Hub Switch with appropriate number of ports and cables and a print server.
3. High-speed broad band connection and service with a minimum speed of _2__ Megabytes per second (mbps) with dynamic IP address for the duration of the project.
4. 19 inch or larger Flat Screen LCD monitor with tilt/swivel capabilities.
5. _750__ Gigabyte or larger external drive with backup software for MS-Windows, and fifteen corresponding formatted data cartridges corresponding to the tape drive size.
6. _1__ Flatbed USB version 2.0 Color Scanner with automatic document feed.
7. Uninterruptible power supply (UPS).
8. Surge protector for the entire computer configuration to be used in conjunction with the UPS.
9. _1__ computer workstations, chair, printer stand, and/or table having both appropriate surface and chair height.
10. One can of compressed air and screen cleaning solution every other month of the duration of the contract.

If more than one computer configuration is specified, provide one wireless network card for the base computer configuration and hardwire connections between computer configurations as directed by the RE.

Also provide:
_4__ USB _16__ GB Flash/Jump memory drives
_100__ CD-R _700__ MB (or larger) recordable CD's compatible with the CD drive and ___ recordable DVD's.
_2__ CD/DVD Holder (each holds 50)

_1__ color laser printers and supplies as follows:

1. Minimum of 192 Megabytes of expanded memory, printer cable, and legal size paper tray.

2. One set of printer ink cartridges every other month for the duration of the construction project for each printer.

THE THIRD PARAGRAPH IS CHANGED TO:

When the computer system is no longer required by the ME, the Department will remove and destroy the hard drive, and return the computer system to the Contractor. The Department will retain other data storage media.

156.03.05 Nuclear Density Gauge

THE LAST PARAGRAPH IS CHANGED TO:

Provide a nuclear density gauge for the exclusive use of the ME using one of the following methods:

1. Purchase a nuclear density gauge under the Contractor's New Jersey Department of Environmental Protection (NJDEP) License or the Contractors United States Nuclear Regulatory Commission (USNRC) license.
2. Lease a nuclear density gauge from a New Jersey Department of Environmental Protection (NJDEP) or United States Nuclear Regulatory Commission (USNRC) licensed third party on the Department's New Jersey Department of Environmental Protection (NJDEP) License.

The Contractor is barred from purchasing gauges on the Department's New Jersey Department of Environmental Protection (NJDEP) license. Perform calibration and servicing of the gauge, other than routine wipe tests, every 24 months. The ME may direct additional calibrations, when necessary. Supply a replacement gauge for the Department's use during the calibration and servicing period.

SECTION 157 – CONSTRUCTION LAYOUT AND MONUMENTS

157.03.01 Construction Layout

THE SEVENTH PARAGRAPH IS CHANGED TO:

Provide the Utilities with the layout needed to install relocated utility facilities and coordinate the Work. Ensure that relocated facilities do not conflict with proposed construction, including High Voltage Proximity Act conflicts.

THE FOLLOWING IS ADDED AFTER THE NINTH PARAGRAPH:

For each bridge and sign structure within the Project Limits, provide the RE as-built measurements of the vertical under clearance at each lane line, shoulder line, curb line and edge of pavement line under a structure to the nearest inch. For each bridge structure, provide vertical under clearance measurements at each fascia beam.

157.04 MEASUREMENT AND PAYMENT

THE FOLLOWING ITEM'S PAY UNIT IS REVISED TO:

Item	*Pay Unit*
CONSTRUCTION LAYOUT	DOLLAR

THE SECOND PARAGRAPH IS CHANGED TO:

The Department will adjust payment for CONSTRUCTION LAYOUT based on the final contract amount and will calculate as follows:

$$CL = \frac{CL_B \times (C_F - E_F)}{C_O - E_O}$$

Where:
CL = Adjusted payment for CONSTRUCTION LAYOUT.
CL_B = Bid price for CONSTRUCTION LAYOUT.
C_O = Original Contract Price.
C_F = Final Contract Price.

E_F = Total of CL_B and the final cost for PERFORMANCE BOND AND PAYMENT BOND, Incentive/Disincentives for completion/interim completion, and claim settlements.
E_O = Total of CL_B
E_O = Total of CL_B, and PERFORMANCE AND PAYMENT BOND.

SECTION 158 – SOIL EROSION AND SEDIMENT CONTROL AND WATER QUALITY CONTROL

158.03.02 SESC Measures

8. Inlet Filters. Provide Type 1 and Type 2 inlet filters as follows:

a. Type 1.

THE ENTIRE TEXT IS CHANGED TO:

For a new inlet structure without a casting, mold welded steel wire fabric around the inlet walls. Extend the welded steel wire a minimum of 6 inches down each side of the structure. Secure geotextile to the welded wire fabric. Place No. 2 coarse aggregate against the inlet structure to hold the inlet filter in place.

For an inlet structure with a casting and exposed exterior walls, place geotextile under the casting and extend it a minimum of 6 inches below the top of the exposed walls. Place No. 2 coarse aggregate around the drain hole opening.

For an existing inlet structure without exposed exterior walls, place geotextile under the grate and extend the geotextile for a minimum of 6 inches beyond the grate.

For an inlet with a curb piece and without exposed exterior walls, ensure that the opening in the curb piece has a height of 2 inches. If the opening is greater than 2 inches, achieve the 2 inch opening size by wrapping the geotextile around an appropriately sized piece of lumber. Place the lumber against the vertical opening.

19. Oil-Only Emergency Spill Kit.

THE SECOND SENTENCE OF THE FIRST PARAGRAPH IS CHANGED TO:

Include Oil-only Emergency Spill Kit, Type 1 consisting of the following:
10 - 5inch by 10 foot Oil-Only Absorbent Booms
10 - 3inch by 10 foot Oil-Only Absorbent Booms
60 - 20 inch by 16 inch Oil-Only Absorbent Heavy Pads
20 - Temporary Disposal Bags and ties
1 - 40lb. bag of Absorbent Pellets
1 - Emergency Response Guide Book
1 - Instruction Manual
1 - Wheeled Container for the above

Note: Each Spill Kit has a 90-gallon absorption capacity. Replace each piece as used.

THE FOLLOWING IS TO BE ADDED TO THIS SECTION:

20. Construction Driveway, Wood Mats.

To minimize tracking of dirt and other materials onto existing roadways and to reduce the compaction of the underlying soils to help preserve archaeological artifacts provide a construction driveway at each location where vehicles exit the work site as approved by the RE. Construct driveways using No. 2 coarse aggregate placed on wood mats on top of geotextile.

Construct wood mats using squared timbers cabled close together and placed on top of stabilization geotextile. The squared timbers shall be a minimum of 4 inches square. Drill a 1/4-inch diameter hole from approximately 12 inches from each end of each timber. Connect the timbers together by threading a 3/16-inch galvanized steel

cable through the holes and loop the cable at each end for ease of transport. Connect mats if needed to reduce movement. Size the wood mats for construction loads and soil strength. Minimize disturbance of root mats of the vegetation during installation or removal. The contractor may use commercially built wood pallets sized for construction loads and soil strength with approval.

Ensure that the driveway is at least 15 feet wide. The Contractor may make driveways wider if approved by RE. Maintain the driveway by top dressing or by excavating and top dressing, as directed by the RE, with additional No. 2 coarse aggregate. When the driveway is no longer required, remove the driveway, backfill to the adjacent ground elevation, and restore the disturbed area to the original condition.

Refer to the construction detail provided in the contract plans for further information.

158.04 MEASUREMENT AND PAYMENT

THE FOLLOWING ITEMS ARE ADDED:

Item	*Pay Unit*
CONSTRUCTION DRVIEWAY, WOOD MATS	SQUARE YARD

SECTION 159 – TRAFFIC CONTROL

159.02.02 Equipment

THE FOLLOWING IS ADDED TO THE LIST OF EQUIPMENT REFERENCES:

Portable Variable Message Sign w/Remote Communication……..……1001.04
Portable Trailer Mounted CCTV Camera Assembly……..……1001.05

159.03.02 Traffic Control Devices

2. Construction Barrier Curb.

THE LAST PARAGRAPH IS CHANGED TO:

Provide top and side mounted flexible delineators on the construction barrier curb. For delineators located on the right side when facing in the direction of traffic, ensure that the retroreflective sheeting is white. For delineators located on the left side when facing in the direction of traffic, ensure that the retroreflective sheeting is yellow. Attach flexible delineators according to the manufacturer's recommendations.

Starting at the beginning of the construction barrier curb section mount top delineators at 100-foot intervals on tangent sections, curves of radii greater than 1,910 feet, and at 50-foot intervals on curves of radii of 1,910 feet or less.

Mount side delineators at the lead end of each barrier segment with the top of the delineator 3 inches from the top of the barrier.

6. Traffic Control Truck with Mounted Crash Cushions.

THE LAST SENTENCE IS CHANGED TO:

Submit drawings to the RE detailing the manner of securing the ballast, signed and sealed by a Professional Engineer, certifying that it is capable of withstanding the impact forces for which the impact attenuator is rated.

THE FOLLOWING IS ADDED TO THE SECOND PARAGRAPH:

8. Portable Variable Message Sign w/Remote Communication (PVMSRC). Place the PVMSRC at the location directed by the RE. Ensure that a designated representative familiar with the operation and programming of the unit is available on the Project for On-Site Configuration. Only display messages authorized by the Department for the Project and make the signs available for use remotely from the Traffic

Operation Center (TOC) specified in 105.07.01.B. If the PVMSRC fails to function, repair the equipment within 48 hours of receiving notice from the Department that the PVMSRC is not functioning.

Provide a broadband cellular telephone service plan with data service on an IP based packet network for the intended uninterrupted 24/7 operational and functional requirements of the PVMSRC. Ensure that the PVMSRC has remote operation capability from the specified TOC using the Department's current DMS control software at the time of deployment.

Provide for one week of testing by the TOC for remotely operating the PVMSRC before the start of construction operations that require lane or shoulder closures, or other impacts to traffic. At least 10 days before testing, submit to the RE for approval a plan for any work to be completed in the TOC. Submit a request to the RE at least 4 days in advance to access the TOC for any work.

9. Portable Trailer Mounted CCTV Camera Assembly (PTMCCA). Place the PTMCCA at the location directed by the RE. Ensure that a designated representative familiar with the operation and programming of the unit is available on the Project for initial installation. If the PTMCCA fails to function, repair the equipment within 48 hours of receiving notice from the Department that the PTMCCA is not functioning.

Provide a system that includes a robotic network camera remotely controllable, including Pan, Tilt and Zoom (PTZ), and viewable over the internet through a password protected website. Provide for internet access through the website hosted by EarthCam for Department cameras. No substitution is permitted. Provide broadband communication service and On-Site Camera Configuration for remote operation and control from the web site to the field site. Provide continuous viewable image at a minimum of 320H x 240V resolution and 1 frame per sec (fps) through the web site. If required by the Traffic Operation Center (TOC) specified in 105.07.01.B, establish password level designations, camera presets, and camera image displays. Provide all incidental equipment or material required for successful remote operation and communications.

Provide for one week of testing by the TOC for remotely operating the PTMCCA before the start of construction operations that require lane or shoulder closures, or other impacts to traffic.

159.03.06 Temporary Traffic Stripes and Temporary Traffic Markings
THE ENTIRE TEXT IS CHANGED TO:

Apply temporary traffic stripes and markings when the ambient and surface temperatures are at least 45 °F and rising and the surface temperature is no more than 140 °F. Apply the traffic paint in a wet film thickness of 6 ± 1 mil. Apply glass beads to the wet paint in a uniform pattern and at the rate of 12 pounds per gallon of paint. Ensure TRAFFIC STRIPES, LONG LIFE, EPOXY RESIN and TRAFFIC MARKINGS, THERMOPLASTIC are applied within 14 days of placing temporary traffic stripes and markings unless directed by the RE.

159.03.08 Traffic Direction

A. Flagger.
THE LAST SENTENCE IS CHANGED TO:

Ensure that the flagger is equipped with a STOP/SLOW paddle and follows MUTCD flagging procedures.

B. Police.
THE FOURTH PARAGRAPH IS DELETED.

159.04 MEASUREMENT AND PAYMENT
THE FOLLOWING ITEMS ARE ADDED:

Item	*Pay Unit*
PORTABLE VARIABLE MESSAGE SIGN WITH REMOTE COMMUNICATION	UNIT.
PORTABLE TRAILER MOUNTED CCTV CAMERA ASSEMBLY	UNIT.

THE SECOND PARAGRAPH IS CHANGED TO:

For traffic control devices measured by the linear foot or unit basis that are specified in 159.03.02, the Department will make payment for the maximum quantity in service at one time as required by the Contract. For CONSTRUCTION

SIGNS, the Department will make payment for the maximum quantity of specific sign types in service at one time as required by the Contract. If a particular sign type has more than one unique text, each sign with a unique text will be considered to be a specific sign type. The Department will make payment for 50 percent of the Contract bid price for traffic control devices specified in 159.03.02 that are measured on a linear foot, square foot or unit basis upon approved placement. The Department will prorate the balance of payment over the duration of the Contract.

THE FOLLOWING IS ADDED

If after being notified by the Department that the PORTABLE VARIABLE MESSAGE SIGN WITH REMOTE COMMUNICATION or PORTABLE TRAILER MOUNTED CCTV CAMERA ASSEMBLY has failed to function and the equipment has not been restored to good working order within 48 hours, the Department will make payment reductions as follows:

For each occasion the equipment was not restored within 48 hours the Department will assess a liquidated damage of $250 for every 48 hours period the equipment is not functioning.

The Department will make payment for TRAFFIC STRIPES, LONG LIFE, EPOXY RESIN and TRAFFIC MARKINGS, THERMOPLASTIC as specified in 610.04.

SECTION 160 – PRICE ADJUSTMENTS

160.03.01 Fuel Price Adjustment
THROUGHOUT THIS SUBPART, TABLE 161.03.01-1 IS CHANGED TO TABLE 160.03.01-1

THE THIRD PARAGRAPH IS CHANGED TO:

If the as-built quantity of an Item listed in Table 160.03.01-1 differs from the sum of the quantities in the monthly Estimates, and the as-built quantity cannot be readily distributed among the months that the Item listed in Table 160.03.01-1 was constructed, then the Department will determine fuel price adjustment by distributing the difference in the same proportion as the Item's monthly Estimate quantity is to the total of the Item's monthly estimates.

THE 13 TH AND 15 TH LINE IN THE TABLE 160.03.01-1 IS CHANGED TO:

SOIL AGGREGATE BASE COURSE, ___ " THICK	1 Gallon per Cubic Yard
DENSE-GRADED AGGREGATE BASE COURSE, ___ " THICK	1 Gallon per Cubic Yard

THE 25 TH LINE IN THE TABLE 160.03.01-1 IS CHANGED TO:

HOT MIX ASPHALT ___ ___ ___ BASE COURSE	2.50 Gallons per Ton

THE FOLLOWING ARE ADDED TO TABLE 160.03.01-1

Items	**Fuel Usage Factor**
NON-VEGETATIVE SURFACE, HOT MIX ASPHALT	2.50 Gallons per Ton
COLOR-COATED NON-VEGETATIVE SURFACE, HOT MIX ASPHALT	2.50 Gallons per Ton
NON-VEGETATIVE SURFACE, POROUS HOT MIX ASPHALT, ___" THICK	2.50 Gallons per Ton

160.03.02 Asphalt Price Adjustment
NOTE 1 OF THE THIRD PARAGRAPH IS CHANGED TO:

1. The Department will determine the weight of asphalt binder for price adjustment by multiplying the percentage of new asphalt binder in the approved job mix formula by the weight of the item containing asphalt binder. If a Hot Mix Asphalt item has a payment unit other than ton, the Department will apply an appropriate conversion factor to determine the number of tons used.

THE FOURTH PARAGRAPH IS CHANGED TO:

$$A = B \times [(MA - BA)/BA] \times C \times M \times G$$

Where:
A = Asphalt Price Adjustment
B = Bid Price for Tack Coat/Prime Coat
MA = Monthly Asphalt Price Index
BA = Basic Asphalt Price Index
C = Petroleum Content of the Tack Coat and Prime Coat in Percent by Volume:
Use 100% for cutbacks and Tack Coat 64-22
60% for Polymer Modified Tack Coat
60% for RS or similar type emulsions
M = Percentage of Bid Price Applicable to Materials Only: Use 82%
G = Gallons of Tack Coat and Prime Coat Furnished and Applied

160.04 MEASUREMENT AND PAYMENT
THE FOLLOWING ITEMS' PAY UNITS ARE REVISED TO:

Item	*Pay Unit*
FUEL PRICE ADJUSTMENT	DOLLAR
ASPHALT PRICE ADJUSTMENT	DOLLAR

THE FOLLOWING SECTION IS ADDED:

SECTION 162 – VIBRATION MONITORING

Vibration Monitoring

162.01 Description

This work consists of the work involved with vibration and settlement monitoring of existing and new structures during piles and sheeting driving operation.

The following is a list of existing structures at their corresponding Stormwater Pumping Stations that are expected to be monitored under VIBRATION MONITORING:

Stormwater Pumping Station 1	Stormwater Pumping Station 2	Stormwater Pumping Station 3
2200 S. Bayview Ave. Seaside Park, NJ	806 S. Bayview Ave. Seaside Park, NJ	10-16 N. Bayview Ave. Seaside Park, NJ
2206 S. Bayview Ave. Seaside Park, NJ		100 N. Bayview Ave. Seaside Park, NJ
2208 S. Bayview Ave. Seaside Park, NJ		
2112 S. Bayview Ave. Seaside Park, NJ		

Stormwater Pumping Station 4	Stormwater Pumping Station 5
134 L St. Seaside Park, NJ	448 Eisenhower Ave. Seaside Heights, NJ
135 L St. Units A & B	446 Eisenhower Ave. Seaside Heights, NJ

Seaside Park, NJ

442 Eisenhower Ave.
Seaside Heights, NJ

469 Eisenhower Ave.
Seaside Heights, NJ

162.02 Monitoring

162.02.01 Instrumentation, Survey and Ground Vibration Monitoring

Ensure that each tiltmeter consists of a tiltplate, a tiltmeter sensor and a readout indicator unit. Ensure that all components are compatible. Ensure that the tiltmeter is either uniaxial or biaxial for vertical applications and shall be bonded or bolted to the structure. Ensure that the tiltmeter has a NEMA 4 weatherproof enclosure. Ensure that the tiltmeter has a minimum range of +/- 5 degrees with a minimum precision of 5 arc seconds and an operating temperature of -4ºF to 122ºF. Ensure that the tiltplates consist of brass, aluminum or ceramic plates with integral pegs or grooves for mounting and orienting. Ensure that the tiltmeter includes an LCD display calibrated for readings in degrees, minutes and seconds. Ensure that the tiltplates are "in-place" units mounted to the structure. Ensure that the tiltmeter sensors are "in-place" or portable units, at the option of the Contractor.

Ensure that the tiltmeters are installed according to the manufacturer's recommendations by qualified technicians with previous experience installing vertical tiltmeters. Ensure that a Professional Engineer licensed to practice in the State of New Jersey and retained by the Contractor supervises and is responsible for instrument installation.

In advance of scheduled monitoring, take readings at each monitoring point. Ensure that the initial readings are verified by conducting a minimum of three separate and complete sets of readings for each instrument and obtaining consistent results.

Ensure that the survey nails are three piece, 0.25 inch diameter expansion anchors consisting of an outer lead alloy sleeve, an inner lead alloy wedge nut and a 1 inch long, 0.25 inch stainless steel hexagonal head bolt.

In advance of scheduled monitoring, establish benchmarks at locations indicated in approved working drawings; or as approved by the RE. Ensure that the elevations and locations of the benchmarks are established by running level circuits starting and closing at the existing benchmarks. Ensure that turning points are established during leveling so that foresight and backsight distances are approximately equal. Ensure that the well-defined surface points of solid, permanent objects or masonry nails driven into pavement are used as turning points. Ensure that the sight distance does not exceed 200 feet. Ensure that the maximum closure error for level circuit closures is 0.012 inches (0.001 feet). If the error of closure is greater than 0.012 inches (0.001 feet) for any level circuit, ensure that the circuit is resurveyed. Ensure that the established elevations and coordinates of benchmarks is verified by obtaining consistent results on at least three separate and complete level circuits. If inconsistent benchmark elevations or coordinates result, ensure that the level circuits is resurveyed until correct and repeatable elevations and coordinate are obtained. Ensure that benchmark elevations and coordinates are verified once per month or as directed by the RE. Follow the methods herein for taking monitoring readings. Establish initial and subsequent elevations and coordinates by running level circuits and closing at approved benchmarks. Ensure that survey nails are positioned on the structure such that the hex-head bolt can receive the survey level rod on the edge of the head. Ensure that survey control and monitoring is performed by qualified technicians with previous experience performing the type of control survey required. Ensure that all survey work is performed under the supervision of a registered land surveyor licensed to practice in the State of New Jersey.

162.02.02 Ground Vibration Monitoring

Hire a firm to monitor and record ground vibrations in the vicinity of the project during the installation of the steel sheet piling and pipe piles. Exercise extreme care to avoid damage to the existing and new concrete bridge. Employ a qualified firm that specializes in recording and analysis of ground vibrations produced by pile driving and steel sheeting installation. Ensure that this firm sets up a vibratory monitoring program to measure and record the vibrations produced at the adjacent structures during all pile driving and sheet piling installations.

162.02.03 Condition Surveys

Ensure that a Professional Engineer licensed to practice in the State of New Jersey and retained by the Contractor performs a through pre-construction structural inspection of the structure and submits a report including field notes and video and/or photographs recorded within one (1) week prior to beginning work adjacent to the structure. Ensure that all existing cracks and other structural defects are carefully documented. Ensure that a similar structural inspection is performed on newly constructed structures. Structural inspection will be performed on all existing and new structures, as long as the Contractor continues to have pile and steel sheeting driving activities near the structures. Upon completion of monitoring activities, perform a similar post-construction structural inspection. Ensure that a report is submitted within two weeks of completion of the monitoring activities.

162.02.04 Monitoring

Monitor the settlement and movement of the existing and new structures during construction activities. The RE will approve monitoring locations before construction commences. Ensure that the monitoring methods include tiltmeters and survey. As a minimum, ensure that the monitoring is performed and readings taken daily beginning two days prior to commencing excavation activities and ending one week after completion of the placement of the new concrete spillway slab and ogee. If the monitoring readings exceed any one of the stop work criteria listed below, immediately stop subsurface activities in the area and submit a work plan to halt structure movement. Ensure that the work does not proceed until the work plan is approved by the RE. The RE's approval of the work plan does not relieve the Contractor of the responsibility of performing the work in such a manner as to not exceed the stop work criteria. The stop criteria are as follows:

1. Structure settlement greater than 0.5 inches.
2. Horizontal movement greater than 0.315 inches at any monitoring point.
3. Angular rotation of the structure wall faces greater than 12 minutes

At the RE's request, allow access and provide the necessary equipment for the RE to take monitoring readings. Take spot readings if requested by the RE. Ensure that the schedule includes time for such monitoring.

When, in the RE's judgment, the monitoring readings indicate potentially damaging ground or structure displacements, modify the construction procedure and take other action, as approved by the RE, and at no additional cost to NJDOT, to reduce the ground and structure displacements.

Additionally, perform a daily visual inspection of the structure noting the descriptions, locations and measurements of all movements as well as all cracks, sags and structural damage. Inspect each instrument daily, noting damaged or non-functional instruments. Ensure that all such deficiencies are reported to the RE immediately.

Ensure that any damaged or missing instrumentation is repaired or replaced to the satisfaction of the RE within five days at no additional cost to the State.

Prior to final acceptance of the work and subject to the RE's approval, remove and dispose of those portions of the instruments that are not required. Ensure that their holes are repaired with non-shrink grout conforming to Subsection 903.08.02.

162.02.05 Ground Vibration Monitoring

Ensure that a representative from the ground vibration monitoring firm is on-site at all times while steel sheet piles (both temporary and permanent) and steel pipe piles are driven and removed.

The ground vibration monitoring firm will provide continuous monitoring seismographs to measure and record the peak particle velocities in the vicinity of the buildings and residences. Ensure that a recent certificate of calibration is furnished for the seismograph being used, with the calibration being directly traceable to the U.S. Bureau of Standards. Ensure that the seismographs are capable of measuring and recording 3-components of ground vibration. Ensure that ground vibrations are monitored and recorded on both sides of the bridge.

162.02.06 Vibration Threshold

Proceed with caution when readings of 1.0 inch per second peak particle velocity are recorded. Stop and implement corrective measures when velocity exceeds 2.0 inch per second.

162.03 Submittals

A. Qualifications, Schedule, Procedure, and Manufacturer's Data: At least 30 calendar days prior to proceeding with the subsurface work adjacent to the structure, ensure that the following items are submitted:

1. Qualifications of supervisory personnel and technicians performing the instrumentation work.
2. Proposed schedule and procedures for instrument installation and monitoring
3. Manufacturer's literature for instrumentation, including recommended installation procedures.
4. Material, instrument, and equipment specifications.

B. Working Drawings: Ensure that working drawings are furnished in accordance with Section 105.05.

1. Prior to instrumentation installation, ensure that the working drawings are submitted showing the proposed locations for all tilt meters, benchmarks, and settlement points.

2. After instrumentation installation is completed, ensure that the working drawings are submitted summarizing the installation of each instrument. Ensure that the information shown on these working drawings includes, but is not limited to, the following data:

    a. Instrument identification numbers and locations, with initial elevations, stations and offsets, and coordinates, as applicable, for each instrument. .
    b. As-built installation details of each instrument, such as materials used and dimensions of key elements.
    c. A separate summary describing the procedure used for the installation of each instrument.

C. Vertical and Horizontal and Rotational Movement: On a daily basis, submit to the RE three copies of original notes on any approved form with the daily monitoring readings. Ensure that the daily reports include descriptions, locations, and measurements of all settlements or movements detected as well as all cracks, sags, or damage of any nature to the monitored structure. In addition, ensure that the reports include a list of all damaged or otherwise non-functioning instrumentation with a schedule for replacement.

D. Ground Vibration Monitoring Report: Ensure that the ground vibration monitoring firm prepares a ground vibration monitoring report. Ensure that the report is signed by the preparer and includes the following:

1. Ensure that a daily report for each date is provided. Ensure that the daily report includes the name of the operator, seismograph serial number, date, time period that ground vibrations were monitored, peak particle velocities, location of seismograph, pile #'s and locations and pile driving equipment being used.
2. A copy of the daily seismograph recording including the date and time.
3. The make, model and serial number of the seismograph(s) and dates used.
4. A copy of the certificate of calibration for the seismograph(s).
5. Ensure that a report summary table is provided and lists each date of monitoring, peak particle velocity recorded for that date and contractor work performed (ie: sheet piles, timber piles, etc.). Ensure that the report summary is signed, dated and included the name of the preparer.

Ensure that the ground vibration monitoring firm has a minimum of ten (10) years experience in work of this nature and is subject to approval by the RE.

Firms qualified to perform this work include but are not limited to the following:

Vibra-Tech Engineers, Inc.
Mount Laurel, NJ
Telephone: (856) 787-1313

Protec Documentation Services
Rancocas, NJ
Telephone: (856) 234-0200

Pile Mechanics, Inc.
New Brunswick, NJ
Telephone: (732) 846-5500

E. Daily Log: Ensure that logs are submitted daily to the RE on an approved form. Ensure that the log includes a summary of construction events and observations including the following information as a minimum:

1. Detailed progress of construction operations, including excavation, location, type, and time of installation of temporary excavation supports.
2. Construction loadings in the vicinity of instrumentation.
3. Amount and description of seepage water observed in or around excavations.
4. Incidence of extraordinary ground loss, boulders, groundwater flow, instability, or other unusual events.
5. Duration and cause of interruptions or delays to excavation support, or construction of structure.
6. Brief soil descriptions as construction proceeds.
7. Temperature, rainfall, and other environmental factors that may affect monitoring readings or construction.

162.04 Measurement and Payment

Payment will be made under:

Pay Item	*Pay Unit*
VIBRATION MONITORING	LUMP SUM

The Department will not make separate payment for furnishing labor, materials, equipment, setup, mobilization and demobilization, and incidentals necessary to satisfactorily complete the work. This includes preparing one or the combination of the specified submittals; performing monitoring; additional monitoring as may be determined necessary by the RE to satisfactorily evaluate the effects of the proposed construction in the existing structure(s). The cost thereof will be included in the price bid for the pay item VIBRATION MONITORING.

DIVISION 200 – EARTHWORK

SECTION 201 – CLEARING SITE

201.01 Description.

THE FOLLOWING IS ADDED AFTER FIRST PARAGRAPH:

This section also includes work required to remove and properly dispose the existing sign structures at the approximate stations 438+18.5 and 478+31.

201.03.01 Clearing Site
THE FOLLOWING IS ADDED:

Dispose of material and debris as specified in 201.03.09.

Remove trees and branches within 15 feet of the end of JCP&L pole cross arms. If the resulting tree is rendered hazardous, then remove the entire tree according to SECTION 802.

THE FOLLOWING IS ADDED:

H. At station 438+18.5 remove existing sign structure pedestals to a depth of 2 feet below ground level and restore the area in accordance with roadway plans.

At station 478+31 completely remove existing pedestals and footings.

201.03.02 Clearing Site, Bridge and Clearing Site, Structure
THE FOLLOWING IS ADDED TO THE FIRST PARAGRAPH.

Only the following equipment is permitted for the work:

1. **Pneumatic or Electric Equivalent Hand Operated Hammers.**
   a. When demolishing concrete not closer than 6 inches to structural members: hammers weighing no more than 90 lbs (exclusive of bit), equipped only with chisel point bits.
   b. When demolishing concrete within 6 inches of structural members: hammers weighing no more than 30 lbs (exclusive of bit).
2. **Saw Cutters.**
   a. When cutting concrete within 6 inches of structural members: concrete cutters and concrete saws. While using water in the cutting operation, provide shielding beneath the cutting operation to prevent water leakage. Continuously collect slurry and dispose of as specified in 201.03.09. Ensure that the slurry does not enter the structure or highway drainage system.
3. **Hydraulic Breakers.** Ram-hoe type breakers, hydraulic breakers, and demolition shears may be used with the following restrictions:
   a. Submit required data to the RE for Department's analysis of stresses induced to the girders.
   b. Delineate the centerline and limits of the top flange of girders before the equipment operation.
   c. Do not use equipment within 6 inches of the delineated flanges.
   d. Do not pull or twist the reinforcement steel.
4. **Hydraulic Splitters.** Hydraulic splitters.

5. Other Equipment. Obtain RE approval before use.

201.03.05 Monitoring Wells
THE FOLLOWING IS ADDED TO END OF THE END OF THIS SUBSECTION.

Fill and seal monitoring wells when directed by the engineer or as shown on the Plans. Fill dug wells as specified in 201.03.07.5. Seal drilled wells according to N.J.A.C. 7:9D et seq. Provide a copy of the well abandonment records submitted to NJDEP to the RE.

When performing a reset monitoring well box, adjust the height of the existing monitoring well boxes so that it is set flush with the proposed grade without disturbing the existing monitoring well.

201.04 MEASUREMENT AND PAYMENT
THE FOLLOWING IS ADDED TO THE TABLE:

Payment will be made under:

Pay Item	*Pay Unit*
SEALING OF MONITORING WELLS	UNIT
RESET MONITORING WELL BOX	UNIT

THE FOLLOWING IS ADDED TO END OF THIS SECTION:

The Department will not make payment for the Item CLEARING SITE in excess of $100,000.00 until Completion.

The Department will not make payment for the Item CLEARING SITE, STRUCTURE (OVERHEAD SIGN SUPPORT STRUCTURE NO. 1) in excess of $14,000.00 until Substantial Completion.

The Department will not make payment for the Item CLEARING SITE, STRUCTURE (OVERHEAD SIGN SUPPORT STRUCTURE NO. 2) in excess of $14,000.00 until Substantial Completion.

SECTION 202 – EXCAVATION

202.02 MATERIALS
THE FIRST IN THE LIST IS CHANGED TO:
Coarse Aggregate (No. 57, or 67).....901.03

202.03.02 Excavating Test Pits
THE FOLLOWING IS ADDED:

Excavate test pits using the vacuum excavation method.

202.03.03 Excavating Unclassified Material

A. Excavating.
THE FIRST PARAGRAPH IS CHANGED TO:

The Department, as the generator, is solely responsible for the designation of excavated material. Unclassified excavation consists of excavation and management of material of whatever nature encountered, except for regulated material, pavement removal and acid producing soil.

202.03.04 Excavating Regulated Material

3. Temporarily Storing.
THE FIRST PARAGRAPH IS CHANGED TO:

Temporarily store regulated or hazardous material in stockpiles within the Project Limits and as shown on the Plans. Construct stockpiles on polyethylene sheeting. Contain stockpiles with haybales or silt fence placed continuously at the perimeter of the stockpiles. For hazardous material, if a stockpile area is not available within the Project Limits, sample and analyze materials in-situ for disposal. Excavate and place the hazardous regulated material directly into trucks, and haul it directly to the approved disposal facility.

SECTION 203 – EMBANKMENT

203.02.01 Materials
THIS SUBPART IS CHANGED TO:

Provide materials as specified:
Soil Aggregate (I-7, I-9, I-10, I-11, I-13, and I-14).....901.11

203.03.01 Constructing Embankment
THE FOURTH PARAGRAPH IS CHANGED TO:

Before placing embankment or any other unbound aggregate material, such as subbase or dense graded aggregate, on existing pavement, break the pavement into pieces that are a maximum of 12 inches in all dimensions.

THE FOLLOWING IS ADDED TO THIS SECTION:

Geotextile, Roadway Stabilization

203.01 Description
This work consists of the installation of geotextile for roadway subgrade stabilization and separation.

203.02 Materials

Ensure that the geotextile conforms to AASHTO M-288, Geotextile Specifications for Highway Applications. The material shall conform to sections 1, 2, 3, 4, 5, 6 and subsections 7.1, 7.2, 7.3 and 7.4 for Separation and Stabilization with a Class 2 or Class 1 Survivability Rating. Ensure that the minimum permittivity is 0.05 sec-1. Ensure that the geotextile has a high resistance to degradation from ultraviolet, chemical and organic conditions that may possibly be encountered in the subgrade soil or overlying subbase or base course material. The mechanical and structural properties of the geotextile must be equal or exceed the requirements of this specification. Ensure that a product certification is provided with each shipment stating that the geotextile material conforms to the requirements of the approved submittal. Ensure that the rolls of the geotextile are properly labeled to show the type and grade of material and the specification to which the material conforms.

203.03 Construction
Ensure that the installation of the geotextile conforms to Appendices A1 and A3 of the AASHTO M-288 Geotextile Specifications for Highway Applications and the following:
Check the geotextile upon delivery to ensure that the proper material has been received. During all periods of shipment and storage, the material must be protected from temperatures greater than 60 degrees C, or less than 0 degrees C, mud, dirt, dust and debris, or materials which may permanently affix to the material. Follow the manufacturer's instructions regarding protection from direct sunlight. At the time of installation of the geotextile, the Engineer will reject the material if it has defects, tears, punctures, flaws, deterioration, or damage incurred during manufacture, transportation or storage. At no cost to the State, geotextile that is damaged during storage or installation will be replacement.

Prior to placing of any geotextile, ensure that the subgrade is shaped and compacted to within a tolerance of plus or minus ½ inch of grade and contour, with no areas consistently high, in accordance with Subsection 208.04. Ensure that the prepared surface is free from water pockets and sharp objects that may tear or puncture the geotextile. Ensure that the geotextile material is not be placed on soft, muddy, or frozen areas, or until all irregularities in the prepared areas, including soft areas in the foundation, have been corrected.

The subgrade will be inspected and approved by the Engineer prior to placement of the geotextile. Excavation of unsuitable material and replacement with suitable material, as directed by the Engineer, will be in accordance with Subsection 208.04.

Ensure that the geotextile material is placed in continuous strips in the longitudinal direction of the roadway. Ensure that all adjacent layers of geotextile material are overlapped a minimum of one foot. Verify the correct orientation (roll direction) of the geotextile. If the Contractor is unable to complete a required length with a single continuous length of stabilization, a joint may be made, with the Engineer's approval. Ensure that this joint is made for the full width of the strip. Ensure that joints are pulled and held taut and free of wrinkles and lying flat during placement of the subbase or base course material.

To prevent damage, ensure that only the amount of geotextile required for immediately pending work is placed. After a layer of geotextile has been placed, ensure that it is pulled tight and held in place by means of pins or small piles of aggregate until the subsequent layer of subbase or base course is placed and compacted. Ensure that vehicles or other construction equipment are not allowed on the geotextile material until at least 6 inches of subbase or base course material cover the geotextile.

Ensure that the subbase or base course material is placed, spread and compacted in such a manner as to minimize the development of wrinkles and/or displacement of the geotextile material. Ensure that the subbase or base course is graded and rolled before the end of each workday to prevent ponding of water on the geotextile.

Turning of tracked vehicles shall be minimized to prevent displacement of the underlying geotextile or roadbed. Ruts that may be created in the subgrade due to construction traffic shall be filled with additional material.

203.04 Measurement and Payment

Payment will be made under:

Pay Item	*Pay Unit*
GEOTEXTILE, ROADWAY STABILIZATION	SQUARE YARD

Completed and accepted Geotextile, roadway stabilization will be measured by the square yard. Payment will not be made for geotextile material used in the creation of overlaps.

DIVISION 300 – SUBBASE AND BASE COURSES

SECTION 302 – AGGREGATE BASE COURSE

302.02 MATERIALS

302.02.01 Materials

THE FOLLOWING MATERIAL IS ADDED:

COURSE AGGREGATE, SIZE NO. 57	901.03

302.04 MEASUREMENT AND PAYMENT

THE FOLLOWING ITEM IS ADDED:

Item	*Pay Unit*
COURSE AGGREGATE, SIZE NO. 57	CUBIC YARD

DIVISION 400 – PAVEMENTS

SECTION 401 – HOT MIX ASPHALT (HMA) COURSES

401.02.01 Materials
EMULSIFIED ASPHALT UNDER TACK COAT IS REVISED TO:
Emulsified Asphalt, Grade RS-1, CRS-1, SS-1, SS-1h, Grade CSS-1 or CSS-1h.....902.01.03

401.02.02 Equipment
THE LAST PARAGRAPH IS CHANGED TO:

When an MTV is used, install a paver hopper insert with a minimum capacity of 14 tons in the hopper of the HMA paver.

401.03.01 Preparing Existing Pavement

A. Milling of HMA.

Stage	Max. time interval allowed
All Stages	72 hours

THE FOLLOWING IS ADDED AFTER THE FOURTH PARAGRAPH:

Sawcut at the limit of paving in driveways and at other limits requiring a neat edge between new and existing HMA.

D. Repairing HMA Pavement.
THE ENTIRE TEXT IS CHANGED TO:

If potholes are discovered, notify the RE immediately. The RE may immediately direct repairs of small areas. The RE may require further evaluation of a large area to determine the need for additional milling and paving.

Sawcut existing HMA pavement to a maximum depth of 10 inches, or to the full depth of bound layers, whichever is less. Sawcut lines parallel and perpendicular to the roadway baseline and 3 inches away, at the closest point, from the damaged area to be repaired.

Remove damaged and loose material to a depth of at least 3 and no more than 10 inches below the level of milling within the boundary of the sawcuts to form rectangular openings with vertical sides. Shape and compact the underlying surface to produce a firm, level base. Ensure that the remaining pavement is not damaged.

Apply polymerized joint adhesive or tack coat to the vertical surfaces of the openings. Spread and grade HMA in the opening as directed by the RE. Ensure that the temperature of the HMA when placed is at least 250 °F, and compact as specified in 401.03.03.F. Compact areas not accessible to rollers with a flat face compactor. Compact until the top of the patch is flush with the adjacent pavement surface.

Reuse removed material as specified in 202.03.07.A.

401.03.02 Tack Coat and Prime Coat
TABLE 401.03.02-1 IS CHANGED TO:

Table 401.03.02-1 Tack Coat Application

Material	Spraying Temp, °F	Gallons per Square Yard	Season
Cut-Back Asphalt:			
RC-70	120 to 190	0.05 to 0.15	Oct 15 to Apr 15
Emulsified Asphalt:			
RS-1	70 to 140	0.05 to 0.15	All year
CRS-1	125 to 185	0.05 to 0.15	All year

SS-1, SS-1h	70 to 140	0.05 to 0.15	All year
CSS-1, CSS-1h	70 to 140	0.05 to 0.15	All year

TABLE 401.03.02-2 IS CHANGED TO:

Table 401.03.02-2 Prime Coat Application

Cut-Back Asphalt	Spraying Temp, °F	Gallons per Square Yard	Season
MC-30	85 to 150	0.1 to 0.5	Oct 15 to Apr 15
MC-70	120 to 190	0.1 to 0.5	Oct 15 to Apr 15
Emulsified Asphalt:			
CSS-1	70 to 140	0.1 to 0.50	All year

401.03.03 HMA Courses

D. Transportation and Delivery of HMA.

THE FIRST PARAGRAPH IS CHANGED TO:

Deliver HMA using HMA trucks in sufficient quantities and at such intervals to allow continuous placement of the material. Do not allow trucks to leave the plant within 1 hour of sunset unless nighttime lighting is provided as specified in 108.06. The RE will reject HMA if the HMA trucks do not meet the requirements specified in 1009.02. The RE will suspend construction operations if the Contractor fails to maintain a continuous paving operation. Before the truck leaves the plant, obtain a weigh ticket from a fully automatic scale. Before unloading, submit for each truckload a legible weigh ticket that includes the following:

1. Name and location of the HMA plant.
2. Project title.
3. Load time and date.
4. Truck number.
5. Mix designation.
6. Plant lot number.
7. Tare, gross, and net weight.

E. Spreading and Grading.

THE THIRD PARAGRAPH IS CHANGED TO:

Use an MTV for the construction of intermediate and surface course in the traveled way. Ensure that the MTV independently delivers HMA from the HMA trucks to the HMA paver. Operate the MTV to ensure that the axle loading does not damage structures, roadway, or other infrastructure.

1 Longitudinal Joints.

THE FOLLOWING IS ADDED:

a. Construct no longitudinal joints per roadway direction on the final surface course between Island Beach State Park and Eisenhower Avenue.

b. Construct no more than one (1) longitudinal joint per roadway direction on the final surface course between Eisenhower Avenue and 6th Avenue (Toms River Township).

H. Air Void Requirements.

THE FOLLOWING IS ADDED TO THE THIRD PARAGRAPH:

Inside shoulders less than 6 feet in width will not be included in other lots unless requested by the RE.

THE FOLLOWING IS ADDED AFTER THE THIRD PARAGAPH:

If areas of existing shoulders are found to be insufficient to support the proposed HMA pavement and the required compaction cannot be achieved, notify the RE immediately. The RE may either direct additional milling and paving to provide a suitable base to pave the proposed HMA or waive coring and air void requirements in such shoulder areas.

J. Ride Quality Requirements.

THIS ENTIRE SUBPART IS CHANGED TO:

The Department will evaluate the final riding surface using the International Roughness Index (IRI) according to ASTM E 1926. The final riding surface is defined as the last lift of the pavement structure where traffic will be allowed. The Department will use the measured IRI to compute the appropriate pay adjustment (PA). The PA will be positive for superior quality work or negative for inferior quality work.

The Department will calculate the PA as specified in Table 401.03.03-7 and will base PA on lots of 0.01 mile length for each lane, ramp, and shoulder and 0.005 mile for each overlaid bridge structure.

1 Smoothness Measurement. The Department will test the longitudinal profile of the final riding surface for ride quality with a Class 1 Inertial Profiling System according to AASHTO M 328 and NJDOT R-1. If project conditions preclude the use of the Class 1 Inertial Profiling System, the Department will use a Class 1 walking profiler or lightweight profiler.

The IRI value reported for each lot is the average of 3 runs of each wheel path, unless otherwise directed by the Department.

2. Quality Control Testing. Perform control testing during lift placement to ensure compliance with the ride quality requirements specified in Table 401.03.03-7

3. Preparation for IRI Testing. Provide traffic control when the Department performs IRI testing. Perform mechanical sweeping of the surface before IRI testing. To facilitate auto triggering on laser profilers, place a single line of preformed traffic marking tape perpendicular to the roadway baseline 300 feet before the beginning and after the end of each lane, shoulder, and ramp to be tested or at the direction of the Department. Submit the actual stationing for each traffic marking tape location to the RE.

4. Quality Acceptance. The Department will determine acceptance and provide PA based on the following:

a. Pay Adjustment. The pay equations in Table 401.03.03-7 express the PA in dollars per lot of 0.01 mile or 0.005 mile as shown in the table. The number of lots for final pay adjustment will be reduced by the number of lots excluded for each segment shown in Table 401.03.03-7. Lots excluded from final PA will be those with the highest recorded IRI numbers for respective roadway and bridge deck segments. IRI numbers are in inches per mile.

Table 401.03.03-7 Pay Equations for Ride Quality			
	Excluded Lots	Pay Equation(s)	
Route 035 NB from MP 0.00 to MP 2.17 --- Route 035 SB from MP 0.00 to MP 2.02	Lane 1 - 61 Lane 2 -22 Lane 3 - 4 --- Lane 1 - 56 Lane 2 - 16 Lane 3 - 14	PA on lots of 0.01 mile length	
		IRI < 45	PA = $50
		45 ≤ IRI < 65	PA = $162.50 − ($2.50 × IRI)
Route 035 NB from MP 3.50 to MP 4.00 --- Route 035 SB from MP 3.50 to MP 4.00	Lane 1- 4 Lane 2- 1 --- Lane 1 -2 Lane 2 -1	65 ≤ IRI ≤ 75	PA = $0
		75 < IRI ≤ 145	PA = (IRI − 75) × (−$7.1429)
		IRI > 145	Remove & Replace
Route 035 NB from MP 2.23 to MP 3.50	Lane 1 – 17 Lane 2 –2 Lane 3 – 2	PA on lots of 0.01 mile length	
		IRI < 35	PA = $50
		35 ≤ IRI < 55	PA = $137.5 − ($2.50 × IRI)
Route 035 SB from MP 2.63 to MP 3.50	Lane 1 – 4 Lane 2 –2 Lane 3 – 2	55 ≤ IRI ≤ 65	PA = $0
		65 < IRI ≤ 135	PA = (IRI − 65) × (−$7.1429)
		IRI > 135	Remove & Replace
Route 035 Ramps and Shoulders	None	PA on lots of 0.01 mile length	
		IRI ≤ 120	PA = $0
		120 < IRI ≤ 170	PA = (IRI-120) x (-$10.00)
		IRI > 170	Remove & Replace

b. Removal and Replacement. If the final IRI is greater than the Remove and Replace Value (RRV), remove and replace the lot. Replacement work is subject to the same requirements as the initial work.

If less than 8 percent of paving lots exceeds the RRV, submit a plan for corrective action. If the corrective action plan is not approved by the RE, remove and replace the designated lots. If the corrective action plan is approved and the lots are reworked, the lots are subject to the requirements of subpart 401.03.03.J Ride Quality Requirements except that the lots are not eligible for positive PA. The RE may allow the lots to remain in place and apply the pay adjustment as computed in Table 401.03.03-7.

401.03.04 Sawcutting and Sealing of Joints in HMA Overlays

THE TEXT OF THIS SUBPART IS DELETED.

THIS SUBPART IS INTENTIONALLY LEFT BLANK

401.03.05 Core Samples
THE LAST SENTENCE OF THE 2ND PARAGRAPH IS CHANGED TO THE FOLLOWING:

Apply an even coating of tack coat to sides of the hole. Place HMA in maximum lifts of 4 inches in the hole and compact each lift. Ensure that the final surface is 1/4 inch above the surrounding pavement surface.

401.04 MEASUREMENT AND PAYMENT
THE FOLLOWING ITEM IS DELETED:

Item	*Pay Unit*
SAWING AND SEALING JOINTS IN HOT MIX ASPHALT OVERLAY	LINEAR FOOT

THE FOLLOWING IS ADDED:

The Department will make a payment adjustment for HMA air void quality by the following formula:

Pay Adjustment = Q x BP x PPA

Where:
BP = Bid Price
Q= Air Void Lot Quantity
PPA= air void PPA as specified in 401.03.03H.

The Department will make a payment adjustment for HMA thickness quality by the following formula:

Pay Adjustment = Q x BP x PPA

Where:
BP = Bid Price
Q= Thickness Lot Quantity
PPA= thickness PPA as specified in 401.03.03I

The Department will make a payment adjustment for HMA ride quality, as specified in 401.03.03J.

DIVISION 500 – BRIDGES AND STRUCTURES

SECTION 504 – STRUCTURAL CONCRETE

504.03.02 Constructing Concrete

G. Removal of Forms and Falsework.

Do not remove forms and false work until the concrete obtains a compressive strength of 3000 psi.

SECTION 511 – BULKHEAD, FENDER, AND DOLPHIN SYSTEMS

511.01 Description.
THE FOLLOWING PARAGRAPH IS ADDED AFTER FIRST PARAGRAPH:

This section also describes the requirements for constructing and installing of the pipe bent assembly of various types as shown on the Plans.

511.02.01 Materials
14 TH ON THE LIST IS CHANGED TO:

Fiberglass Reinforced Plastic Lumber (FRPL) 916.01

THE FOLLOWING IS ADDED AT THE END OF THE LIST:

Stainless Steel Bolts.....908.04

511.04 MEASUREMENT AND PAYMENT
THE FOLLOWING IS ADDED AFTER LAST PARAGRAPH:

The Department will include payment for Navigational Hazard Sign Panel and Support under the item FIBERGLASS REINFORCED PLASTIC LUMBER

DIVISION 600 – MISCELLANEOUS CONSTRUCTION

SECTION 601 – PIPE

601.04 MEASUREMENT AND PAYMENT
THE FOLLOWING IS ADDED:

The Department will make payment for restoring the pavement structure for trenches in the traveled way and shoulder under various Items of the Contract.

THE FOLLOWING IS ADDED TO THIS SECTION:

14" Ductile Iron Pipe
16" Ductile Iron Pipe
18" Ductile Iron Pipe
24" Ductile Iron Pipe
30" Ductile Iron Pipe
36" Ductile Iron Pipe
42" Ductile Iron Pipe
48" Ductile Iron Pipe
Pipe Bedding

601.01 Description

This section describes the requirements for constructing storm pipes for surface drainage using Ductile Iron Pipe. This section describes the requirements for use of pipe bedding material when the existing backfill is deemed unsuitable by the RE.

601.02 Materials

Ductile Iron Pipe	909.02.08
Polyethylene Wrap for DIP	909.02.08
Double Cement Lining for DIP	909.02.08
Class B Bedding	909.01.02

The Ductile Iron Pipe must be Double Cement Lined and must have thickness Class 50 for its entire length.

601.03 Construction

601.03.01 Installing Pipe

A. Storing and Handling. Handle and store pipe to prevent damage such as cracking, denting and breaking. Lift pipe off of the delivery vehicle to avoid damage while unloading. Do not dump or drag pipe off the delivery vehicle. Store pipe in an area where it will not be damaged during construction operations. Use blocks or straps when stacking pipe. Alternate the bells and spigots to reduce the load on the bells. The RE will reject pipe that is damaged, bowed, or considered unacceptable for other reasons.

B. Excavating. Maintain the existing drainage system during construction until the new drainage facilities are completed and placed into service.

Excavate the same distance on each side of the centerline of the pipe to ensure that the pipe is in the center of the trench. Ensure that the trench is at least 18 inches wider than the outside diameter of the pipe. Provide vertical sides for excavations within the traveled way, shoulder, sidewalk areas, and where existing facilities require protection.

Except where necessary to maintain flow, do not excavate trenches or place drains in embankment until the embankment has been constructed to an elevation of at least 3 feet above the top of the pipe or to the top of the embankment, whichever is lower. Do not excavate trenches more than 300 feet in advance of installing the pipe unless approved by the RE.

Obtain RE approval before finishing excavation. If the RE determines that the bottom of the trench is unstable, undercut as directed by the RE and backfill with Class B bedding.

If the material at the bottom of the trench is rock or other hard material, remove at least 12 inches of the material below the bottom of the pipe. Backfill the undercut with Class C bedding.

For trenches in the traveled way, shoulder, and within 30 feet of the outside edge of the shoulder, backfill and restore the pavement structure to match the surrounding pavement before opening to traffic. The Contractor may submit working drawings for approval for temporary protection instead of backfilling trenches.

Provide and maintain trench crossings where necessary. For trenches not in the traveled way and shoulder, do not leave trenches open overnight unless protected with fence. Maintain trenches according to 29 CFR 1926.

C. Bedding. Do not place bedding material until the RE approves the depth of excavation and the material at the bottom of the excavation. If bedding is not shown, place pipe directly on the material at the bottom of the trench.

For Class A bedding, construct a concrete cradle. Place concrete according to the limitations specified in 504.03.02.C. Place concrete across the area to minimize rehandling. Ensure that concrete is not discharged into windrows or piles. Consolidate the concrete by hand spading or using internal mechanical vibrators. Protect concrete as specified in 504.03.02.I.

For Class B, Class C, and Class D bedding, place the bedding and provide recesses for pipe bells deep enough to ensure that the bell will not rest on the bottom of the recess. Ensure that the recess does not exceed 2 inches from the edge of the bell along the length of the pipe. Compact using the directed method as specified in 203.03.02.C.

D. Installing Pipe. When installing pipe, use a laser system to control the alignment and grade of the pipe.

Begin installing pipe at the lowest elevation of the pipeline. Ensure that the pipe is in firm contact with the bottom of the excavation or bedding throughout its full length. Place bell ends of pipe facing towards the highest elevation. When using perforated pipe, ensure that the perforations are at the bottom.

When installing pipe through concrete or masonry walls, provide a sufficient length of pipe outside of the wall to allow for connections, and cut the pipe flush with the inside face of the wall. Seal the connection using mortar. When pipe enters below the invert of existing structures, cut and shape the existing invert to form a new channel. Install the pipe so that it is solidly supported by the underlying material over its full length except where recesses have been made for joints. Ensure that interior of the pipe is kept clean and free of intrusion by soil or other foreign material. Protect open ends of the pipe at all times and securely seal the openings with plugs approved by the Utility whenever work is stopped. Remove the plug, inspect, and clean the interior of the pipe before resuming pipe installation.

When constructing storm drains in stages, cover the end of the pipe after each stage to prevent material from entering the pipe. Do not cover the pipe if it is required to keep the pipe open for temporary drainage.

When using pipe for a stream diversion, install pipe outside of the existing stream bed while maintaining flow in the existing stream. When installing pipe within an existing stream channel, construct a temporary stream diversion while maintaining flow in the existing stream channel. Once the temporary channel is completed, divert the stream flow into the temporary channel while constructing the pipe system within the existing stream bed. When the pipe is completed, divert the stream flow into the pipe.

E. Joining Pipe. Join pipe according to the manufacturer's recommendations. Cut pipe according to the manufacturer's recommendations. Ensure cuts are clean and square.

F. Backfilling. When using PVC pipe, backfill from the bottom of the trench to 2 feet above the top of the pipe with Class C bedding. When using pipe other than PVC, backfill from the bottom of the trench to 2 feet above the top of the pipe with suitable excavated material free from stones and rock larger than 2 inches in any dimension. For distances 2 feet above the top of the pipe, backfill using suitable excavated material.

Place backfill material symmetrically on each side of the pipe in lifts not exceeding 6 inches thick, loose measurement. Compact as follows:

1. If the backfill material is predominantly granular, use vibratory plate compactors.
2. If the backfill material is not predominantly granular, use vibratory rammer compactors.
3. For heights more than 2 feet above the pipe, the Contractor may use a roller.

The RE may direct compaction using the density control method as specified in 203.03.02.D.

Remove shoring, bracing, and sheeting as the backfilling proceeds.

The Contractor may use CLSM as alternate backfill material when backfilling trenches for drainage pipe. Do not use CLSM to replace pavement, base courses, or drainage layers that form the pavement structure. The RE will not allow combining other backfill materials in the same trench as CLSM. Place CLSM according to the limitations specified in 504.03.02.C. Place CLSM across the area to minimize rehandling. Protect CLSM as specified in 504.03.02.I.

When the existing backfill is deemed unsuitable by the RE, the existing backfill is to be replaced with pipe bedding material class B.

601.04 Measurement and Payment

Payment will be made under:

Pay Item	*Pay Unit*
14" DUCTILE IRON PIPE	LINEAR FEET
16" DUCTILE IRON PIPE	LINEAR FEET
18" DUCTILE IRON PIPE	LINEAR FEET
24" DUCTILE IRON PIPE	LINEAR FEET
30" DUCTILE IRON PIPE	LINEAR FEET
36" DUCTILE IRON PIPE	LINEAR FEET
42" DUCTILE IRON PIPE	LINEAR FEET
48" DUCTILE IRON PIPE	LINEAR FEET
PIPE BEDDING	CUBIC YARD

All Ductile Iron Pipes are required to have a thickness Class 50, a double cement interior lining, and must be wrapped with a Polyethylene. All of these requirements are included in the unit cost of the item: __" Ductile Iron Pipe.

All pipe trench dewatering is considered incidental to the unit cost of pipe items

SECTION 602 – DRAINAGE STRUCTURES

THE FOLLOWING IS TO BE ADDED TO THIS SECTION:

602.01 Description.

This work shall consist of fabrication, and installation of non-standard items: Inlet, Type Double B; Manhole, 7' Diameter; Manhole, 8' Diameter; and Junction Chamber designed by the Contractor and approved by the Engineer in locations shown on the plans.,

602.02 Materials.

The materials for the Inlet, Type Double B; Manhole, 7' Diameter; Manhole, 8' Diameter; and Junction Chamber will be the same as standard inlets and manhole shown under this subsection.

602.03 Construction.

602.03.02 Inlets and Manholes.

The construction for the Inlet, Type Double B; Manhole, 7' Diameter; Manhole, 8' Diameter; and Junction Chamber will be the same as standard inlets and manhole shown under this subsection.

602.04 Measurement And Payment

THE FOLLOWING ITEMS ARE ADDED:

Item	*Pay Unit*
INLET, TYPE DOUBLE B	UNIT
MANHOLE, 7' DIAMETER	UNIT
MANHOLE, 8' DIAMETER	UNIT
JUNCTION CHAMBER	UNIT

THE FOLLOWING IS TO BE ADDED TO THIS SECTION:

Manufactured Treatment Device

602.01 Description.

This work shall consist of fabrication and installation of non-standard precast Manufactured Treatment Device selected by the Contractor and approved by the Engineer, for a design treatment capacity as shown follows:

Route or Roadway	Station/Side	Flow(cfs) (25-yr storm)	Flow(cfs) (WQ storm)
35	280+76 (LT)	9.83	5.54
35	292+82 (LT)	22.61	12.58
35	293+84 (LT)	21.32	11.78
35	325+29 (RT)	22.28	12.60
35	325+56 (RT)	22.28	12.60
35	326+43 (RT)	13.73	8.17

35	348+88 (RT)	20.44	12.19
35	349+15 (RT)	20.44	12.19
35	350+07 (RT)	12.49	7.69
35	350+29 (RT)	12.49	7.69
35	378+05 (RT)	20.95	12.55
35	378+29 (RT)	20.95	12.55
35	379+00 (RT)	23.15	12.60
35	379+16 (RT)	23.15	12.60
35	403+46 (RT)	16.02	6.49
Bay Blvd	23+75 (LT)	22.10	12.60
Bay Blvd	23+78 (LT)	13.50	7.70
Bay Blvd	23+97 (LT)	13.50	7.70
Bay Blvd	24+01 (LT)	22.10	12.60

602.02 Materials.

602.02.03 Quality Control Inspection.

A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection by the Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places, and the sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the sites shall be marked for identification and shall be removed from the site at once. All sections which have been damaged beyond repair during delivery will be rejected and, if already installed, shall be repaired to the Engineer's acceptance level, if permitted, or removed and replaced, entirely at the Contractor's expense.

B. All sections shall be inspected for general appearance, dimensions, soundness, etc. The surface shall be dense, close textured and free of blisters, cracks, roughness and exposure of reinforcement.

C. Imperfections may be repaired, subject to the acceptance of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final acceptance. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi (28MPa) at the end of 7 days and 5,000 psi (34 MPa) at the end of 28 days when tested in 3 inch (76 mm) diameter by 6 inch (152 mm) long cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs.

602.02.04 Submittals / Shop Drawings.

The Contractor shall be provided with dimensional drawings and, when specified, utilize these drawings as the basis for preparation of shop drawings showing details for construction, reinforcing, joints and any cast-in-place appurtenances. Shop drawings shall be annotated to indicate all materials to be used and all applicable standards for materials, required tests of materials and design assumptions for structural analysis. Shop drawing shall be prepared at a scale of not less than 3/16-inches per foot (1:75). Six (6) hard copies of said shop drawings shall be submitted to the Engineer for review and approval.

602.02.05 Products.

Materials and Design:

Concrete for Precast Manufactured Treatment Device shall conform to ASTM C 857 and C 858 and meeting the following additional requirements:

1. The wall thickness shall not be less than 6 inches (152 mm) or as shown on the dimensional drawings. In all cases the wall thickness shall be no less than the minimum thickness necessary to sustain HS20-44 (MS 18) loading requirements as determined by a Licensed Professional Engineer.

2. Sections shall be tongue and groove or ship-lap joints with a butyl mastic sealant conforming to ASTM C 990.

3. Cement shall be Type II Portland cement conforming to ASTM C 150.

4. All sections shall be cured by an approved method. Sections shall be not be shipped until the concrete has attained a compressive strength of 4,000 psti (28 MPa) or until 5 days after fabrication and/or repair, whichever is longer.

5. Pipe openings shall be sized to accept pipes of the specified size(s) and material(s), and shall be sealed by the Contractor with a hydraulic cement conforming to ASTM C 595M

Performance:

The Manufactured Treatment Device shall be capable of removing 50% of the net annual Total Suspended Solids (TSS) load based on a 50-micron particle size. Annual TSS removal efficiency models shall be based on documented removal efficiency performance from full scale laboratory tests. Annual TSS removal efficiency models shall only be considered valid if they are corroborated by independent third party field testing. Said field testing shall include influent and effluent composite samples from a minimum of ten storms at one location. The Manufactured Treatment Device shall have the Design Treatment Capacity listed in Table 2.2, and shall not resuspend trapped sediments or re-entrain floating containments at flow rates up to and including the specified Design Treatment Capacity.

The Manufactured Treatment Device shall have usable sediment storage capacity of not less than the corresponding volume specified by the manufacturer. The system shall be designed such that the pump-out volume is less than ½ of the total system volume. The system shall be designed to not allow surcharge of the upstream piping network during dry weather conditions.

A water-lock feature shall be incorporated into the design of the Manufactured Treatment Device to prevent the introduction of trapped oil and floatable contaminants to the downstream piping during routine maintenance and to ensure that no oil escapes the system during the ensuing rain event. Direct access shall be provided to the sediment and floatable contaminant storage chambers to facilitate maintenance. There shall be no appurtenances or restrictions within these chambers.

Manufacturer:

The Manufactured Treatment Device shall be a type that has been installed and used successfully for a minimum of 5 years. The manufacturer of said system shall have been regularly engaged in the engineering design and production of systems for the physical treatment of stormwater runoff during the aforementioned period.

602.03 Construction.

602.03.08 Installation of Manufactured Treatment Device.

A. The Manufactured Treatment Device shall be installed at elevations and locations shown on the plan or as otherwise directed by the Engineer.

B. Place the precast base unit on a granular subbase of minimum thickness of six inches (152 mm) after compaction or a greater thickness and compaction if specified elsewhere. The granular subbase shall be checked for level prior to setting and the precast base section of the trap shall be checked for level at all four corners after it is set. If

the slope from any corner to any other corner exceeds 0.5% the base section shall be removed and the granular subbase material re-leveled.

C. Prior to setting the precast roof section, bitumen sealant equal to ASTM C 990 shall be placed along the top of the baffle wall, using more than one layer of mastic if necessary, to a thickness at least 1-inch (25 mm) greater than the nominal gap between the top of the baffle and the roof section. The nominal gap shall be determined either by field measurement or the shop drawings. After placement of the roof section has compressed the butyle mastic sealant in the gap, finish sealing the gap with an approved non-shrink grout on both sides of the gap using the butyl mastic as a backing material to which to apply the grout. Also apply non-shrink grout or Sikaflex-1a sealant to the joints at the side edges of the baffle walls.

D. After setting the precast roof section of the Manufactured Treatment Device, set precast concrete manhole riser sections, to the height required to bring the cast iron manhole covers to grade, so that the sections are vertical and in true alignment with a ¼ inch (6 mm) maximum tolerance allowed. Backfill in a careful manner, bringing the fill up 6 inch (152 mm) lifts on all sides. If leaks appear, clean the inside joints and caulk with lead wool to the satisfaction of the Engineer. Precast sections shall be set in a manner that will result in a watertight joint. In all instances, the installation of Manufactured Treatment Device shall conform to ASTM specification C 891 "Standard Practice for Installation of Underground Precast Utility Structures".

E. Holes made in the concrete sections for handling or other purposes shall be plugged with a nonshrink grout or by using grout in combination with concrete plugs.

F. Where holes must be cut in the precast sections to accommodate pipes, do all cutting before setting the sections in place to prevent any subsequent jarring which may loosen the mortar joints. The Contractor shall make all pipe connections.

602.04 Measurement and Payment.

Payment will be made under:

Pay Item	*Pay Unit*
MANUFACTURED TREATMENT DEVICE	UNIT

Payment for the work specified herein, including all labor, materials, equipment, and incidentals associated with furnishing and installing a Manufactured Treatment Device shall be paid for at the applicable. This price will include all materials, equipment and labor requested to complete this item of work.

THE FOLLOWING IS TO BE ADDED TO THIS SECTION:

602.01 Description.

This work shall consist of fabrication, and installation of non-standard items: Stormwater Pumping Station, Location No. ___ as shown in the Stormwater Pumping Station Plans and in locations shown on the plans.,

602.02 Materials.

The materials for the Stormwater Pumping Station, Location No. ___ will be described in the separate supplemental specification in the appendices of these special provisions.

602.03 Construction.

602.03.09 Stormwater Pumping Station.

The construction of the Stormwater Pumping Station, Location No. ___ will be described in the separate supplemental specification in the appendices of these special provisions.

602.04 Measurement And Payment

THE FOLLOWING ITEMS ARE ADDED:

Item	*Pay Unit*
STORMWATER PUMPING STATION, LOCATION NO. 1	UNIT
STORMWATER PUMPING STATION, LOCATION NO. 2	UNIT
STORMWATER PUMPING STATION, LOCATION NO. 3	UNIT
STORMWATER PUMPING STATION, LOCATION NO. 4	UNIT
STORMWATER PUMPING STATION, LOCATION NO. 5	UNIT

THE FOLLOWING IS TO BE ADDED TO THIS SECTION:

24" Tide Control Check Valve, Inline
30" Tide Control Check Valve, Inline
36" Tide Control Check Valve, Inline

602.01 Description.

This section also describes the requirements for furnishing and installing slip-in (inline) type tidal check valves for various storm drain pipe sizes.

602.02 Materials.

602.02.03 Materials.

Ensure the slip-in check valve is all rubber and of the flow operated check type with a slip-in cuff connection. Also ensure the valve is a one piece rubber construction with ply reinforcement. Ensure valve is manufactured with no metal, mechanical hinges or fasteners, which would be used to secure the disc or bill to the valve housing. Port area of the check valve must allow passage of flow in one direction while preventing reverse flow. The entire check valve is to fit within the specified pipe inside diameter and secured in place by means of furnished stainless steel hardware. Installed slip-in type check valve shall not protrude beyond the end of the pipe.

The check valve shall have low headloss to pipe velocity ratio of 0.1 to 0.15 ft/fps.

Submit a certification of compliance, as specified in 106.07,

602.03 Construction.

Submit product literature for the slip-in check valves that includes information on the performance and operation of the valve, materials of construction, dimensions and weight, elastomer characteristics, flow data, headloss data, and pressure ratings.

Valve shall be stored and installed as per manufacturer's instruction and recommendations and approved submittals.

Ensure Check Valve manufacturer's authorized representative is available for customer service during installation and start-up, and to train personnel in the operation, maintenance and troubleshooting of the valve.

602.04 Measurement and Payment.

Payment will be made under:

Pay Item	*Pay Unit*
24" TIDE CONTROL CHECK VALVE, INLINE	UNIT
30" TIDE CONTROL CHECK VALVE, INLINE	UNIT
36" TIDE CONTROL CHECK VALVE, INLINE	UNIT

Payment for the work specified herein, including all labor, materials, equipment, and incidentals associated with furnishing and installing a __" Tide Control Check Valve, Inline shall be paid for at the applicable. This price will include all materials, equipment and labor requested to complete this item of work.

SECTION 606 – SIDEWALKS, DRIVEWAYS, AND ISLANDS

606.03.02 Concrete Sidewalks, Driveways, and Islands

H. Protection and Curing.

THE LAST SENTENCE IS CHANGED TO:

Ensure vehicles and other loads are not placed on sidewalks, islands, and driveways until the concrete has attained compressive strength of 3000 pounds per square inch, as determined from 2 concrete cylinders field cured according to AASHTO T 23.

THE FOLLOWING IS TO BE ADDED TO THIS SECTION:

Imprinted Crosswalk.

606.01 DESCRIPTION

THE FOLLOWING IS ADDED:

This Section also describes the requirements for constructing imprinted crosswalks.

606.02.01 Materials

THE FOLLOWING IS ADDED:

For Imprinted Crosswalk, use a hot applied wearing surface that is a mixture of thermoplastic resins, polymer, rubber, aggregates, glass fibers, pigments and/or fillers that produce a product with superior adhesion, flexibility and abrasion resistance characteristics as well as color stability, chemical resistance and scrub ability. Ensure that it is capable of being produced in the specified color and pattern, and it has been developed specifically for use on asphalt and concrete pavement. The below list of companies can produce the required material:

1. TrafficPrint by Traffic Calming USA, 266 South Main Street, Suite 800, Dallas, Georgia, 30132, 770-505-4044, www.trafficcalmingusa.com
2. Imprint by Dynamic Surface Applications Ltd., 373 Village Road, Pennsdale, PA 17756, 800-491-5663, www.dsa-ltd.com
3. Techprint by Crafco, Inc., 420 N. Roosevelt Ave., Chandler, AZ 85226, 800-528-8242, www.crafco.com

Provide material selected from available standard colors to most closely match the darkest red in Anchor Concrete Products' Liberty Blend pavers (Anchor Concrete Products, 800-682-5625, www.anchorcp.com). Provide the brick imprint mold in a running bond pattern.

Ensure that the imprinted crosswalk material meets the requirements in Table 606.02.01-1.

Table 606.02.01-1 Imprinted Crosswalk Material Properties

Property	Test Method	Requirement
Water Absorption, maximum	ASTM D 570	0.5%
Softening Point, minimum	ASTM D 36	200ºF
Bond Strength, minimum	ASTM D 4796	300 psi
Impact Resistance, minimum	ASTM D 256, Method A	10 in-lbs
Flash Point, minimum	ASTM D 92	440ºF
Skid Resistance, minimum	ASTM E 303	55
Low Temperature Stress Resistance	AASHTO T 250	No cracks

Ensure that pigment used for imprinted crosswalk is well dispersed in the resin. Ensure that the pigment, or any other materials in the imprinted crosswalk, does not contain lead, lead chromate or hexavalent chromium. Ensure that the imprinted crosswalk material, upon heating to application temperature, does not exude fumes that are toxic or injurious to persons or property.

As cover aggregate for the imprinted crosswalk, use only manufactured stone sand that conforms to 901.05.02 except that not more than 5 percent passing No. 200 sieve is permitted.

606.03 CONSTRUCTION

THE FOLLOWING IS ADDED:

606.03.04 Imprinted Crosswalk

Ensure that the installation of the imprinted crosswalk is performed by a manufacturer qualified applicator who has a minimum of five years experience with asphalt pavement texturing.

Submit product data in accordance to the RE with the Materials Questionnaire. Submit samples showing color, texture, and pattern to the RE for approval by the Office of Landscape Architecture.

Prepare the HMA pavement area that is to receive the imprint resin material. Sawcut as needed and mill the HMA surface course to the depth specified by the manufacturer. Remove all dirt, debris, salts, concrete admixtures, and any chemical residues. Ensure the hot applied resin is not installed when precipitation is expected or temperatures are below 32 ºF.

Prepare the imprinted crosswalk for installation utilizing a heating kettle specifically designed for hot applied mixed resin. Ensure the material is heated to within a temperature range of 385 ºF to 420 ºF. Uniformly distribute the hot applied resin material onto the pavement surface by means of preheated finishing irons that are used to smooth and level the material. Immediately apply dry sand over the hot applied resin to cover the surface at an approximate rate of 1.75 lb/sf. Immediately after applying the sand, stamp the pattern into the semi-molten resin material using an approved stamp capable of providing a 5/16 inch ±1/16 inch deep impression. Ensure the stamp has a brick pattern.

Allow the hot applied resin to cure for a minimum of 1 hour until the material has hardened and remove all excess sand from the surface.

606.04 MEASUREMENT AND PAYMENT

THE FOLLOWING ITEM IS ADDED:

Item	*Pay Unit*
IMPRINTED CROSSWALK	SQUARE YARD

THE FOLLOWING IS TO BE ADDED TO THIS SECTION:

Nonvegetative Surface, Porous Resin Bound Aggregate

608.01 Description.

This Section also describes the requirements for placing Nonvegetative Surface, Porous Resin Bound Aggregate at a 2" thickness

608.02 Materials.

608.02.01 Materials.

Provide materials as specified for Nonvegetative Surface, Porous Resin Bound Aggregate at a 2" thickness

Provide 3/8" nominal Quartzose Aggregate from a local quarry. Ensure that the color of the aggregate is a natural local blend of south New Jersey quartzose, obtained from one quarry. The Office of Landscape Architecture will provide the Contractor with a color sample to match and will approve color.

Ensure that the epoxy is a high strength elastomeric binder as specified in the FILTER**PAVE®** porous pavement system, Gravel-Lok Porous Stone Paving, or approved equal.

Geotextile, Paving Fabric……..919.01

608.02.02 Equipment.

Small-Batch Mixer……..1010.04

608.03 Construction.

608.03.03 Nonvegetative Surface, Porous Resin Bound Aggregate

A. Prepare Base. Prepare existing subgrade with a minimum of 2 passes of a vibratory compactor to produce a firm and even surface.

B. Setting Forms. Set forms as specified in 405.03.02D1 in areas where sidewalk is not being placed as interior edge.

C. Nonvegetative Surface, Porous Resin Bound Aggregate Placement. Place geotextile weed barrier fabric on prepared base.

Ensure that work is supervised by a person who has 5 years previous experience with placement of material. At least 5 references must be given prior to work performed.

Prepare clear high strength UV stable elastometric epoxy as per manufacturer's directions. Completely coat clean washed dry aggregate with epoxy at ratio required by manufacturer in small batches. Spread mixture over prepared surface. Shape and compact the mixture making sure that there are no loose stones. Level and trowel to finish.

D. Protection and Curing. Allow 24 hours to cure. Protect area for the duration of the curing period. Post warning tape around poured area during the curing period. Do not cover with plastic.

E. Removal of Forms. Remove forms after the 24 hour curing period has occurred.

608.04 Measurement and Payment.

Payment will be made under:

Pay Item	*Pay Unit*
NONVEGETATIVE SURFACE, POROUS RESIN BOUND AGGREGATE	SQUARE YARD

SECTION 607 – CURB

607.03.01 Concrete Barrier Curb

D. Placing Concrete.
THE THIRD SENTENCE OF THE FIRST PARAGRAPH IS CHANGED TO:

To place concrete between November 1 to March 15, submit to RE for approval a plan detailing the method of protecting the concrete from salt for at least 30 days after placing.

607.03.02 Concrete Vertical Curb and Concrete Sloping Curb
D. Placing Concrete.
THE ENTIRE TEXT IS CHANGED TO:

Place concrete for vertical curb and sloping curb as specified in 607.03.01.D, except that consolidation may be achieved by hand spading or internal mechanical vibrators.

SECTION 608 – NON-VEGETATIVE SURFACES

THE ENTIRE SECTION IS CHANGED TO:

608.01 DESCRIPTION

This Section describes the requirements for constructing non-vegetative surfaces of HMA; color-coated HMA; porous HMA; broken stone, and polyester matting.

608.02 MATERIALS

608.02.01 Materials

Provide materials as specified:

Broken Stone, Coarse Aggregate No. 3……..901.03
HMA (9.5M64)……...902.02
Asphalt-Stabilized Drainage Course…….902.06
Non-Vegetative Surface Coating……...912.02.04
Herbicide……917.11.03
Polyester Matting……..919.15

Provide Non-Vegetative Surface, Porous HMA conforming to the requirements of Asphalt-Stabilized Drainage Course.

608.02.02 Equipment

Provide equipment as specified:

HMA Compactor……..1003.05
Vibratory Drum Compactor……..1003.06
HMA Plant……1009.01
HMA Trucks……....1009.02

608.03 CONSTRUCTION

608.03.01 Non-Vegetative Surface, HMA

Excavate as specified in 202.03.03. Shape and compact the underlying material to produce a firm, even surface. Obtain RE approval before finishing excavation. If the RE determines that the bottom of the excavation is unstable, undercut, backfill, and compact as directed by the RE.

Construct the non-vegetative surface, HMA before installing guide rail. Obtain RE approval for alternate methods of construction.

Deliver HMA as specified in 401.03.03.D. Construct non-vegetative surfaces 4 inches thick. Place and compact the material to produce a surface free of roller marks and ridges. Spread and grade the HMA as specified in 401.03.03.E. Ensure that the finished surface is smooth, even, and graded to drain away from the guide rail. Compact HMA as specified in 401.03.03.F. Spread, rake, and lute areas not accessible to pavers and rollers with hand tools and compact with dynamic compactors.

Repair non-vegetative surface damaged by guide rail installation with HMA. Use hand tampers around posts and other obstacles where mechanical compactors are not accessible.

608.03.02 Color-Coated Non-Vegetative Surface, HMA

Construct color-coated non-vegetative surfaces as specified in 608.03.01.

Uniformly apply the final color at the rate of 0.3 to 0.5 gallons per square yard by spraying, brushing, or squeegeeing over the HMA surface course. Ensure that the surface is clean and dry at the time of application. Reapply the coating to any missed spots or areas to obtain a uniform coating.

Avoid spilling the color coating on adjacent surfaces. If the color coating spills, immediately clean it with water before the coating dries. If the coating dries, repair as directed by the RE.

The RE will not allow traffic on the color-coated surface until it is dry.

608.03.03 Non-Vegetative Surface, Broken Stone

Ensure that areas to receive non-vegetative surface, Broken Stone, are free from vegetation. Vegetation removal may require manual removal, herbicide treatment as specified in 608.03.06 or both.

Apply a pre-emergent herbicide to the area before placement of broken stone. Spread broken stone, aggregate size No. 3, in a uniform layer, to prescribed thickness.

608.03.04 Non-Vegetative Surface, Porous HMA

Ensure that areas to receive non-vegetative surface, Porous HMA, are free from vegetation. Vegetation removal may require manual removal, herbicide treatment as specified in 608.03.06 or both. Excavate as specified in 202.03.03. Shape and compact the underlying material to produce a firm, even surface. Obtain RE approval before finishing excavation. If the RE determines that the bottom of the excavation is unstable, undercut, backfill, and compact as directed by the RE.

Construct the non-vegetative surface, porous HMA before installing guide rail. Obtain RE approval for alternate methods of construction.

Construct porous HMA surface course to prescribed thickness according to the requirements of Section 303 except for the application of prime coat. Repair non-vegetative surface damaged by guide rail installation with porous HMA. Use hand tampers around posts and other obstacles where mechanical compactors are not accessible.

608.03.05 Non-Vegetative Surface, Polyester Matting

Install polyester matting according to the manufacturer's requirements by manufacturer certified workers.

Ten days before installation, submit to the RE a list of manufacturer certified workers and one copy of the "engineering package" including demonstration compact discs and samples of product components; such as foot prints, finished seams, etc. The manufacturer may elect to train the workers and Department inspectors on a test section on the worksite.

Ensure that the surface areas to receive the matting are smooth, firm, stable and free of rocks, clods, foliage, roots or other material which might prevent the matting from lying in direct contact with the ground surface, free of wrinkles or bulges. Existing non-vegetative surface or HMA that is in the same location as proposed polyester matting may be left in place as long as its surface area is properly prepared as previously stated. Mow grass as low as possible prior to installation of matting. Install the matting immediately following installation of guide rail posts and prior to installation of the guide rail hardware by lifting the matting above the posts and allowing it to drop to the ground with the posts passing through prefabricated openings.

Stake the matting along its edges in accordance with the manufacturer's recommendations.

Seal matting openings with a separate prefabricated piece of matting that will provide a snug fit around the post and completely cover the opening. Ensure that seams are sealed.

Ensure that the matting surface is vegetation-free from installation until final acceptance. Vegetation removal may require herbicide treatment, mechanical removal, or both, as specified in 608.03.06.

608.03.06 Post-Emergent Weed Control of Non-Vegetative Surfaces

Manually remove or spray vegetation growing on the non-vegetative surface with a post-emergent non-selective herbicide treatment for total control of vegetation on the non-vegetative surface area, as directed by the RE. Select post-emergent herbicides for control of targeted vegetation based on the manufacturer's recommendations and product label. Begin the work associated with vegetation removal as early as the conditions permit. Herbicides must be applied by, or under the direct supervision of, a Certified Commercial Pesticide Applicator, according to the manufacturer's recommendations. Restore areas where herbicide has been applied and not intended to its prior existing condition at no cost to the State. Do not apply herbicide in the rain or when wet weather is expected within 24 hours. Do not apply herbicide after rain until approved by the RE.

The RE will notify the ME after Acceptance for inclusion of the non-vegetative surface in its herbicide spraying program including the date that the herbicide was last applied on the project section.

608.04 MEASUREMENT AND PAYMENT

The Department will measure and make payment for Items as follows:

Item	*Pay Unit*
NON-VEGETATIVE SURFACE, HOT MIX ASPHALT	SQUARE YARD
COLOR-COATED NON-VEGETATIVE SURFACE, HOT MIX ASPHALT	SQUARE YARD
NON-VEGETATIVE SURFACE, BROKEN STONE,___THICK	SQUARE YARD
NON-VEGETATIVE SURFACE, POROUS HOT MIX ASPHALT,___THICK	SQUARE YARD
NON-VEGETATIVE SURFACE, POLYESTER MATTING	SQUARE YARD

When the RE directs undercutting of unstable material in the excavation area, the Department will make payment, as specified in 104.03.03, for the additional excavation. The Department will also make payment, as specified in 104.03.03, for the additional bedding if there is not an excess of excavated material available for use as bedding.

SECTION 609 – BEAM GUIDE RAIL

609.03.01 Beam Guide Rail
THE SEVENTH PARAGRAPH IS CHANGED TO:

Install flexible delineators with white retroreflective sheeting on the right side of the direction of traffic. Install flexible delineators with yellow retroreflective sheeting on the left side of the direction of traffic. Mount flexible delineators on the blockout of beam guide rail using either a "U" channel base on the I-beam blockout or a flat base attached to a wood, polymer, or other solid top blockout. Attach the base to the blockout using an adhesive recommended by the manufacturer of the base and panel.

609.03.03 Terminals and Anchorages
THE FOLLOWING IS ADDED:

Excavate cut slope as specified in 202.03.03 within the limits of the buried guide rail terminal. Drive beam guide rail posts for buried guide rail terminal to the required position. Ensure that posts are driven plumb, properly spaced, and to the line and grade shown. Attach the beam guide rail element to the spacer at every post. Attach the beam guide rail element and plate to the terminal posts. Align the top edge of the beam guide rail element in a straight line. Where a vertical transition is required, ensure that the top edge of the beam guide rail element forms the chords of a smooth vertical curve. Backfill with excavated material as specified in 203.03.02C.

609.04 MEASUREMENT AND PAYMENT
THE FOLLOWING ITEM IS ADDED

Item	*Pay Unit*
BURIED GUIDE RAIL TERMINAL	UNIT

SECTION 610 – TRAFFIC STRIPES, TRAFFIC MARKINGS, AND RUMBLE STRIPS

610.03.04 Removal of RPMs
THE ENTIRE TEXT IS CHANGED TO:

Remove RPMs as directed by the RE. Dispose of RPMs as specified in 201.03.09. If directed by the RE, fill the hole with HMA patch as specified in 159.03.07 except sawcutting is not required.

610.03.06 Ground Mounted Flexible Delineators
THE FIRST PARAGRAPH IS CHANGED TO:

Use white retroreflective sheeting for delineators located on the right side when facing in the direction of traffic. Use yellow retroreflective sheeting for delineators located on the left side when facing in the direction of traffic.

610.04 MEASUREMENT AND PAYMENT
THE FOLLOWING ITEM IS DELETED:

Item	*Pay Unit*
RPM, BI-DIRECTIONAL, WHITE LENS	UNIT

SECTION 612 – SIGNS

612.02 MATERIALS
THE FOLLOWING IS DELETED FROM THE MATERIALS LIST.

Non-Breakaway Sign Supports 911.02.03

THE SECOND PARAGRAPH IS DELETED.

612.03.02 Type GA Breakaway and Non-Breakaway Support Guide Signs
THE SUBPART HEADING IS CHANGED TO:

612.03.02 Type GA Breakaway Support Guide Signs

612.03.02 Type GA Breakaway Support Guide Signs

C. Constructing Pedestals
THE SUBPART IS CHANGED TO:

Place reinforcement steel as specified in 504.03.01 before placing the concrete. Ensure that concrete placement complies with the limitations as specified in 504.03.02.C. Place concrete as specified in 504.03.02.D. Cure concrete as specified in 504.03.02.F.

D. Erecting Posts
THE SUBPART IS CHANGED TO:

Erect posts as specified in 512.03.01.G.

THE FOLLOWING IS ADDED:

F. Constructing Anchor, Hinge, Bracket and Coupling Assemblies.. At least 10 days before beginning the work, submit the manufacturer's installation guide and installer's certification to the RE.

Ensure that the installer is certified by the manufacturer.

Ensure that the manufacturer's representative is present during the foundation pour and the installation of the first sign. Install anchor, hinge, bracket and coupling assemblies according to the manufacturer's recommendations. The RE may require the system manufacturer's representative to be present at all times during the installation to provide on-site technical support.

612.04 MEASUREMENT AND PAYMENT
THE FOLLOWING ITEM IS DELETED:

Item	*Pay Unit*
GUIDE SIGN, TYPE GA, NON-BREAKAWAY SUPPORTS	SQUARE FOOT

THE FOLLOWING IS ADDED TO THIS SECTION:

Relocate Sign

612.01 DESCRIPTION

This Section describes the requirements for relocating a sign located as directed by the RE..

612.02 MATERIALS

The Contractor is responsible for modification of the sign supports and furnishing all connection fixtures required for the installation/erecting of the sign at the location specified on the plan.

Materials and construction operations not specifically covered in the Plans and Specifications shall be according to the MUTCD (latest edition), published by FHWA.

612.03 CONSTRUCTION

612.03.04 Relocate Sign

Ensure that during the removal of the signs, care is taken is not to damage the sign or post.

The sign must be stored in a dry, safe, and secure place to avoid damage during construction.

The sign shall be installed according the following:

1. **General.** Signs shall be erected plumb, level, and accurate, securely anchored and left in condition ready for use. On all bolted connections, after tightening, cut off excess bolt, file sharp edges, and burr, peen or distort thread to prevent loosening or removal of nut. Set MUTCD Bike Crossing Warning signs at height of 7' above grade to bottom of sign to avoid conflicts with pedestrians and bikers
2. **Positioning Signs.** Faces shall be so positioned in relation to a line normal to the adjacent edge of travel that the sign face is rotated about its edge, nearest the travel way, through an angle of five degrees, in the direction of travel. All signs shall be level and at the heights indicated.
3. **Mounting Signs.** The installation of the sign is designated as Type GA in accordance with the NJDOT Standard Specification for Road and Bridge Construction (English – 2001).

612.04 MEASUREMENT AND PAYMENT

The Department will measure and make payment for Items as follows:

Item	*Pay Unit*
RELOCATE SIGN	UNIT

Any and all modifications of the sign supports due to relocating shall be included in the unit cost.

THE FOLLOWING IS ADDED TO THIS SECTION:

Custom Sign

612.01 DESCRIPTION

This Section describes the requirements for a custom sign as depicted on the Construction Details (CD-811-2) and located as directed by the RE.

612.02 MATERIALS

The Contractor is responsible for fabrication of the sign supports and furnishing all connection fixtures required for the installation/erecting of the sign at the location specified on the plan.

Materials and construction operations not specifically covered in the Plans and Specifications shall be according to the MUTCD (latest edition), published by FHWA.

612.03 CONSTRUCTION

612.03.05 Custom Sign

Ensure that during the installation of the signs, care is taken is not to damage the sign or post.

The sign shall be installed according the following:

1. **General.** Signs shall be erected plumb, level, and accurate, securely anchored and left in condition ready for use. On all bolted connections, after tightening, cut off excess bolt, file sharp edges, and burr, peen or distort thread to prevent loosening or removal of nut. Set MUTCD Bike Crossing Warning signs at height of 7' above grade to bottom of sign to avoid conflicts with pedestrians and bikers
2. **Positioning Signs.** Faces shall be so positioned in relation to a line normal to the adjacent edge of travel that the sign face is rotated about its edge, nearest the travel way, through an angle of five degrees, in the direction of travel. All signs shall be level and at the heights indicated.
3. **Mounting Signs.** The installation of the sign is designated as Type GA in accordance with the NJDOT Standard Specification for Road and Bridge Construction (English – 2001).

612.04 MEASUREMENT AND PAYMENT

The Department will measure and make payment for Items as follows:

Item	*Pay Unit*
CUSTOM SIGN	UNIT

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DIVISION 650 – UTILITIES

SECTION 651 – WATER

651.01 DESCRIPTION

THE SECTION IS REPLACED WITH THE FOLLOWING:
There are three (3) water supply systems impacted by the project; New Jersey American Water (NJAW), Seaside Park Water, and Shore Water. This Section describes the requirements for furnishing the material and installing water pipe, valve boxes, connecting water services; installing, relocating, and resetting fire hydrant assemblies, and submitting as-built plans.

651.02 MATERIALS

THE FOLLOWING IS ADDED:

PVC Pipe…… .....……..909.02.03
Ductile Iron Pipe, Class 52……. .....……..909.02.08

For New Jersey American Water (NJAW):
NJAW will supply all materials required for installation of NJAW facilities.

For Seaside Park and Shore Water:

Pipe
For Seaside Park, provide Ductile Iron Pipe as noted under MATERIALS. For Shore Water, provide PVC pipe conforming to AWWA C900. All PVC pipe shall have a pipe dimension ratio (DR) of fourteen (14) with a pressure Class of 200 PSI. Each pipe delivered to the job shall have clearly marked the nominal pipe size, material code designation, the DR pressure class, the AWWA designation and manufacturer's name.

Provide pipe joints postioned on the main line that are push-on type with an elastometric seal conforming to ASTM D-2129. Plain ends shall be suitably beveled to permit easy entry into the bell.

Gate Valves
Provide gate valves with mechanical joint, resilient wedge ductile iron body gate valves, non-rising stem, open left, 3"-16" 250 p.s.i., working pressure and as follows:

1. Valves shall conform to AWWA C509, standard for resilient Seated Gate Valves. Valve body, bonnett and gate castings shall all be ductile iron.

2. Wedge shall be constructed of ductile iron, fully encapsulated in synthetic rubber except for guide and wedge nut areas. Wedge nut shall be pinned and shall have no seal plate or bolts.

3. Wedge rubber shall be molded in place and bonded to the ductile iron portion, and shall not be mechanically attached with screws, rivets, or similar fasteners.

4. Wedge shall seat against seating surfaces arranged symmetrically about the centerline of the opening stem, so that seating is equally effective regardless of direction of pressure unbalance across the wedge.

5. The deformation of the rubber sealing bulbs of the wedge shall be limited by design to prevent damage of the sealing surfaces.

6. Stem shall be constructed of high strength bronze. The seal between the stem and bonnett shall be composed of a thermoplastic cartridge incorporating O-rings; all stem seals shall be replaceable with valve wide open and while subjected to full rated pressure. Gate shall be guided by thermoplastic inserts locked

into the slots of the gate to insure proper alignment between the gate and body to evenly compress the rubber sealing surfaces when the gate is closed.

7. Waterway shall be smooth and shall have no depressions or cavities in seat area where foreign material can lodge and prevent closure or sealing.

8. Inside and outside surfaces of the valve body and bonnett shall be protected with fusion bonded epoxy coating that shall conform to AWWA C-550 inside and out.

9. All valves shall be mechanical joint and shall be supplied complete with mechanical joint accessories.

10. Valves shall be as manufactured by United States Pipe and Foundry Co., Metroseal 250 resilient seated gate valve, Mueller, or equal in conformance with standards of water department of the owner.

Concrete for Thrust Blocks

Joint restraint shall be be concrete reaction/thrust blocks. Provide concrete having minimum compressive strength of 4,000 p.s.i. at twenty-eight days in accordance with Section 914 of the NJDOT Standard Specifications.

Mechanical Joint Fittings

Mechanical Joint Fittings shall be in the quantities, types and sizes as indicated on the drawings. Fittings shall include all glands, flanges, bolts, and nuts. Where restrained joints are required fittings will also include Uni-Flange Series 1300C or equal PVC restrainers.

651.03 CONSTRUCTION

THE FOLLOWING IS ADDED:

Refer to the utility details for water main and valve layout and installation methods for specific municipalities

Prior to initiating work, conduct utility investigations as specified in 105.07.01B. To avoid conflicts with proposed infrastructure (drainage pipe, inlets, MTDs utilities, ITS facilities, traffic signals, etc.) and existing facilities to remain, the Contractor may utilize varying pipe depth installation (3' minimum and variable), use of fittings, and pipe joint deflection (within the recommended tolerances of pipe manufacturer requirements). Submit recommended adjustments to the water main alignment to the RE for approval.

Only a prequalified subcontractor, approved by New Jersey American Water Co. (NJAW), may construct and relocate NJAW facilities. The following is a list of subcontractors that have been previously approved by NJAW. This list is provided as information only, and is not an endorsement by the Department of any subcontractor. The Contractor is responsible for soliciting from a subcontractor that will be approved by NJAW when preparing its Bid. The subcontractor for NJAW work will be required to install, locate, disinfect, clean, and test NJAW facilities installed under this contract in accordance with applicable specifications from NJAW. Work restricted to the water subcontractor does not preclude the Contractor from performing the work of layout, traffic control, sawcutting, pavement removal, temporary or final pavement restoration, and landscape restoration associated with the work of installing or relocating NJAW facilities.

APPROVED NJAW CONTRACTORS

Alward, H.W. J. Bardzik 161 Mt. Airy Rd Bernardsville, NJ 07924 908.766.0063	CMW Contractors P. Scott Handel 420 W 1st Ave. Roselle, NJ 07203 908-241-8810	Creamer. J.F. D. Creamer 101 East Broadway Hackensack, NJ 07601 201.488.9862

CRJ Contracting
J. Ciacciarelli
P.O. Box 5387
Branchburg, NJ 08876
908-259-1300

Dewcon, Inc.
F. Dewey
P.O. Box 439
Basking Ridge, NJ 07920
908-832-5710

Henkels & McCoy Inc
M. Anders
512 Elbow Lane
Burlington, NJ 08016
609.387.9000

Hisko Excavating
J. Hisko Sr.
5 Commerce St.
Somerville, NJ 08876
908-782-8556

J.F. Kiely Construction Co.
R. Sexton
700 McClellan St.
Long Branch, NJ 07740
732-222-4400

Liedl & Co
D. Liedl
3322 Rt 22 West, Suite 415
Branchburg, NJ 08876
908-510-6876

Montana Construction
Dominic Santaite
80 Contant Ave.
Lodi, NJ 07644
973-478-5200

Northeast/Remsco
Rolando Acosta
1433 Highway 34 South, B-1
Farmingdale, NJ 07727
732-557-6100

Pioneer Pipe Contractors, Inc.
H. Covely Jr.
P.O. Box 358
Pitman, NJ 08071
856-582-5522

R.C.W. Contracting, Inc
R. Peterson
2228 Turk Road
Doylestown, PA 18901
267-880-3617

Renda, Ernest Const. Co
A. Renda
51 Tannery Rd
Somerville, NJ 08876
908.534.4116

Sambol Construction Co.
G. Matthews
P.O. Box 5110
Toms River, NJ 08753
732-349-2900

Schilke Contracting Co
D. Schilke
301 Valley Rd
Somerville, NJ 08876
908.369.8495

Spinello Companies
E.J. Solimine
12 East Daniel Road
Fairfield, NJ 07004
973-808-8383

Vollers Excavating
G. Jannerone
3311 US Hwy #22
North Branch, NJ 08876
908.725.1026

Waters & Bugbee, Inc
S. Minshall
75 South Gold Drive
Hamilton, NJ 08691
609-584-1100

651.03.01 Water Pipe

A. Scheduling of Work and Interruption of Water Service.

THE FOLLOWING IS ADDED:

Prior to initiating water main construction, submit a detailed sequencing plan of the anticipated work including service cut-overs. Ensure that the sequencing plan addresses the Contractor's proposed stage construction limits and all work to be completed within those limits. Provide all materials and appurtenances, including tapping sleeves and valves (wet taps), insertion/isolation valves, fittings, etc., to perform water main tie-ins and stage construction of the water facilities. Construct temporary water service connections as specified in 651.03.03. Ensure main shut-downs and service cut-overs are performed in accordance with the requirements and restrictions of the respective water utility owner.

E. Installing Water Pipe.

THE FOURTH SENTENCE OF THE FIFTH PARAGRAPH IS CHANGED TO:

Install gate valves, butterfly valves, inserting valves, tapping sleeves, tapping valves, valve boxes, blow-offs, and miscellaneous fittings. Install push on joint pipe through straight runs of pipe. Install mechanical joints and restraints at fittings and valves. Install gaskets at every three (3) pipes lengths before and after mechanical joint restraint. Install marker balls above all fittings at a maximum of 5 feet below grade.

THE FOLLOWING IS ADDED TO THE FIFTH PARAGRAPH:

Apply hot coat of asphaltic compound to both inside and outside of cast iron valve boxes. Ensure valve box is supported so that no load can be transmitted from the valve box to the valve. Install a self-centering alignment ring at the operating nut or ensure bottom of the box is centered over the operating nut and runs perpendicular to the horizontal. After field installation, apply petrolatum wax tape coating to all steel surfaces. Prepare surface and install tape according to ASTM C217 and the manufacturer's recommendations. If RE approves corrosion protection for exposed buried metal, apply aerosol rubberized coating according to manufacturer's recommendations.

F. Hydrostatic Pressure Testing and Leakage Testing.
THE FOLLOWING REVISION IS MADE TO THIRD SENTENCE:
Revise test pressure from 150 psi to 250 psi.

H. Disnfection/Bacteriological Testing.
THE FOLLOWING IS ADDED:

Sterilization for Seaside Park and Shore Water Facilities

1. Each complete unit of water main and distribution system shall be thoroughly sterilized with chlorine before it is placed in operation. The amount of chlorine applied shall be such as to provide a dosage of at least 50 ppm. The contact period shall be at least 24 hours, at the end of which time the chlorine residual shall be at least 10 ppm. The line should then be flushed with clean water until the chlorine residual is not greater than 0.2 ppm.

2. The chlorine required shall be in the form of high test calcium hypochlorine (HTH) in tablet form. The number of tablets required per length of pipe shall be determined from the following table:

Section Length	6"	8"	10"	12"	16"	20"
13'	2	3	4	4	6	8
18'	3	3	4	6	8	10
20'	3	4	5	6	8	10

3. The required number of tablets should be fastened to the top of each length of pipe as it is laid using hot tar or "Permatex No. 2" gasket cement as the adhesive. Care should be taken to see that the adhesive only covers the side of each tablet so that as much surface as possible is exposed to the water when it is introduced into the main.

4. Other methods of sterilization may be used, however, prior approval of the Engineer in writing must be obtained prior to the test being performed.

Bacteria Testing for Seaside Park and Shore Water Facilities

1. After flushing has been completed and the chlorine residual is not greater than 0.2 ppm a bacteriological sample shall be taken in accordance with the New Jersey Department of Environmental Protection Agency, Potable Water Standards bulletin PW-D 10, December 1970.

2. The mouth of the valve, hydrant, blowoff, etc. shall be sterilized and the water then allowed to flow for a period of not less than 5 minutes.

3. The standard sample shall be collected in sterile bottles care being taken not to contaminate the neck of the bottle or stopper during collection.

4. This sample will then be delivered to a certified laboratory designated by the Engineer or the Engineer's representative for analysis or sample collected by the certified lab.

5. Copies of the analysis shall be sent to the Engineer directly from the laboratories.

6. In the event that the laboratory analysis shows bacteria present the line shall be rechlorinated, flushed, sterilized and a new sample taken until such time as the New Jersey Department of Environmental Protection, Potable Water Standard PW-D 10, December 1970 is met.

   Prior to any public water supply system being accepted by the Engineer and his client all of the requirements contained herein shall have been satisfied.

I. Thrust Blocks.

THE FIRST SENTENCE IS CHANGED TO:
Install thrust blocks in addition to joint restraint at fire hydrant assemblies and at plugs or caps as shown in Plans.

651.03.03 Water Service Connection

THE FOLLOWING IS ADDED AFTER THE SIXTH SENTENCE:
Install corporation stops, curb stops, and curb boxes for the water service connections. Replace existing corporation stops, curb stops, and curb boxes with meter pits for NJAW. Install meter setter, meter tile, meter box frame and cover.

651.04 MEASUREMENT AND PAYMENT

THE LAST PARAGRAPH IS DELETED.

THE FOLLOWING IS ADDED:

The Department will measure and make payment for Items as follows:

Item	*Pay Unit*
GATE VALVES AND BOXES	UNIT
BUTTERFLY VALVES AND BOXES	UNIT
2" BLOWOFF VALVE	UNIT
4" POLYVINYL CHLORIDE WATER PIPE	LINEAR FEET
6" POLYVINYL CHLORIDE WATER PIPE	LINEAR FEET
8" POLYVINYL CHLORIDE WATER PIPE	LINEAR FEET

THE FOLLOWING IS ADDED:
For New Jersey American Water, the Department will measure ___" DUCTILE IRON WATER PIPE by the linear foot including the lengths of tees, sleeves, and valves measured parallel to the water pipe outside the limit of a structure. All water supply materials shall be provided by New Jersey American Water. The contractor will not be reimbursed for the cost of materials supplied by New Jersey American Water.

For all other water companies, the Department will measure ___" DUCTILE IRON WATER PIPE by the linear foot including the lengths of tees, sleeves, and valves measured parallel to the water pipe outside the limit of a structure. All water supply materials associated with relocation due to drainage and/or utility conflicts shall be included under the item: ___" DUCTILE IRON WATER PIPE by the linear foot.

SECTION 652 – SANITARY SEWERS

652.01 DESCRIPTION

THE SECTION IS REPLACED WITH THE FOLLOWING:

ROUTE 35, RESTORATION, BERKELEY TWP. TO TOMS RIVER TWP. (MP 0-4)
CONTRACT NO. 000950319
FEDERAL PROJECT NO. ER-7044(103)

There are three (3) sanitary sewer systems impacted by the project; Ocean Co. Utility Authority (OCUA), Toms River Municipal Sewer Authority, and Berkeley Twp. Sewer. This Section describes the requirements for installing sanitary sewer gravity and force mains, sewer lining, sanitary sewer manholes, sanitary sewer connections, miscellaneous fittings, by-pass pumping, and testing.

THE FOLLOWING IS ADDED:
For OCUA: Furnish and Install pre-cast concrete Manhole/Chamber 15-5, cast iron manhole frame and cover, and polypropylene steps. Include exterior joint plastering and interior PVC wall and ceiling liner,cast-in-place benching, excavation, dewatering, bypassing of flow, backfill and bedding, and connections to existing pipes. Benches and channels shall be reinforced concrete, cast-in-place in the field to provide smooth transitions with connecting pipes, with 125 mils of epoxy coating.

652.02 MATERIALS
THE FOLLOWING IS ADDED:
For OCUA: Provide watertight, bolt down type manhole covers with non-penetrating pick holes, gasket, and six (6) ½" stainless steel bolts. Cast covers with 2" letters, "OCUA". Provide polypropylene steps having minimum horizontal pull-out load capacity of 1600 lb., and minimum vertical load capacity of 800 lb. Provide butyl rubber based sealants between precast concrete sections per Type B, AASHTO M-198 with no bitumen content. Provide resilient connectors with pipes to precast sections meeting or exceeding requirements of ASTM C923. Provide PVC liners white in color meeting specifications of Dura Plate 100 or equal.

652.03 CONSTRUCTION
THE FOLLOWING IS ADDED:

Refer to the utility details for sewer main and manhole layout and installation methods for specific municipalities.

652.03.01 Sewer Pipe

A. Scheduling of Work.
THE FOLLOWING IS ADDED:
Ensure all interruption of service is in accordance with the procedures and timing restrictions of the respective municipal utility authority. For force main work, coordinate with OCUA for shutdowns to their facilities. Both OCUA force mains can not be simultaneously taken out of service; one must remain in operation. OCUA will perform all shutdowns. Pump out effluent from section of pipe as necessary to perform work.

C. Excavating.
THE FOLLOWING IS ADDED:
Ensure bedding for manhole bases and trenches are thoroughly dewatered. Ensure groundwater is continuously drawn down to elevation two (2) feet below bottom of the bedding. Continue dewatering operations for as long as trench is open and for a minimum of two (2) full working days.

E. Installing Sanitary Sewer Gravity and Force Mains.
THE FOLLOWING IS ADDED:
Install steel casing lengths as shown on the plans. Paint exterior with two (2) coats of bitumastic paint to 12 mils.
Install casing spacers, insulators, and end seals according to the manufacturer's recommendations.
Install centering devices as shown on the plans, but positioned not less than according to the manufacturer's recommendations. Place centering devices on pipe during pipe assembly and position with casing.

F. Thrust Blocks.
THE THIRD SENTENCE IS CHANGED TO:
Ensure that thrust blocks do not come in contact with other utilities or structures without the approval of the RE.

THE FOLLOWING IS ADDED:

For sewer force mains, install restrain harnesses at all joints according to manufacturer's recommendations. Install restrained coupling systems at all locations force main and existing ductile iron pipe are joined together according to manufacturer's recommendations. Ensure all joints and fitting for force mains are fully restrained.

G. Sewer Pipe Testing.
THE FOLLOWING IS ADDED:
Testing for Ocean County MUA

A. Pressure Test:

1. Conduct pressure and leakage test in pipelines in accordance with AWWA C600.

2. Furnish and install temporary testing plugs or caps, pressure pumps, pipe connections, meters, gages, equipment, and labor.

3. The pipe to be tested must be sufficiently backfilled and braced to prevent movement while under test pressure.

4. Joint restraint at fittings should be permanent and constructed to withstand test pressure.

5. Test ends should be restrained to withstand the appreciable thrusts that are developed under test pressure.

6. Slowly fill section of pipe with water.

7. Expelling Air from Pipeline: All air should be expelled from the pipeline during filling and again before making either pressure or leakage tests. Automatic air-release valves are recommended. Compressed entrapped air can create surges that exceed the test pressure prescribed and could cause pipe failure. Furthermore, entrapped air may cause imprecise pressure test results.

8. Pressure Testing:

   Conduct pressure test for 2-hour duration.

   a. $P_{test} = 1.5 \times P_{operating} + P_{operating}$

   b. $P_{operating} = 30$ psi

   The purpose of a pressure test is to locate defects in materials or workmanship, thereby permitting proper repair. Test pressure should not exceed design pressure for pipe, appurtenances, or thrust restraints, unless approved by the manufacturer.

   Do not build up pressures greater than specified for test. Specified test pressure should be maintained for the specified test time while monitoring for pressure loss. Air pressure testing of installed PVC pressure pipe is expressly prohibited for reasons of safety, should failure occur.

9. If unable to achieve and maintain specified pressure for two hours with no additional pumping, tested section of pipe fails test.

B. Leakage Test:

1. The purpose of the leakage test is to establish that the section of line tested, including all joints, fittings, and other appurtenances, will not leak.

2. Normal operating pressure is usually applied for leakage tests. Pressure should be maintained at a constant level throughout the period of test. Measurement of the amount of additional water pumped in during the test provides a measurement of the amount of leakage, if any. If the amount of additional water introduced into the line during the test exceeds the testing allowance, the section fails the leakage test. If the amount of water added is less than the allowable, the section passes the test.

3. The American Water Works Association installation standard AWWA C605 requires that all visible leaks be repaired, regardless of the amount of leakage.

THE FOLLOWING IS ADDED.

I. Flow Control of Sewer Lines (Bypass Pumping)

PLUGGING OR BLOCKING

A sewer line plug or flow through plug shall assure watertight condition downstream from the plugged connection. The Plugs shall be designed to allow all or any portion of the sewage flow be easily released. Insert bypass plug into the sewer line(s) at a manhole located at the upstream end of the section in which the work is to be performed. A second by-pass plug shall be inserted at a manhole located at the downstream end of the section to be cleaned. Plugs shall be removed upon completion of work.

BY-PASS PUMPING

Whenever sewers or manholes are to be removed, reconstructed, rehabilitated, or relocated, or the new sewers and manholes are to be constructed, the Contractor shall maintain the sewage flow by pumping the sewage between manholes. The Contractor shall bulkhead an exiting upstream manhole and pump all sewage entering that manhole to a manhole downstream from the point of construction. The Contractor shall furnish and operate pumps whenever sewage flow cannot be maintained through a continuous pipeline.

Pumps shall have the capacity, under all conditions encountered on this project, to pump sewage flow according to the following schedule flows of the respective sewer line. Head requirements shall be based upon manhole inverts shown on the plans, grade elevations shown on the plans and the hydraulic characteristics of the bypass equipment.

Submit pump performance curves, system curves and an estimate of pumping capacity under field conditions. A written plan of every by-pass pumping operation shall be submitted at least two weeks prior to construction for review and approval.

Maintain on hand a minimum of one (1) backup pump for every two operating by-pass pumps. If only one by-pass pump is being utilized, the Contractor shall have one backup pump. Backup pumps shall be of equal or greater capacity as the operating pumps.

Under no circumstances shall sewage be allowed to flow into the trench or drainage system and mix with the ground or storm water to be diverted to drainage systems. Pipes for the pumping operation shall be of sufficient quality and strength to withstand vehicular traffic passing over them or steel sleeves or ramps shall be provided. Couplings shall be tight and free from leaks. Any pipe or joint that leaks shall be immediately repaired removed and/or replaced. Utilization of adequately rated High Density Polyethylene Pipe (HDPE) is required at all easement locations. Quick connector (Bauer type) pipe shall not be allowed in the easement, marsh, 100 Year Flood Plain or wetlands areas.

By-pass pumping will be permitted only during construction, unless otherwise approved by the Resident Engineer.

At the completion of construction of each section, the Contractor shall remove bypass system. Temporary bypass piping shall provide capacity to the existing pipe. All temporary connections shall be watertight.

In many instances, it will become necessary to interrupt the service of one or more sewer customers. No interruption of service shall occur without prior approval of the Resident Engineer, and the Contractor shall notify all homes and

businesses in writing at least 24-hours prior to any service interruption. In no event shall any customer have service interrupted for more than a continuous 8-hour period.
The Contractor shall conduct his work so as to not cause excessive surcharging of the sewerage system and shall not cause damage to the sewerage system, its connections and/or apparatus. Any damage caused by the Contractor's operations shall be repaired to the complete satisfaction of the respective municipal sewer authority's engineer at no additional cost to the Department.

Bypass pipe shall be adequately supported through stream crossing, 100 year floodplain areas, and wetlands areas.

A steel pipe sleeve shall be used to support the carrier pipe at stream crossing. Steel pipe to be adequately anchored and supported on both sides of the stream as per the pipe manufacturers recommendations.

Bypass pumps shall be supplied with adequate noise inhibitors to comply with local noise ordinances.

Ramps and/or steel sleeves to be installed at any road crossing of the above ground temporary pipe shall be submitted in form of shop drawings for the Resident Engineer's review and approval prior to construction.

CLEAN-UP

The Contractor shall be responsible for the disposal of excess material and general clean-up of the work are

652.03.04 Sanitary Sewer Service Connections
THE FOLLOWING IS ADDED:

Construct laterals at least 3 feet below the proposed grade, as measured from the top of the pipe to the grade elevation. Install deep house connections for sewer lines exceeding 10 feet of depth from finished grade. Install 4-inch laterals for residential connections with a minimum slope of ¼ inch per foot. Install 6-inch laterals, if warranted, for commercial/industrial connections with a minimum slope of 1/8 inch per foot. Where possible, connect sewer laterals to existing laterals using couplings. Install cleanouts at grade at all changes in lateral direction requiring bends. Do not install more than 75 feet of continuous sewer lateral without at least 1 cleanout. Locate cleanouts such that all portions of the lines can be cleaned by rodding. Do not install cleanouts within driveways or sidewalks. Permanently mark top of curbs with letter "H" indicating the location of the curbside cleanouts. Do not stamp more than ½-inch deep.

652.03.08 Video Inspection of Sewer
THE ENTIRE TEXT IS CHANGED TO:

Upon the completion of all installations of new sanitary sewer mains, perform closed circuit television (CCTV) inspections for each sanitary sewer pipe run. All CCTV inspections shall be performed by experienced personnel trained in performing these types of inspections.

Upon the completion of all installations of each new sanitary sewer lateral from the new sanitary sewer mains to the sewer clean-outs, perform CCTV inspections for each of the installed sanitary sewer laterals. All CCTV inspections shall be performed by experienced personnel trained in performing these types of inspections.

Submit to the Resident Engineer, for acceptance and approval, three (3) copies of unedited post-installation DVDs and associated inspection reports for each of the completed CCTV inspections of the newly installed sanitary sewer mains and newly installed sanitary sewer laterals prior to the final paving. Provide the Owner of the sanitary sewer systems with two (2) copies of the approved post-installation DVDs and associated inspection reports for each of the completed CCTV inspections.

652.04 MEASUREMENT AND PAYMENT
THE LAST PARAGRAPH IS DELETED.

THE FOLLOWING PAY ITEM IS DELETED.

Item	*Pay Unit*
VIDEO INSPECTION OF SEWER	LINEAR FEET

THE FOLLOWING IS ADDED:

The Department will measure and make payment for Items as follows:

Item	*Pay Unit*
10" POLYVINYL CHLORIDE SEWER PIPE	LINEAR FEET
10" SANITARY FORCE MAIN	LINEAR FEET
12" SANITARY SEWER MAIN	LINEAR FEET
MANHOLE, SANITARY SEWER TYPE A	UNIT
SANITARY SEWER BY-PASS PUMPING	LUMP SUM
SANITARY SEWER CLEANOUT	UNIT

The Department will not make separate payment for the required video inspections specified in 652.03.08.

SECTION 654 – JCP&L FACILITY

654.01 DESCRIPTION

This Section describes the requirements for installing, relocating and removing Jersey Central Power and Light (JCP&L) electric utility facilities including conduits, manholes, transformer vaults, handholes, and appurtenances in accordance with the drawings and material listings provided by JCP&L in this contract. This Section also includes the requirements for transferring electric services.

654.02 MATERIALS

Except for the materials noted below, JCP&L will supply all materials necessary for the work at no cost to the Contractor. Provide JCP&L written notice 30 days in advance of when materials will be required. Ensure the electric subcontractor takes delivery of the materials from JCP&L's storage facility within two weeks of the notice from JCP&L indicating that the material is available. Materials may be located at more than one JCP&L storage facility. If the electric subcontractor fails to take delivery, the material may not be available, and the electric subcontractor may be required to provide an additional request for materials. The Contractor is responsible for compensating the Department for any additional handling costs incurred by JCP&L resulting from the failure to take delivery within the time required.

The electric subcontractor is responsible for loading the material, delivering it to the job site, and all subsequent handling and delivery within the jobsite. Store and protect all materials received from JCP&L. Return and deliver all excess materials furnished by JCP&L to JCP&L's storage facility. Obtain a receipt for all material received from JCP&L, maintain a documented inventory of materials used and obtain a receipt for all material returned to JCP&L.

Provide materials as specified:

Tack Coat 64-22: PG 64-22 ..... 902.01.01
Concrete 903.03
Curing Materials 903.10
Controlled Low Strength Material (CLSM) 903.09
Hot Mix Asphalt (HMA) 902.02
Sealer, Hot-Poured 914.02
Polymerized Joint Adhesive 914.03

654.03 CONSTRUCTION

654.03.01 Electric

A. Prequalification.

THE ENTIRE TEXT IS CHANGED TO:

Only a prequalified electric subcontractor, approved by JCP&L, may construct and relocate JCP&L electric facilities. The following is a list of electric subcontractors that have been previously approved by JCP&L. This list is provided as information only, and is not an endorsement by the Department of any subcontractor. The Contractor is responsible for soliciting from a subcontractor that will be approved by JCP&L when preparing its Bid. Work restricted to the electric subcontractor does not preclude the Contractor from performing the work of layout, traffic control, sawcutting, pavement removal, temporary or final pavement restoration, and landscape restoration associated with the work of installing or relocating JCP&L electrical facilities.

APPROVED ELECTRICAL SUBCONTRACTOR

APPROVED ELECTRICAL CONTRACTORS

Hawkeye, LLC
100 Marcus Blvd
Hauppague, NY 11788
Tel: 631-447-3100
Fax: 631-776-1847
Att: Charles Gravina - Mgr. Electric Operations
email: cgravina@hawkeyellc.com

M.J. Electric, Inc.
1047 Shoemaker Avenue
PO Box 310
Shoemaker, PA 19555-310
Tel: 610-562-7570 x 4802
Fax: 610-562-1375
Att: Mike Troutman
email: mtroutman@mjelectric.com

Henkels & McCoy, Inc.
985 Jolly Road
Blue Bell, PA 19422
Tel: 215-283-7707
Fax: 215-283-7573
Att: Alan L. Lippy - Director, Power Operations East
email: alippy@henkels.com

Asplundh
161 Second Street
Wilkes Barre, PA 18702
Tel: 570-947-1101
Fax: 570-822-0770
Attn: Vincent Stanbro
email: v.stanbro@asplundh.com

JBL Electric Inc.
130 Furler Street
Totowa, NJ 07512
Tel: 800-525-4628
Att: Jim Leary – President
email: jleary@jblelectric.com

Tri-M Corp
PO Box 69
204 Gale Lane
Kennett Square, PA 19348
Tel: 610-444-1001 ext 159
Fax: 484-731-0209
Attn: Ron Baugess
email: rbaugess@trimecc.com

MYR (Harlan & The L.E. Myers Company)
1416 Trindle Road 3-A
Carlisle, PA 17013-9718
Tel: 717-243-4600
Fax: 717-243-3633

Approved for underground work only
J. Fletcher Creamer & Son, Inc.
1701 E. Linden Avenue
Linden, NJ 07036
Tel: 908-925-3200

Att: Jim Collins
email: jcollins@myrgroup.com

Fax: 908-925-3350
Att: Ted Paliwoda
email: tpaliwoda@jfcson.com

Richardson and Wayland
PO Box 12648
Roanoke, VA 24027
Tel: 540-344-3244
Attn: Andy Euclide
Email: aeuclide@rwec.com

SREC Resources
PO Box 7250
Sussex, NJ 07461
Attn: Chris Reese
Tel: 973-875-5101 x 123
FAX: 973-875-2394
creese@sussexrec.com

J Wm Foley
340 Chestnut Avenue
West Berlin, NJ 08091
Attn: Bob Dougherty
Tel: 856-768-8800
FAX: 856-768-8884
rdougherty@jwmfoley.com

B. Indemnification. The Contractor agrees to indemnify and hold harmless JCP&L, its officers, employees and agents from liability and claims related to the work described under Section 654. This requirement does not establish JCP&L as a third party beneficiary; the provisions specified in Section 107.10 are unaltered.

C. Scheduling of Work and Interruption to Utilities. Provide the RE and the designated JCP&L representative with a detailed schedule of when the electric utility work will be performed. Indicate in the schedule for each activity the following information: the work locations; the number of crews; and whether the work will be performed during a day shift or night shift, or on weekends. Coordinate all electric utility work with the JCP&L representative, and notify the RE and the JCP&L representative at least two weeks prior to starting electric utility work. Do not interrupt existing electric service until approved by the JCP&L representative.

Weather conditions may prevent connections to existing systems between June 1 and September 30. Do not perform work which will require electric transmission service interruptions from June 1 through September 30 without the approval of JCP&L. JCP&L may extend this period based on weather conditions and system demand. Notify JCP&L at least one month in advance of commencing conductor work.

If service transfers are required, coordinate service transfers with the JCP&L representative. Notify the property owner and all tenants affected by service interruptions or transfers prior to making the service transfer. Minimize disruption to normal operations of existing facilities and minimize any interruption of electric service to JCP&L customers. Protect existing facilities during construction and installation of the service transfer.

D. Quality Control and Quality Assurance. Provide access to the work for the JCP&L representative at all times. Perform all electric utility work in a manner acceptable to the JCP&L representative. Perform all electric utility work in accordance with JCP&L standards and details.

E. Safety. Perform work in accordance with applicable OSHA regulations, N.J.S.A. 34:6-47 “High Voltage Proximity Act”, and JCP&L safety standards.

F. Abandonment and Removal. Prior to beginning work, review the condition of all existing electric utility facilities noted to be removed with the JCP&L representative. If the JCP&L representative designates the material to be salvaged, remove the material and deliver it to a JCP&L storage facility. Remove and dispose of all other electrical utility material designated for removal.

G. Excavation. When excavation is required in areas having existing pavement and sidewalk, sawcut to the full depth of the existing pavement and sidewalk. Excavate trenches for conduit, manholes and vaults and appurtenances. Provide vertical sides for excavations within the traveled way, shoulder, sidewalk areas, and where existing facilities require protection. Remove unstable material at the bottom of the excavation and backfill with granular material. Do not excavate trenches more than 300 feet in advance of installing conduit unless approved by the RE. Provide and maintain trench crossings where necessary to maintain access. Do not leave trenches open overnight unless protected by temporary fencing or steel plates. Remove and dispose of excess or unsuitable material as specified in 202.03.07.

H. Backfill. Backfill with suitable material in lifts not exceeding 6 inches thick, loose measurement. If the backfill is predominantly granular material, compact the backfill material with a vibratory plate compactor. For material that is not predominately granular, compact the backfill material with a vibratory rammer compactor. If it is not possible to compact the backfill material, the Contractor may backfill with CLSM with the approval of the JCP&L representative. If using CLSM, install as specified in 601.03.01.F.

I. Restoration. Restore areas disturbed in the performance of electrical utility relocations to its original condition. In areas that are disturbed for which the plans provide final grading, pavement or landscaping, provide temporary restoration to the satisfaction of the RE. If open-cut trenching across a road is required, restore the pavement with in-kind construction.

J. Field Testing. Perform a high-potential test (also known as a dielectric voltage withstand test) on all cables and splices prior to energizing. Testing must be performed by a person who is qualified to operate the test equipment, and is familiar with the cable system. Ensure that the cables are disconnected from non-cable systems equipment, and that adequate physical clearances are maintained between all cable ends, energized cables, and electrical grounds and all other equipment during the test. Prior to performing the test, verify that all taps or laterals in the circuit are cleared. In the event hot poured compound filled splices and terminations are involved, do not perform testing until they have cooled to ambient temperature. Set the relays in the high voltage direct current test equipment to operate between 5 and 25 milliamperes leakage. The shape of the leakage curve under constant voltage is more important than the absolute leakage current of a "go or no go" withstand test result. The field test voltage is related to the final factory applied dc potentials using a factor of 80 percent.

Ensure the high potential test is performed in the presence of the JCP&L representative. Apply a direct current field test voltage according to the following table:

Field Test Values

Rated Voltage Phase to Phase	**dc Hi-Pot Test (15 Minutes) Wall - mils**	**Kv**	**dc Hi-Pot Test Wall - mils**	**kV**
5000	90	25	115	35
8000	115	35	140	45
15000	175	55	220	65
25000	260	80	320	95
28000	280	85	345	100
35000	345	100	420	125
46000	445	130	580	170
69000	650	195	650	195

Note: If the leakage current quickly stabilizes, the duration may be reduced to 10 minutes.

After the voltage has been applied and the test level reached, record the leakage current at one-minute intervals. If the leakage current decreases or stays steady after it has leveled off, the cable is considered satisfactory. If the leakage current starts to increase, excluding momentary spurts due to supply-circuit disturbances, extend the test to see if the rising trend continues. At the conclusion of the test, discharge the circuit through the test set and voltmeter circuit. After the potential drops below 95% of the test value, ground the cable and discharge the circuit. Leave the grounds on all conductors for a minimum of four times as long as the test voltage was applied.

Remove and replace cables that fail to meet the requirements of the direct current field test. The Contractor is responsible for reimbursing the Department for any additional material costs incurred by the Department resulting from the failure to meet the requirements of the direct current field test.

K. Energizing Lines. Energize lines with the guidance of the JCP&L representative. Prior to energizing lines, submit a request to JCP&L. Switching orders may only originate from JCP&L employees. Submit a request for permission to energize transmission lines 10 days in advance of when the work will be performed. Request permission to energize distribution lines in a manner that will permit the JCP&L representative to submit a request to JCP&L's Dispatch Office by noon the previous business day.

L. As-builts. Upon completion of the work, submit to JCP&L as-built drawings in accordance with JCP&L standards. Prints of construction drawings, marked to show the final location, are acceptable. Provide a copy of the as-built drawings to the RE.

654.04 MEASUREMENT AND PAYMENT

The Department will measure and make payment for Items as follows:

Item	*Pay Unit*
ELECTRICAL UTILITY RELOCATION, JCP&L	LUMP SUM

DIVISION 700 – ELECTRICAL

SECTION 701 – GENERAL ITEMS

701.03.01 Existing Systems

Deliver and unload salvaged materials to:
THE FOLLOWING IS ADDED:

If new cable or wire is designated to be installed into existing conduit systems, clean and swab the conduit system prior to installing the cable or wire. After cleaning, test each conduit by pulling through a metal ball with a diameter at least 85 percent of the nominal inside diameter of the conduit to ensure the conduit is free of any obstruction or foreign material. If the ball fails to pass through the conduit, repair or replace the defective conduit as directed by the RE. Restore disturbed areas to original condition.

701.03.05 Rigid Nonmetallic Conduit

B. Installation.
THE LAST PARAGRAPH IS CHANGED TO:

Install true tape marked in 1-foot increments for the length of the rigid non-metallic conduit. Install a tracer wire continuously for the entire run of conduit, including through the junction boxes, mounting it on the wall. Splice the tracer wire only in the junction box. Seal the ends of rigid nonmetallic conduit carrying the tracer wire. If wire or cable is not scheduled to be installed within 6 months of conduit installation, cap and seal the other conduits leaving the true tape inside. Install warning tape in the trench above the conduit.

701.03.07 Flexible Nonmetallic Conduit

B. Installation.
THE SECOND PARAGRAPH IS CHANGED TO:

Terminate flexible nonmetallic conduit according to manufacturer's recommendations.

THE LAST PARAGRAPH IS CHANGED TO:

Install true tape marked in 1-foot increments for the length of the flexible non-metallic conduit. Install a tracer wire continuously for the entire run of conduit, including through the junction boxes, mounting it on the wall. Splice the tracer wire only in the junction box. Seal the ends of flexible nonmetallic conduit carrying the tracer wire. If wire or cable is not scheduled to be installed within 6 months of conduit installation, cap and seal the other conduits leaving the true tape inside. Install warning tape in the trench above the conduit.

701.03.15 Cable and Wire

A. Installing.
THE FOLLOWING IS ADDED

Test the existing tracer wire in the conduit for continuity. If there is no existing tracer wire in any of the conduits in the same trench, then install a continuous tracer wire between the adjacent junction boxes without any splice when installing the cable and wire as directed by the RE.

C. Connection and Coordination with Utility Services.
THE FOLLOWING IS ADDED TO THE FOURTH PARAGRAPH:

At Substantial Completion provide the RE with a letter requesting transfer of utility services providing the latest copy of the utility bill from each utility company. Such transfers are to be effective beginning the next monthly billing cycle after Substantial Completion or as directed by the RE.

For transfer of utility services involved with ITS system devices, successful ITS system testing is also required to be completed as specified in Section 704.

701.04 MEASUREMENT AND PAYMENT
THE FOLLOWING IS ADDED:

If restoration of disturbed areas includes pavement, curb, sidewalk, driveway or island, the Department will make payment for such work as specified in 104.03.03.

When the RE directs the installation of a new conduit or a repair to the defective conduit, the Department will make payment for this work as specified in 104.03.03.

When the RE directs the Contractor to install a tracer wire in existing conduit, the Department will make payment for this work as specified in 104.03.03.

SECTION 702 – TRAFFIC SIGNALS

702.02 MATERIALS AND EQUIPMENT

702.02.01 Materials

THE FOLLOWING IS ADDED:

Provide an emergency pre-emption system of basic operational compatibility with existing pre-emption systems. Include all hardware and software to provide a functional system. Include wiring for the emergency pre-emption receivers and fail-safe light indications. Receive the Departments approval on the selected system.

702.03 CONSTRUCTION
THE FOLLOWING IS ADDED:

After placing a new, temporary or interim traffic signal system into operation, inspect the traffic signal system every 2 months. Fill out a Contractor Maintenance Traffic Signal Inspection Report (Form EL-16C) when the traffic signal system becomes operational, when the traffic signal system is modified, and at every 2-month inspection.

Maintain as-built drawings of each signal modification. Place copies of the as-built drawings for each traffic signal system modification, Forms EL-16C, and Forms EL-11C in a plastic pocket mounted inside the cabinet door of each controller cabinet. Also provide a copy of all forms and as-built drawings to the RE.

If a new, temporary or interim traffic signal system fails or becomes damaged, repair and restore the traffic signal system to normal operation. Begin repair of the traffic signal system within 2 hours of receiving notice of damage or malfunction from the Department, State police, or local authorities. Ensure that workers assigned to such repair work continuously until the traffic signal resumes normal signal operation.

For each response to a system failure or damage, fill out a Contractor Maintenance Emergency Call Record (Form EL-11C) and place it in a plastic pocket mounted inside the cabinet door of each controller cabinet.

If the Contractor fails to respond to a failure or damage notification and begin work within 2 hours of notification, or does not continue to work until the traffic signal system resumes normal operation, the Department, in the interest of safety, will respond with its own forces to restore normal operation. If the Department mobilizes its forces to effect repairs, the Contractor agrees to pay the Department a sum of $3000 for costs of mobilizing its forces and equipment. In addition, the Contractor must pay the Department the actual cost of material used for the repair and pay the actual costs of police traffic protection.

702.03.01 Controller
THE FOLLOWING IS ADDED:

Provide an 18" extension for the cabinet. Provide a battery back-up system with full power conditioning, filtering and surge protection.

Provide an external 30 amp twist-lock generator male input plug in a lockable door, similar to the police panel door, mounted on the power panel side of the controller cabinet constructed with the same material as the cabinet. Provide full generator auto-bypass components with an internal means of disconnect for the generator plug cord from the input plug.

Weld a heavy duty handle/fastener on the lower side of controller cabinet to secure a chain to deter thief of a generator when in use.

In the field, install a "battery backup power-on" LED indicator light on the controller cabinet as directed.

Provide controllers with a Time Synchronized GPS unit connected to the controllers time reset input to prevent time clock drifting.

702.03.11 Temporary and Interim Traffic Signal Systems
THE FIRST THROUGH FIFTH PARAGRAPHS ARE DELETED.

THE FOLLOWING IS ADDED:
702.03.14 Optical Emergency Pre-Emption System
In accordance with the manufacturer's instructions, provide one pre-emption emitter for use during the testing period. Coordinate emergency pre-emption detector alignment and installation with Toms River Township Emergency Services.

Contact at Toms River Township Emergency Services as of 2013:

John Winton Coordinator

33 Washington Street
Toms River, New Jersey 08753
(732) 341-1000, ext. 1075
Direct: 732-341-3267

Realign detectors as necessary to provide maximum distance of emitter signal reception for each approach. Install ground pre-emption heads, as soon as possible after installation, and before energizing the system.

702.04 MEASUREMENT AND PAYMENT

THE FOLLOWING PAY ITEM IS ADDED:

Pay Item Pay	*Unit*
OPTICAL EMERGENCY PRE-EMPTION SYSTEM	UNIT

The lump sum for the optical emergency pre-emption system includes all necessary wiring for the pre-emption system.

SECTION 703 – HIGHWAY LIGHTING

703.03 CONSTRUCTION
THE FOLLOWING IS ADDED:

Maintain up-to-date as-built drawings of the highway lighting system and temporary highway lighting system. Place copies of the as-built drawings in a plastic pocket mounted inside the meter cabinet, and provide a copy to the RE

If the highway lighting system or temporary highway lighting system fails or becomes damaged, repair and restore the system to normal operation. Begin repair of the signal system within 2 hours of receiving notice of damage or malfunction from the Department, State police, or local authorities. Ensure workers assigned to such repair work continuously until the lighting system is restored to normal operation.

For each response to a system failure or damage, fill out a Contractor Maintenance Emergency Call Record (Form EL-11C) and place it in a plastic pocket mounted inside the cabinet door of each controller cabinet.

If the Contractor fails to respond to a failure or damage notification and begin work within 2 hours of notification, or does not continue to work until the lighting system is restored to normal operation, the Department, in the interest of safety, will respond with its own forces to restore normal operation. If the Department mobilizes its forces to effect repairs, the Contractor agrees to pay the Department a sum of $3000 for costs of mobilizing its forces and equipment. In addition, the Contractor must pay the Department the actual cost of material used for the repair and pay the actual costs of police traffic protection.

SECTION 704 – INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

704.02.01 Materials
FIFTH PARAGRAPH IS CHANGED TO:

Submit catalog cut sheets of the ITS and electrical material specified components along with the system working drawings, in a complete package for approval. The complete package of the system working drawings includes but is not limited to the ITS System Block Diagrams, Fiber Assignment Diagrams, and Rack/Cabinet Equipment Layout Diagrams;.Electrical material catalog cut sheets, Certified Structural Details & Calculations. All components must be approved in the system working drawings before use on the Contract. Submit structural components separately for structural review and approval with the required certification and include a copy of all approvals when submitting the system working drawings to meet the complete package requirement.

THE FIRST SENTENCE OF THE LAST PARAGRAPH IS CHANGED TO:

For materials furnished and installed, provide a minimum 2-year warranty from the latter date of Substantial Completion and Successful ITS SystemTesting against any imperfections in workmanship, components and materials.
THE FOLLOWING IS ADDED:

The image detector cable shall be 75 ohm with 20 gauge solid bare copper connector, solid polyethylene insulating dielectric, 96% (minimum) tinned copper double braided shield, and black polyethylene outer covering. Nominal outside diameter shall be 0.304 inches. Connectors shall be compatible with the CCTV assembly and the ACU.

704.03.01 General System (GS)

B. Installation.
THE FOLLOWING IS ADDED TO THE FIRST PARAGRAPH:

When installing a new system or modifying an existing system, ensure the respective manufacturer certified field representative of ITS components and related equipment is on site to put the equipment into operation.

1. Junction Box ITS.
THE ENTIRE TEXT IS CHANGED TO:

a. Installation. Excavate as specified in 202.03.02. Install junction boxes only in areas where the slope is not less than 22H: 1V. Place junction boxes on 10 inches of coarse aggregate No. 57. With each junction box, provide 6 coiling brackets, inserts and fasteners, and a ground rod and clamp. Backfill and compact using the directed method as specified in 203.03.02.D. Restore disturbed areas to the original conditions, the conditions specified in the Contract, or as directed by the RE.

b. Relocation. Submit plans showing the proposed method of relocation of junction box including any provisions for maintaining network operation and/or cut-over during the process to the RE for approval. Remove existing ITS junction box by excavating around the junction box, cutting back conduits, pulling the cable slack equally to adjacent junction boxes and notching the portion of junction box below the conduits sufficient to slide the fiber optic cable. After removal of the junction box, re-couple the conduit(s), and terminate them using approved conduit repair kits and backfill with approved material and compact using the directed method as specified in 203.03.02.D. Install the Junction Box after

approval by the RE. Ensure that the cut conduit ends are terminated at the entrance of the junction box wall using a manufacturer recommended kit depending upon the type of conduits. Ensure that the fiber optic cable is pulled back from the adjacent junction boxes in equal length to maintain the required slack for any immediate or future splicing.

6. Control Center System.

THE FOLLOWING IS ADDED:

Ensure the ITS System Network working drawing is submitted in a format acceptable to the Department. Sample Working Drawings are available at:

http://www.state.nj.us/transportation/eng/elec/ITS/pdf/sampledrawings.pdf

Ensure the working drawing contains the following information:

1 Affected network nodes are shown in nodal format with Latitude/Longitude
2. Each node shows equipment type and the proposed communication links between them.
3. Distances between Ethernet switches and calculated dB loss between them.
4. A Communication Network Assignment Table specifying Equipment Location (Node, Site ID, Lat/Long, Plan sheet reference, Route, Mile Post), Equipment Information (Item No., Description, Function, VLAN No., Subnet Mask, and IP Address)

Supply and install equipment, software, software revisions, firmware, miscellaneous wiring and cabling, at the specified Control Centers to ensure the remote operation and control of all ITS field devices from the Traffic Operation Centers. Comply with building installation requirements, restrictions, access, and security requirements in the performance of work. The material and work required for the integration of the various ITS installations into the various existing operating systems or subsystems used by the Department includes, but is not limited to, the following:

1. At least 6 days in advance of requiring access to the designated Control Center, submit a written notice to the RE requesting access.
2. Ensure complete functionality with field devices. Coordinate with the Department for access, rack space, and LAN connections to Client Workstations, respectively.
3. Ensure CCTV encoders are compatible with approved camera system especially for PTZ and focus control and CCTV Controller Software.
4. Ensure CCTV Controller Software is updated by integrating new cameras installed and ensure video and control is available to all necessary Traffic Operations personnel.
5. Ensure DMS signs are integrated and remotely operable by the DMS Controller Software.
6. Ensure Transmit Devices are integrated and operational in accordance with Contract requirements. Develop the required travel time routes and the appropriate travel time sign messages as directed by the Department.
7. Ensure CTSS components are fully integrated and all the necessary functionality is demonstrated in the designated CTSS Controller Software.
8. Secure and provide all necessary Network configurations and assignments as directed by the Department.
9. Provide and install any other electronic equipment that may become necessary as a result of network protocol translation, electrical signal transmission degradation or communications media translation (fiber optic, coax, DSL interface, network interface, etc.)
10. Provide for software support to integrate new ITS devices into new and existing platforms for all workstations and servers utilized by DOT operators. This includes any required work from each of the software suppliers for workstations located remotely from the Traffic Operation Centers. The Department will provide information regarding the respective system, on particulars for authorized remote users.
11. Provide for the installation of network assignments for all field devices as well as enabling the network and device management protocols as directed by the Department.
12. Ensure that network support requests through the RE to the Department are made at least 60 days prior to the installation of any device to be included in the network.

13. For RWIS, integrate weather station(s) into the appropriate password protected website as directed by the Department.
14. For WIMS, integrate the system for live data retrieval by the designated staff with password protected web site as directed by the Department.

THE FOLLOWING IS ADDED:

7. ITS Conduits. Install Flexible Nonmetallic Conduits as specified in 701.03.07 with the following exceptions:

a. Do not install mechanical joints on conduit runs between junction boxes.

b. Obtain RE approval for fusion joints that may be permitted under special circumstances on conduit runs between junction boxes.

c. Provide an as-built list indicating the location of all joints to the RE.

d. Install a continuous tracer wire without any splice in the conduits and from junction box to a termination point in the field cabinet.

e. Ensure that all conduits and ducts entering a junction box, foundation, cabinet, hub, or building are terminated based on manufacturer's recommendation and are rodent proofed and sealed around cables, or plugged if conduit is built for future use.

f. Ensure that the ITS Conduits facilitate the various means of cable and wire installations including but not limited to pulling, jetting, and blowing of Fiber optic cable and electrical wires.

g. When lateral ITS conduits are installed under a roadway, install a Schedule 80 rated protective sleeve around the group of conduits.

8. **Fiberoptic Cross-Connect Cabinet.** Submit working drawings for approval that include a block wiring diagram illustrating the interconnection of the system components within the cabinet. Identify each component by manufacturer, model, and CLEI number. Install a Fiberoptic Cross Connect Cabinet on Foundation ITS Type A with concrete pads on front and back of the cabinet. Ensure all fiber optic cables entering this cabinet are terminated into individual patch panels. Provide and install jumpers between multiple patch panels as required to complete the fiber network continuity.

C. Testing.

THE FIRST PARAGRAPH IS CHANGED TO:

Perform wiring and cable testing, as specified in 701.03.15.D, before performing any other testing. Complete the device and system testing as specified on the Department provided forms and instructions.

1. Device Testing.

b. Level B.

THE FIRST SENTENCE IS CHANGED TO:

Demonstrate that each device is fully operational from the designated control center to the work site with the original equipment manufacturer's software.

2. Project Testing.

THE FIRST SENTENCE OF THE SECOND PARAGRAPH IS CHANGED TO:

After the Contractor's verification test, the Department will conduct a 14-day observational and functional test period of all systems on the Project.

E. Final Documentation.

THE FOLLOWING IS ADDED AT THE END OF FIRST PARAGRAPH:

Place one set of all manuals of each device in the respective controller cabinet installed in the field, and provide a set to the RE. Also, send an electronic set to the RE. Provide all documentation listed under this section at or prior to Substantial Completion of the project.

THE FOLLOWING IS ADDED TO THE FOURTH PARAGRAPH:

10. Certification of successful deployment of ITS components from the respective equipment manufacturers with complete details of any repair work performed under warranty.

THE FOLLOWING IS ADDED:

G. Warranty. In addition to the provisions set forth in Section 108.21, document all repairs made by the manufacturer or its designated representative to the device under warranty during construction. Include an explanation of the exact repairs made and identification of parts replaced by part number and circuit number. Provide all necessary equipment for safe access to the installed device along with traffic control promptly upon request by the manufacturer to perform the repairs under warranty during this period. Provide the Department with a complete record of the repairs made to each device as part of the Final Documentation. Ensure that a minimum two year warranty certificate by the manufacturer is provided and transferred to the Department with documentation as set forth in Section 704.02.01 for any repairs to be performed by the manufacturer after substantial completion.

704.03.02 Camera Surveillance System (CSS)

B. Installation.

The Department will allow existing camera system shutdowns from _____. For each half hour the work extends beyond those time frames, the Department will assess liquidated damages of $500 per half hour.

THE FOLLOWING IS ADDED AFTER THE FIRST PARAGRAPH :

If directed by the RE, provide a bucket truck with safety equipment that can reach the height of the camera. Operate the bucket truck for the Department to use to determine the camera's final location and orientation, and for testing.

1. Foundation CSS.

THE FOLLOWING IS ADDED:

Ensure that the anchor bolts are placed after verifying the orientation of the camera lowering system to minimize the obstruction of desired camera view by the Camera Standard.

2. Camera Standard.

THE FOLLOWING IS ADDED:

At least 30 days before beginning construction, submit working drawings for approval that include structural calculations meeting the specified criteria. Ensure the calculations are signed and sealed by a Professional Engineer.

3. Camera

THE FIRST PARAGRAPH IS CHANGED TO:

Mount the camera housing and camera according to the manufacturer's recommendation. Ensure that the camera's field of view is unobstructed. Perform tree trimming and site clearing to provide an unobstructed field of view as directed by the RE. Set up "On Screen Display" to indicate the quadrant views with directional titles (e.g. NB view, EB view, SB view, WB view) displayed in the bottom right corner of the screen for each camera. Leave the display blank for any quadrant not representing any highway view. For a camera with multiple highway views, include route and directional title (e.g. Rt 1 NB view). Also, establish a pan and tilt zones system and set up 4 presets for quick pan-tilt-zoom views prior to level B testing. At least 6 days prior to Level C testing, submit a request to the RE for the Department to integrate each camera into the designated control center CSS control software management system in use at the time of construction.

THE FOURTH PARAGRAPH IS CHANGE TO:

Provide a drill, a drill adaptor assembly and a manual crank assembly with handle for each impacted TOC when a CSS Type A or B standard is installed.

F. Equipment Training.

THE FOLLOWING IS ADDED:

G. Warranty. Perform repairs under warranty and provide documentation as specified in 704.03.01.G.

704.03.03 Fiber Optic Cable

B. Installation.

The Department will allow existing system shutdowns on the fiber network from _____. For each half hour the work extends beyond those time frames, the Department will assess liquidated damages of $500 per half hour.

THE FOLLOWING IS ADDED TO THE SIXTH PARAGRAPH:

When installing fiber optic cable in existing conduits, install a tracer wire as specified in 701.03.15.A. Perform testing of existing tracer wires for continuity and perform splicing required to ensure access to the tracer wire from cabinet to cabinet.

THE FIRST SENTENCE OF THE LAST PARAGRAPH IS REVISED TO:

Splice a manufacturer recommended fiber optic breakout kit with connectors to each end of the strands for a cable that terminates at a device cabinet.

C. Testing

THE LAST PARAGRAPH IS CHANGED TO:

After completion of Level 1 and 2 tests, perform network communication system testing and demonstrate that the communication system is fully operational to meet the material specifications and project requirements. Complete the testing as specified on the Department provided forms and instructions.

F. Equipment Training.

704.03.04 Controlled Traffic Signal System (CTSS)

B. Installation.

The Department will allow existing CTSS system shutdowns from _____. For each half hour the work extends beyond those time frames, the Department will assess liquidated damages of $500 per half hour.

C. Testing.

THE FIRST PARAGRAPH IS CHANGED TO:

Perform testing as specified in 704.03.01.C, except do not perform Level B Testing.

F. Equipment Training.

THE FOLLOWING IS ADDED:

G. Warranty. Perform repairs under warranty and provide documentation as specified in 704.03.01.G.

704.03.05 Travel Time Systems (TTS)

B. Installation.

The Department will allow existing TTS system shutdowns from _____. For each half hour the work extends beyond those time frames, the Department will assess liquidated damages of $500 per half hour.

C. Testing.

THE FOLLOWING IS ADDED:

For TTS with transmit, both Level B and Level C Testing will be done with integration into TRANSCOM's transmit software control system and the control center software management systems.

F. Equipment Training.

THE FOLLOWING IS ADDED:

G. Warranty. Perform repairs under warranty and provide documentation as specified in 704.03.01.G.

704.03.06 Road Weather Information System (RWIS)

B. Installation.

The Department will allow existing RWIS system shutdowns from _____. For each half hour the work extends beyond those time frames, the Department will assess liquidated damages of $500 per half hour.

F. Equipment Training.

THE FOLLOWING IS ADDED:

G. Warranty. Perform repairs under warranty and provide documentation as specified in 704.03.01.G.

704.03.07 Dynamic Message System (DMS)

B. Installation.

The Department will allow existing DMS system shutdowns from _____. For each half hour the work extends beyond those time frames, the Department will assess liquidated damages of $500 per half hour.

THE FOLLOWING IS ADDED TO THE FIRST PARAGRAPH:

Construct the DMS sign mounting structure and foundation as specified in Division 500.

1. Foundation DMS.

THIS SUBPART HEADING AND TEXT ARE CHANGED TO:

1. Foundation DMS Ground Mounted. Construct the foundation as specified in701.03.12 and 51X.03.

2. DMS Standard.

THIS SUBPART HEADING AND TEXT ARE CHANGED TO:

2. DMS Standard Ground Mounted. At least 30 days before beginning work, submit working drawings for certification that include sign mounting and lifting calculations. Ensure the calculations are signed and sealed by a Professional Engineer.

Excavate as specified in 202.03.03.

Set anchor bolts into template to maintain alignment and elevation. Secure in position to prevent displacement while placing concrete. Place reinforcement steel as specified in 504.03.01 before placing the concrete. Ensure that concrete placement complies with the limitations as specified in 504.03.02.C. Place concrete as specified in 504.03.02.D. Cure concrete as specified in 504.03.02.F.

Erect posts as specified in 512.03.01.G

3. DMS Sign.

4. DMS Sign with Controller.

5. DMS Sign Install and DMS Sign With Controller Install.

THE FIRST PARAGRAPH IS CHANGED TO:

Submit working drawings that include sign mounting and lifting calculations, and controller installation requirements. Ensure the calculations are signed and sealed by a Professional Engineer. Within 25 days after receiving direction from the RE, provide the address of the location for the delivery of the specified DMS signs. Inspect and provide notice of acceptance as specified in 106.02. The Department will provide for delivery of the signs within 6 months of Notice to Proceed. Mount the sign on the DMS standard or sign support structure, and make all wire and cable connections to the DMS sign controller according to the sign manufacturer's recommendations. When required by the type of sign, securely bolt the controller to the

foundation in a vertical position using stainless steel hardware. Seal the underground conduit entrance to the controller with a sealing compound. Coordinate with the manufacturer, and provide access and support, for any warranty work covered by the DMS material.

C. Testing.
THE FOLLOWING IS ADDED:

For DMS specified for integration in Traffic Operations Center South, both Level B and Level C Testing will be done with integration into the Vanguard control software system.

F. Equipment Training.

THE FOLLOWING IS ADDED:

G. Warranty. Perform repairs under warranty and provide documentation as specified in 704.03.01.G.

704.03.08 Weigh in Motion System (WIMS)

B. Installation.

The Department will allow existing WIMS system shutdowns from _____. For each hour the work extends beyond those time frames, the Department will assess liquidated damages of $1000 per hour.

F. Equipment Training.
THE FOLLOWING IS ADDED:

G. Warranty. Perform repairs under warranty and provide documentation as specified in 704.03.01.G.

704.03.09 Traffic Volume System (TVS)

B. Installation.

The Department will allow existing TVS system shutdowns from _____. For each hour the work extends beyond those time frames, the Department will assess liquidated damages of $1000 per hour.

F. Equipment Training.

THE FOLLOWING IS ADDED:

G. Warranty. Perform repairs under warranty and provide documentation as specified in 704.03.01.G.
THE FOLLOWING IS ADDED:

704.03.10 Adaptive Image Detector, CTSS
Install adaptive image detector, CTSS to a mast arm, with an automatic control unit, a pointing device and all material needed to provide accurate vehicle detection at the specific location. Mount and install according to the manufacture's recommendation, including all cable and cable connections from the camera to the control unit without splices.

Provide and install Adaptive Image Detector, CTSS. Maintain compatibility with the existing traffic signal detection. Employ a manufacturer's certified representative to program and configure the detection zones, detector processor and associated software.

Install image detector cable continuously do not splice the image detector cable.

704.04 MEASUREMENT AND PAYMENT
THE FOLLOWING ITEMS ARE ADDED:

Item	*Pay Unit*
DMS STANDARD GROUND MOUNTED	UNIT
FIBER CROSS CONNECT CABINET	UNIT
ITS CONDUIT, TYPE A	LINEAR FOOT
ITS CONDUITS, TYPE A MODIFIED	LINEAR FOOT
METER CABINET ITS	UNIT

FOUNDATION CSS	UNIT
FOUNDATION DMS GROUND MOUNTED	UNIT
JUNCTION BOX ITS, RELOCATION	UNIT
ADAPTIVE IMAGE DETECTOR, CTSS	UNIT

THE FOLLOWING ITEMS ARE DELETED:

Item	*Pay Unit*
DMS STANDARD TYPE _____	UNIT
FOUNDATION CSS TYPE_____	UNIT
FOUNDATION DMS TYPE_____	UNIT

THE FOLLOWING IS ADDED AFTER THE FIRST PARAGRAPH:

The Department will consider ITS CONDUITS, TYPE A MODIFIED as a single conduit comprised of multiple individual conduits as shown in details and will make payment as one unit.

The Department will accept either drilled shaft foundation method or alternate spread footing method for the installation of ground mounted DMS sign structures and will make payment under FOUNDATION DMS GROUND MOUNTED.

THE TABLE UNDER SECOND PARAGRAPH IS REVISED TO:

Work Completed	**Payment**
Installing the Item	60% of Total Contract Price
Successful completion of Level A testing	10% of Total Contract Price
Successful completion of Level B testing	10% of Total Contract Price
Successful completion of Level C testing	10% of Total Contract Price
Successful completion of Project testing	10% of Total Contract Price

THE FOLLOWING IS ADDED
The image detector cable is paid for under the item: ADAPTIVE IMAGE DETECTOR, CTSS.

DIVISION 800 – LANDSCAPING

SECTION 802 – TRIMMING AND REMOVING TREES

802.03.02 Removing Existing Trees

THE FOLLOWING IS ADDED:

The Office of Landscape Architecture will inspect material in early Spring 2013 to determine which material will need to be removed due to death or decline from salt inundation. A list of locations of trees to be removed will be given to the Contractor as soon as the material has been evaluated.

SECTION 811 – PLANTING

811.01 DESCRIPTION

THE FOLLOWING IS ADDED TO THIS SUBPART:

This section also describes maintenance of existing trees and shrubs including trimming, furnishing and placing of fertilizer, and the general treatment for any major disease or insect infestation due to salt inundation and any other general maintenance.

811.02 MATERIALS

THE FOLLOWING IS ADDED:

For Tree Maintenance, use a 10-6-4, 50 percent organic fertilizer containing a minimum 10% nitrogen, 6% available phosphoric acid and 4% soluble potash. Ensure that each delivery of fertilizer is accompanied by a delivery slip showing the weight and a certified chemical analysis of the fertilizer composition.

Use pesticides and fungicides according to the recommendations for the treatment of the specific infestation found on the project. Ensure that each product meets the requirements of the manufacturer and is applied according to the manufacturer's recommendations.

For stone mulching, use an aggregate of 3/8" nominal Quartzose Aggregate from a local quarry. Ensure that the color of the aggregate is a natural local blend of south New Jersey quartzose, obtained from one quarry, and that it matches the aggregate used in the item Nonvegetative Surface, Porous Resin Bound Aggregate 2" Thick. The Office of Landscape Architecture will provide the Contractor with a color sample to match and will approve color.

Notify the RE and Office of Landscape Architecture 72 hours prior to performing tree maintenance work.

811.03.01 Planting

E. Excavation for Plant Pits and Beds.

THE LAST SENTENCE OF THE SECOND PARAGRAPH IS CHANGED TO:

Obtain RE approval before reusing topsoil from the excavated pits.

I. Watering.

THE FIRST PARAGRAPH IS CHANGED TO:

Water plants with sufficient frequency and quantity to ensure that the soil surrounding the root system remains moist but not saturated.

THE FOLLOWING IS ADDED:

O. Tree Maintenance. The Office of Landscape Architecture will inspect material in early Spring 2013 to determine which material will need to receive tree maintenance.

Water plants as per direction of the Office of Landscape Architecture or a certified tree expert if the plants show indication of stress due to salt inundation.

Trim existing trees in accordance with subsection 802.03.01.

Fertilize trees as per direction or supervision of a certified tree expert. Calculate the amount of fertilizer at a rate of three pounds (3 lb.) per inch of diameter breast height (DBH). Bore holes 1-1 1/2 feet deep, in concentric circles spaced 2 feet apart, beginning from the outer branch limit (dripline) to one-half the distance between the dripline and the trunk. Divide the fertilizer equally between all the holes and mix at a ratio of 1 part fertilizer to 2 parts topsoil. Place the mixture in the holes and tamp with a rod. Water the area thoroughly at a rate of 5 gallons per square yard of fertilized area immediately after fertilizing. Alternative methods of fertilization may be used with the approval of the RE.

Use a certified pesticide applicator for all pesticide and/or herbicide applications. Use pesticides and fungicides according to the recommendations for the treatment of the specific infestation found on the project. Ensure that each product meets the requirements of the manufacturer and is applied according to the manufacturer's recommendations

811.03.02 Plant Establishment Period

THE THIRD AND FOURTH PARAGRAPHS ARE CHANGED TO:

The Department will reinspect the plants annually for 1 years, beginning approximately 1 year after the start of the plant establishment period. If the Department determines that plants need to be replaced after each inspection, replant plants as specified in 811.03.01 within 3 weeks of notification. If replacing outside of the optimal planting season as specified in Table 811.03.01-1, only use containerized or balled and burlapped plants that are certified as being dug dormant.

2. Maintenance Bond.

Provide a bond to the Department in the amount of $ 75,000.00.

811.04 MEASUREMENT AND PAYMENT

THE FOLLOWING ITEM IS ADDED:

Item	*Pay Unit*
EVERGREEN TREE, 7-8' HIGH B&B	UNIT
TREE MAINTENANCE	LUMP SUM

DIVISION 900 – MATERIALS

SECTION 901 – AGGREGATES

901.11 SOIL AGGREGATE

1. Composition of Soil Aggregate.

THE FOLLOWING IS ADDED TO THE LAST PARAGRAPH:

For Designation I-14, the Contractor may use up to 30 percent steel slag by weight of the coarse aggregate portion of the soil aggregate. Obtain steel slag from a source listed on the QPL as specified in 901.01. Use steel slag that was produced as a co-product of the steel making process. Ensure that the steel slag consists of tough, durable pieces that are uniform in density and quality. Stockpile steel slag as specified in 901.02. Ensure steel slag for blending with I-14 Soil Aggregate does not exceed 0.50 percent expansion from hydration when tested according to ASTM D 4792.

SECTION 902 – ASPHALT

902.02.02 Composition of Mixtures

TABLE 902.02.02-2 IS CHANGED TO:

Table 902.02.02-2 Additional Fine Aggregate Requirements for HMA

Tests	Test Method	Minimum Percent
Uncompacted Void Content of Fine Aggregate	AASHTO T 304, Method A	45
Sand Equivalent	AASHTO T 176	45

902.02.04 Sampling and Testing

B. Sampling.

THIS ENTIRE PART IS CHANGED TO:

The ME will take a random sample from each 700 tons of production for volumetric acceptance testing and to verify composition.. The ME will perform sampling according to AASHTO T 168, NJDOT B-2, or ASTM D 3665.

902.03.02 Mix Design

THE FOURTH PARAGRAGH IS CHANGED TO:

The ME will test 2 specimens to verify that the final JMF produces a mixture that has a minimum void content as specified in Table 902.03.03-1. The ME will determine percent air voids according to AASHTO T 209, and either NJDOT B-6 or AASHTO T 331.

902.03.03 Sampling and Testing

THE FOLLOWING IS ADDED TO THE FIRST PARAGRAPH:

Ensure that the mix meets the requirements as specified in 902.02.04.A, otherwise the RE or ME will reject the material.

THE SECOND PARAGRAPH IS CHANGED TO:

During production, the ME will take one random acceptance sample from each 700 tons of production to verify composition. Conduct air voids and draindown tests as directed by the ME.

THE FOURTH PARAGRAPH IS CHANGED TO:

The ME will perform sampling according to NJDOT B-2 or ASTM D 3665, and will perform testing for composition according to AASHTO T 308 or NJDOT B-5. Perform testing for air voids according to AASHTO T 209 and either NJDOT B-6 or AASHTO T 331. Perform testing for draindown according to NJDOT B-7 or NJDOT B-8.

902.04.03 Sampling and Testing
THE FIRST PARAGRAPH IS CHANGED TO:

Ensure that the mix meets the requirements as specified in 902.02.04.A, otherwise the RE or ME will reject the material. Maintain the temperature of the mix between 300 °F and 330 °F. Perform and meet requirements for quality control testing as specified in 902.02.04.C.

THE SECOND PARAGRAPH IS CHANGED TO:

During production, the ME will take one random acceptance sample from each 700 tons of production to verify composition. Conduct draindown tests as directed by the ME.

902.05.01 Composition of Mixture
THE FIFTH PARAGRAPH IS CHANGED TO:

For fine aggregate, use stone sand conforming to 901.05.02. Ensure that the combined fine aggregate in the mixture conforms to the requirements in Table 902.02.02-2.

902.05.02 Mix Design
THE FIRST PARAGRAPH IS CHANGED TO:

Design the SMA to meet the requirements in Table 902.05.02-1 and Table 902.05.02-2. Prepare the JMF according to AASHTO R 46. Determine the JMF at 4 percent air voids and 75 gyrations of the Superpave gyratory compactor.

TABLE 902.05.02-2 IS CHANGED TO:

Table 902.05.02-2 SMA Mixtures Volumetrics For Design and Plant Production

Property	Production Control Tolerances	Requirement
Air Voids	±1%	4.0%
Voids in Mineral Aggregate (VMA)	–	17.0% minimum
VCA_{mix}	–	Less than VCA_{dry}
Draindown @ production temperature	–	0.30% maximum
Asphalt Binder Content (NJDOT B-5)	±0.15%	6% minimum
Asphalt Binder Content (AASHTO T 308)	±0.40%	6% minimum
Tensile Strength Ratio (AASHTO T 283)	–	80% minimum

902.05.03 Sampling and Testing
THE FOLLOWING IS ADDED TO THE FIRST PARAGRAPH:

Ensure that the mix meets the requirements as specified in 902.02.04.A, otherwise the RE or ME will reject the material.

THE SECOND PARAGRAPH IS CHANGED TO:

During production at the plant, the ME will take a sample from each 700 tons of production to verify composition and air voids. Conduct draindown, VCAmix, VCAdry, and VMA testing as directed by the ME. Perform tests according to AASHTO R 46.

THE FOURTH PARAGRAPH IS CHANGED TO:

The ME will perform sampling according to NJDOT B-2 or ASTM D 3665, and will perform testing for composition according to AASHTO T 308, or NJDOT B-5. The ME will determine bulk specific gravity of the compacted sample

according to AASHTO T 166 or AASHTO T 331. The ME will use the most current QC maximum specific gravity test result, obtained according to AASHTO T 209, in calculating the volumetric properties of the SMA. Perform testing for draindown according to AASHTO T 305.

902.06.03 Sampling and Testing
THE FOLLOWING IS ADDED TO THE FIRST PARAGRAPH:

Ensure that the mix meets the requirements as specified in 902.02.04.A, except that the temperature of the mix at discharge is required to be between 230 °F and 275 °F, otherwise the RE or ME will reject the material.

THE SECOND PARAGRAPH IS CHANGED TO:

During production, the ME will take one random acceptance sample from each 700 tons of production to verify composition. Conduct draindown tests as directed by the ME.

SECTION 903 – CONCRETE

903.03.06 Tables

Table 903.03.06-2 Requirements for Structural Concrete Items
THE SEVENTH LINE UNDER CAST-IN-PLACE ITEMS IS CHANGED TO:

Table 903.03.06-2 Requirements for Structural Concrete Items

	Concrete Class	Slump[1] (inches)	Percent Air Entrainment for Coarse Aggregate[1]	
			No. 57 & No. 67	No. 8
Decks, Sidewalks, Curbs, Parapets, Concrete Patch	A	3 ± 1	6.0 ± 1.5	7.0 ± 1.5

903.05.04 Control and Acceptance Testing Requirements
THE SUPERSCRIPT REFERENCE NO. 4 UNDER TABLE 903.05.04-1 IS CHANGED TO:

4. For chloride permeability testing, the ME will mold 4 additional cylinders, taking 2 cylinders each from 2 randomly selected delivery trucks for testing at 56-days.

THE FOURTH PARAGRAPH IS CHANGED TO:

If, upon testing at 56 days, 1 or more individual test results exceed 2000 coulombs, the RE may:

1. Require that the Contractor remove and replace the defective lot, or
2. Allow the Contractor to submit a corrective action plan for approval.

THE FOLLOWING IS TO BE ADDED TO THIS SECTION:

903.11 Miscellaneous Concrete (Groundwater Baffles)

903.11.01 Description.

Due to the potential for contaminated groundwater, the installation of groundwater baffles is required in newly installed storm and sanitary sewer pipe trenches. The groundwater baffles are to prevent the migration of contaminated groundwater through the newly constructed pipe trenches.

903.11.02 Materials.

The groundwater baffles shall be constructed of a slurry mixture composed of high-grade granular bentonite, Type I or Type II Portland cement and portable water. The mixture ratio shall be approximately on part bentonite to 19 parts cement with a water to cement ratio of 0.74. The slurry shall be thoroughly mixed vial recirculation in a mixing vessel with an air pump or approved equal. The acceptable density range shall be 1600 to 1760 kilograms per cubic meter. The density of the slurry shall be measured in the field with a mud balance to ensure proper mix ratios.

903.11.03 Construction Requirements.

Groundwater baffles shall be constructed in the newly installed storm sewer pipe trenches at location as shown on the plans.

The baffles shall be installed at intervals of approximately 40 feet in the proposed pipe trenches. Each baffle shall span the entire width of the pipe trench and shall be approximately 1.0 feet thick. The baffles shall be made of a thick slurry like mixture of bentonite and Portland cement that is placed in the trench like thick concrete but has the long term low permeability qualities of clay.

The slurry shall not be placed until it is within the acceptable density range. The desired location for placement of the baffle shall be formed with plywood prior to placement of the slurry to ensure placement at the desired location. Other methods of limiting the potential migration of contaminated groundwater may be utilized (concrete, geomembrane liners or clay soil) with the approval of the Engineer.

903.11.04 Measurement and Payment.

Payment will be made under:

Pay Item	*Pay Unit*
MISCELLANEOUS CONCRETE	CUBIC YARD

The Groundwater Baffles will be paid for under the item: MISCELLANEOUS CONCRETE.

SECTION 904 – PRECAST AND PRESTRESSED CONCRETE

904.01.02 Fabrication
THE LAST SENTENCE OF PART 2 IS CHANGED TO:

If using SCC, minimize or eliminate the use of vibrators to prevent segregation.

904.02.06 Quality Control and Acceptance Requirements
STEP 2 IN THE THIRD PARAGRAPH IS CHANGED TO:

2. Dimensions not conforming to the tolerances specified in Table 904.02.02-1.

SECTION 905 – REINFORCEMENT METALS

905.01.03 Welded Wire Reinforcement
THE SECOND PARAGRAPH IS CHANGED TO:

When approved as an alternate to galvanized reinforcement bars, use galvanized welded wire reinforcement that meets the requirements of ASTM A 641, Table 1, Class 1.

905.01.05 Dowels
THE ENTIRE SUBPART IS CHANGED TO:

Use plain reinforcement bars according to ASTM A 615, Grade 60. Galvanize according to ASTM A 123.

905.03.03 Dowel Bars
THE FIRST PARAGRAPH IS CHANGED TO:

For dowel bars in transverse joints, use epoxy-coated, Grade 60, plain reinforcement steel according to ASTM A 615. If shown on the Plans, use dowel bars fitted with end caps. Ensure that the end caps are non-metallic and designed to prevent the entrance of grout or mortar into the expansion void.

SECTION 909 – DRAINAGE

909.02.08 DUCTILE IRON WATER PIPE
THE FOLLOWING IS ADDED TO THE END OF THIS SECTION:

Use of a Double Cement Interior Lining must conform to ANSI/AWWA C104/A21.4-08.

Use of a Polyethylene Wrap must conform to ANSI/AWWA C105/A21.5-10

THE FOLLOWING SUBPARTS ARE ADDED:

909.02.10 PVC Sewer Pipe
THE FOLLOWING IS ADDED TO THE END OF THIS SECTION:

All PVC pipe shall meet the requirements of ASTM D3034 (SDR-35). In addition to straight pipe, the contractor shall furnish all fittings, adapters, elbows, WYES, etc. of the same material for all the work shown on the drawings. Each pipe and fitting shall be clearly marked on the outside surface with the trade name, pipe size, and class designation.

909.02.11 Ductile Iron Sewer Pipe
THE FOLLOWING IS ADDED TO THE END OF THIS SECTION:

Ductile iron pipe shall be manufactured in accordance with ANSI A21.51 and shall be thickness Class 52 except where otherwise specified. Mechanical joints or push-on type joints shall conform to ANSI A21.11.

All fittings shall be mechanical joint type and shall conform to ANSI A21.10. Fittings shall conform to pressure ratings of 250 psi.

The pipe shall be furnished with the necessary rubber gaskets.

All exposed sewage piping at the pump station, in the wet well and valve pit, shall have flanged joints conforming to ANSI B 16.1.

SECTION 911 – SIGNS, SIGN SUPPORTS, AND DELINEATORS

911.02.02 Breakaway Sign Supports for Ground Mounted Signs
THE ENTIRE SUBPART IS CHANGED TO:

Fabricate and construct breakaway sign supports for ground mounted signs using materials conforming to the requirements in Table 911.02.02-1.

Table 911.02.02-1 Materials for Breakaway Sign Supports

Item	Test Method	Type or Grade	Galvanizing
Aluminum Materials (other than bracket)	911.01.01		
Bracket	B308	6061-T6	
Structural steel shapes	ASTM A709	Grade 36	ASTM A123
Steel Sheet	ASTM A1011	Grade 36	ASTM A 653
Bolts (except special bolt for coupling)	ASTM A325		ASTM A153

Special bolt for coupling	ASTM A449		ASTM A153
Cap Screw	ASTM A307		ASTM A153
Lock Washer	ANSI B18-21-1		ASTM A153
Nut	ASTM A563	Grade DH	ASTM A153
Coupling	AMS 6378 F		ASTM A153
Steel Hinge Plate	AISI 4130		ASTM 123
Anchor Rod	AISI 1045		
Anchor Coil	AISI 1008		
Anchor Washer	908.04		
Anchor Ferrule	908.04		

Submit mill certificates for the component materials.

911.02.03 Non-Breakaway Sign Supports for Ground Mounted Signs
THE TEXT OF THIS SUBPART IS DELETED.

THIS SUBPART IS INTENTIONALLY LEFT BLANK

911.03 FLEXIBLE DELINEATORS

1. Delineator Dimensions.

b. Guide Rail Mounted.
THE ENTIRE TEXT IS CHANGED TO:

Ensure that the unit for beam guide rail mounted flexible delineators has a minimum width of 3 inches and a minimum thickness of 0.100 inch. Use units of a height that will ensure that the top of the reflective area is 5 ± 2 inches above the top of post.

Design the base of the unit to mount over the I-beam blockout or to the top of a wood or synthetic blockout, of the beam guide rail.

c. Barrier Curb Mounted.
THE ENTIRE TEXT IS CHANGED TO:

For barrier curb mounted flexible delineators, use a delineator that is 3-1/2 × 3-1/2 inches, with a minimum thickness of 0.100 inch, and that has a base that forms a "T" shape with the panel for mounting on the side of the barrier curb, and is flexible or hinged so as to return to its original position after being struck.

THE FOLLOWING IS ADDED:

d. Construction Barrier Curb Mounted. For construction barrier curb top mounted flexible delineators, use a delineator that is 6 x 12 inches with a minimum thickness of 0.100 inch. For construction barrier curb side mounted flexible delineators, use a delineator that is 3-1/2 x 3-1/2 inches with a minimum thickness of 0.100 inch, and that has a base that forms a "T" shape with the panel for mounting on the barrier curb and is flexible or hinged so as to return to its original position after being struck.

4. Retroreflective Sheeting.

b. Guide Rail Mounted.
THE ENTIRE TEXT IS CHANGED TO:

Ensure that the sheeting is a minimum of 3 inches square and is mounted on the upper portion of the delineator.

THE FOLLOWING IS ADDED:

d. Construction Barrier Curb Mounted. Ensure that the sheeting for top mounted flexible delineators is 6 x 12 inches and the sheeting for side mounted flexible delineators is 3-1/2 x 3-1/2 inches.

Submit a certification of compliance, as specified in 106.07, for delineators.

SECTION 912 – PAINTS, COATINGS, TRAFFIC STRIPES, AND TRAFFIC MARKINGS

912.03.01 Epoxy Traffic Stripes

B. Glass Beads.
THE FOLLOWING IS ADDED TO THE FIRST PARAGRAPH:

Ensure that glass beads do not contain more than 200 ppm of lead, 200 ppm of antimony, or 200 ppm of arsenic.

912.03.02 Thermoplastic Traffic Markings
THE FOLLOWING IS ADDED TO THE FIRST PARAGRAPH:

Ensure that glass beads do not contain more than 200 ppm of lead, 200 ppm of antimony, or 200 ppm of arsenic.

912.04.01 Latex Paint
THE FOLLOWING IS ADDED TO THE SECOND PARAGRAPH:

Ensure that glass beads do not contain more than 200 ppm of lead, 200 ppm of antimony, or 200 ppm of arsenic.

SECTION 913 – GUIDE RAIL, FENCE, AND RAILING

913.01.05 Miscellaneous Hardware
SUBPART 3 OF THE FIRST PARAGRAPH IS CHANGED TO:

3. Use plates for guide rail on bridges and buried guide rail terminals conforming to ASTM A 36 and galvanized according to ASTM A 123.

SECTION 914 – JOINT MATERIALS

914.04.01 Preformed Elastomeric (Compression Type)

B. Joint Sealer.
THE LAST SENTENCE OF THE SECOND PARAGRAPH IS CHANGED TO:

If splicing of a sealer is allowed, ensure that the sealer at the splice point has no significant misalignment at its sides or top and that misalignment at the bottom does not exceed half of the bottom wall thickness.

SECTION 917 – LANDSCAPING MATERIALS

917.05 SEED MIXTURES

917.05.01 Grass Seed Mixtures

REPLACE TABLE 917.05.01-4 TYPE B GRASS SEED MIXTURE WITH THE FOLLOWING:

Table 917.05.01-4 Type B Grass Seed Mixture			
Kind of Seed	**Minimum Purity, Percent**	**Minimum Germination, Percent**	**Percent of Total Weight of Mixture**
Redtop	92	85	10
Red Fescues (Creeping or Chewings)	95	80	55
Blackwells Switchgrass	95	85	15
Perennial Ryegrass	98	85	5
Kentucky 31	95	80	15

917.10 PLANT MATERIALS

H. Inspection.

THE SECOND PARAGRAPH IS CHANGED TO:

The Department may inspect plant materials before delivery to the Project Limits and upon delivery to the Project Limits before installation. The Department may seal the inspected plant materials. For plant material originating from nurseries farther than 100 miles from the Project Limits, stock plant material at a Contractor-provided holding yard that is acceptable to the Department. The Department may inspect plant material originating from nurseries within 100 miles of the Project Limits at the nursery. Ensure that all plant material is untied and located so that trunk or stem and branch structure can be easily inspected. Provide sufficient notice to allow Department inspection at the nursery or holding yard and to allow time for Contractor reordering of rejected material. Notify the RE at least 5 days in advance of delivery to the Project Limits for installation. The Department will reject materials arriving with broken or missing seals, broken or loose balls, broken or pruned leaders, insufficient protection, or that have been damaged in transit. The Department may randomly inspect the root system of the plant material by breaking open the earth balls. Provide necessary assistance during Department inspections.

SECTION 918 – ELECTRICAL MATERIALS

918.01 CONDUIT AND FITTINGS

4. Flexible Nonmetallic Conduit.

THE FOLLOWING IS ADDED:

For colored conduits (other than black and natural) ensure the "X" designation as part of the Cell Classification under Section 6.2 of ASTM D 3350 is "E".

For ITS Conduit Type __, one of the conduits that is designated for electrical use is to be extruded integrally colored red to indicate its use for Electrical wiring.

918.12 PEDESTALS, POLES, TRANSFORMER BASES, AND MAST BRACKET ARMS

THE FIRST SENTENCE OF THE FIRST PARAGRAPH IS CHANGED TO:

Fabricate pedestals, poles, transformer bases, and mast bracket arms for traffic signal, highway lighting, and camera standards with materials according to the appropriate ASTM standard and the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

DIVISION 1000 – EQUIPMENT

SECTION 1001 – TRAFFIC CONTROL EQUIPMENT

THE FOLLOWING SUBSECTION IS ADDED:

1001.04 PORTABLE VARIABLE MESSAGE SIGN WITH REMOTE COMMUNICATION

Provide a NTCIP compliant portable variable message sign as described under 1001.02 equipped with broadband cellular modem.

THE FOLLOWING IS ADDED:

Provide a NTCIP compliant portable variable message sign as described under 1001.02 with the exceptions noted below and each equipped with broadband cellular modem.

Ensure that the sign panel is capable of displaying three lines of text with variable size characters.

Ensure nine characters are displayed per line for posting travel times. For this nine character requirement, smaller size characters may be allowed that meets MUTCD guidelines.

Ensure that the panel is also capable of displaying eight (8) characters per line with a minimum character height of eighteen (18) inches.

1001.05 PORTABLE TRAILER MOUNTED CCTV CAMERA ASSEMBLY

Provide a Portable Trailer Mounted CCTV Camera Assembly (PTMCCA) with the following:

A. Trailer Platform

1. Maximum size, including tongue, 14 feet long by 7 feet wide by 8 feet high.
2. NJDOT approved lighting package to include electrical brake and marker lights with wire connections.
3. Primed and painted with powder coated orange color.
4. Fitted with manual telescoping outriggers with adjustable jacks sized to counter full mast extension.
5. Four 3500 pounds, drop leg, top wind screw jacks.
6. All equipment secured to prevent theft or separation from platform.
7. 24/7 operation in all weather conditions.
8. One locking NEMA-4 equipment box for operational controls.
9. Removable wheels (with wheel locks) when trailer is in deployed position.
10. Operation manual with a copy placed in the storage bin.

B. Mast

1. 150 pounds payload capacity.
2. 29 feet to 32 feet of extension with capability to mount antenna at 20 feet, 25 feet or at the top, 10 feet maximum nested length of mast - 3 to 9 sections.
3. Un–guyed.
4. Driven by galvanized steel cable.
5. Spiral conduit for cables.
6. Compactly retractable when nested into storage container at the bottom & foldable for easy transport.
7. Operated by a power winch with a safety brake.

8. Capable of being raised or lowered during sustained wind speeds of 30 miles per hour.

C. Power Source

Equip the PTMCCA with either a diesel charged or a solar charged battery system. Ensure that the PTMCCA is also capable of operating on 120-volt AC electrical service. The Department may require a solar charged battery system in noise sensitive areas. Provide the power with a battery backup system capable of providing continuous operation when the primary power source fails. Ensure that the power source meets the following requirements:

1. Diesel. Ensure that the fuel tank is capable of operating the sign for a period of 72 hours without refueling. Equip with an exhaust muffler and a United States Department of Forestry approved spark arrester. Ensure that the engine is shock mounted to reduce vibration and locked in a ventilated enclosure.
2. Solar. Provide solar panels capable of recharging the batteries at a rate of 4 hours of sun for 24 hours of camera usage. Ensure that the battery capacity is capable of operating the sign for a period of 18 days without sunlight.

D. Electronics

1. Cellular (CDMA), microwave, or 802.11 bandwidth option.
2. Work lights in all cabinets.
3. Remote trailer diagnostics (battery level, charging output, etc.).

E. Camera and Software

Ensure that the camera has the following characteristics:

1. Dome Camera in a heavy duty plastic dome or with a weather resistant case.
2. Impact resistant viewing window.
3. Minimum resolution of NTSC 704 (H) x 480 (V).
4. Backlight compensation.
5. Image stabilization.
6. Light Sensitivity 0.02 lux NIR Mode.
7. Auto Focus with Manual Focus capability.
8. Auto White Balance with Manual White Balance capability.
9. Motorized Zoom up to 16x optical, 10x digital.
10. Motorized Pan-Tilt, pan 360°, tilt 180°.
11. Thermostatically controlled heater and defroster -50° to 140°F operating range.
12. Windshield wiper.
13. 24/7 operation in all weather conditions.
14. Time and date stamp.

Ensure the software provides the following functionality:

1. Remote control of pan, tilt and zoom.
2. Display of streaming video in MPEG format, motion-JPEG, and single snapshot JPEG images, remotely interchangeable by using central software.
3. Preset controls of pan/tilt/zoom combinations. Ensure all presets are accessible from a drop-down menu with descriptive name of preset. Set first 8 presets with quick- launch icons with graphical representation of the preset views.
4. Display of all the project's web cams in a single view screen.

5. Display of local time and weather conditions including temperature and humidity.
6. Saving images and sending e-mail images.
7. Viewing archived images via a graphical calendar control and storing archived images at least every five minutes.
8. Three levels of password protection: administrator, user, and guest, individual user accounts.
9. Monitoring and controlling the cameras using web access.

SECTION 1009 – HMA PLANT EQUIPMENT

1009.01 HMA PLANT

A. Requirements for HMA Mixing Plants.

THE FOLLOWING IS ADDED AFTER THE SECOND PARAGRAGH:

> The HMA producer is required to have a quality control (QC) program plan approved annually by the ME as per Materials Approval Procedure MAP-102. The HMA producer is required to ensure that the QC plan conforms to the requirements outlined in the report entitled "Hot Mix Asphalt Quality Control Program Plan" prepared by the Department of Transportation and New Jersey Asphalt Paving Association. Failure to follow these requirements will result in rejection of HMA materials supplied by the HMA producer and removal of the HMA supplier from the QPL.

THE FOLLOWING SUBSECTION IS ADDED AFTER 1009.02:

1009.03 ASPHALT-RUBBER BINDER BLENDING EQUIPMENT

Provide equipment for preparation of Asphalt-Rubber Binder. Ensure that the unit is equipped with a crumb rubber feed system capable of continuously supplying the asphalt cement feed system, and is capable of fully blending the individual crumb rubber particles with the asphalt cement. Use an asphalt-rubber binder storage tank that is equipped with a heating system capable of maintaining the temperature of the binder between 325 and 375 °F during the reaction. Ensure the asphalt-rubber binder storage tank is also equipped with an internal auger mixing device, oriented horizontally in the tank, capable of maintaining a uniform mixture of the asphalt-rubber binder.

Ensure that the tanks for storage of asphalt-rubber binder are equipped to uniformly heat the material to the required temperature under effective and positive control at all times. Ensure that heating is accomplished so that no flame comes in contact with the heating tank.

Provide a circulating system of sufficient capacity for the binder to ensure continuous circulation between the storage tank and proportioning units during the entire operating period. Ensure that the discharge end of the binder circulating pipe is maintained below the surface of the binder in the storage tank to prevent discharge of hot binder into the open air.

Ensure that pipe lines and fittings are steam or oil jacketed, electrically or otherwise heated, and insulated to prevent heat loss.

Provide valves according to AASHTO T 40, except ensure that a sampling valve is also located in the lowest third of each storage tank.

If the plant has been equipped with a water injection type asphalt foaming system, ensure that the system will allow the proper amount of asphalt rubber binder to be supplied continuously or provide a by-pass to ensure that the proper amount of asphalt rubber binder is supplied to the mix.

NJDOT TEST METHODS

NJDOT B-8 – DETERMINING JOB MIX FORMULA FOR MODIFIED OPEN-GRADED FRICTION COURSE MIXES

C. Procedure.

3. Relative VMA Asphalt Content.

THE FOURTH SENTENCE IN THE FIRST PARAGRAPH IS CHANGED TO:

Determine the bulk specific gravity, Gmb from each specimen according to NJDOT B-6 or AASHTO T 331.

THE FOOTNOTE FOR GMB IN THE SECOND EQUATION IS CHANGED TO:

Gmb = the bulk specific gravity of the specimen as determined by NJDOT B-6 or AASHTO T 331.

THE FOLLOWING TEST METHODS ARE ADDED:

NJDOT B-10 – OVERLAY TEST FOR DETERMINING CRACK RESISTANCE OF HMA

A. Scope. This test method is used to determine the susceptibility of HMA specimens to fatigue or reflective cracking. This test method measures the number of cycles to failure.

B. Apparatus. Use the following apparatus:

1. Overlay Tester. An electro-hydraulic system that applies repeated direct tension loads to specimens. The machine features two blocks, one is fixed and the other slides horizontally. The device automatically measures and records a time history of load versus displacement every 0.1 sec at a selected test temperature.

   The sliding block applies tension in a cyclic triangular waveform to a constant maximum displacement of 0.06 cm (0.025 in.). This sliding block reaches the maximum displacement and then returns to its initial position in 10 sec. (one cycle).

2. Temperature Control System. The temperature chamber must be capable of controlling the test temperature with a range of 32 to 95 ^{o}F (0 to 35 ^{o}C).
3. Measurement System. Fully automated data acquisition and test control system. Load, displacement, and temperature are simultaneously recorded every 0.1 sec.
4. Linear Variable Differential Transducer (LVDT). Used to measure the horizontal displacement of the specimen (+/- 0.25 in.). Refer to manufacturer for equipment accuracy for LVDT.
5. Electronic Load Cell. Used to measure the load resulting from the displacement (5000 lb capacity). Refer to manufacturer for equipment accuracy for load cell.
6. Specimen Mounting System. Used two stainless steel base plates to restrict shifting of the specimen during testing. The mounting jig holds the two stainless steel base plates for specimen preparation.
7. Cutting Template.
8. Two Part Epoxy. Two part epoxy with a minimum 24 hour tensile strength of 600 psi (4.1 MPa) and 24 hour shear strength of 2,000 psi (13.8 MPa).
9. 10 lb weight (4.5 kg). Used to place on top of specimens while being glued to specimen platens**.**
10. ¼ inch Width Adhesive Tape. Placed over gap in plates to prevent the epoxy from bonding the plates together.
11. Paint or Permanent Marker. Used to outline specimens on platens for placement of epoxy.
12. 3/8-in. Socket Drive Handle with a 3-in. (7.6 cm) extension.

C. Procedure. Perform the following steps:

1. Sample Preparation.

a. Laboratory Molded Specimens - Use cylindrical specimens that have been compacted using the gyratory compactor (AASHTO T 312). Specimen diameter must be 6 inches (150 mm) and a specimen height must be 4.5 inches +/- 0.2 inches (115 +/- 5 mm).

Note 1 - Experience has shown that molded laboratory specimens of a known density usually result in a greater density (or lower air voids) after being trimmed. Therefore, it is recommended that the laboratory technician produce molded specimens with an air void level slightly higher than the targeted trimmed specimen. Determine the density of the final trimmed specimen in accordance with AASHTO T 166.

b. Core Specimens – Specimen diameter must be 6 inches +/- 0.1 inch (150 mm +/- 2 mm). Determine the density of the final trimmed specimen in accordance with AASHTO T166.

2. Trimming of Cylindrical Specimen. Before starting, refer to the sawing device manufacturer's instructions for cutting specimens.

a. Place the cutting template on the top surface of the laboratory molded specimen or roadway core. Trace the location of the first two cuts by drawing lines using paint or a permanent maker along the sides of the cutting template.

b. Trim the specimen ends by cutting the specimen perpendicular to the top surface following the traced lines. Discard specimen ends.

c. Trim off the top and bottom of the specimen to produce a sample with a height of (1.5 inches +/- 0.02 inches (38 mm +/- 0.5 mm).

d. Measure the density of the trimmed specimen in accordance with AASHTO T 166. If the specimen does not meet the density requirement as specified for performance testing for the mix being tested, then discard it and prepare a new specimen.

e. Air dry the trimmed specimen to constant mass, where constant mass is defined as the weight of the trimmed specimen not changing by more than 0.05% in a 2 hour interval.

3. Mounting Trimmed Specimen to Base Plates (Platens).

a. Mount and secure the base plates (platens) to the mounting jig. Cut a piece of adhesive tape approximately 4.0 inches (102 mm) in length. Center and place the piece of tape over the gap between the base plates.

b. Prepare the epoxy following manufacturer's instructions.

c. Cover a majority of the base plates (platens) with epoxy, including the tape. Glue the trimmed specimen to the base plates.

d. Place a 10 lb (4.5 kg) weight on top of the glued specimen to ensure full contact of the trimmed specimen to the base plates. Allow the epoxy to cure for the time recommended by the manufacturer. Remove the weight from the specimen after the epoxy has cured.

e. Turn over the glued specimen so the bottom of the base plates faces upward. Using a hacksaw, cut a notch through the epoxy which can be seen through the gap in the base plates. The notch should be cut as evenly as possible and should just begin to reach the specimen underneath the epoxy. Great care should be taken not to cut more than 1/16 inch (1.58 mm) into the specimen.

f. Place the test sample assembly in the Overlay Tester's environmental chamber for a minimum of 1 hour before testing.

4. Start Testing Device. Please refer to manufacturer's equipment manual prior to operating equipment.

a. Turn on the Overlay Tester. Turn on the computer and wait to ensure communication between the computer and the Overlay Tester occurs.

b. Turn on the hydraulic pump using the Overlay Tester's software. Allow the pump to warm up for a minimum of 20 minutes.

c. Turn the machine to load control mode to mount the sample assembly.

5. Mounting Specimen Assembly to Testing Device. Enter the required test information into the Overlay Tester software for the specimen to be tested.

a. Mount the specimen assembly onto the machine according to the manufacturer's instructions and the following procedural steps.

1. Clean the bottom of the base plates and the top of the testing machine blocks before placing the specimen assembly into the blocks. If all four surfaces are not clean, damage may occur to the machine, the specimen, or the base plates when tightening the base plates.
2. Apply 15 lb-in of torque for each screw when fastening the base plates to the machine.

6. Testing Specimen.

a. Perform testing at a constant temperature recommended by the New Jersey Department of Transportation for the mixture in question. This is typically either 59 °F (15 °C) or 77 °F (25 °C).

Note 3 – Ensure the trimmed specimen has also reached the constant temperature required.

b. Start the test by enabling the start button on the computer control program. Perform testing until a 93% reduction or more of the maximum load measured from the first opening cycle occurs. If 93% is not reached, run the test until a minimum of 1,200 cycles.

c. After the test is complete, remove the specimen assembly from the Overlay Tester machine blocks.

D. Report. Include the following items in the report:

1. Date and time molded or cored.
2. NJDOT mixture identification.
3. Trimmed specimen density.
4. Starting Load.
5. Final Load.
6. Percent decline (or reduction) in Load.
7. Number of cycles until failure.
8. Test Temperature

NJDOT R-1 – OPERATING INERTIAL PROFILER SYSTEMS FOR EVALUATING PAVEMENT PROFILES

THIS ENTIRE TEST METHOD IS CHANGED TO:

A. Scope. This test method describes the procedure for operating, verifying the calibration of an ASTM E 950 Class 1 Inertial Profiler System (IPS) and testing riding surface for pavement profiles evaluation.

B. Apparatus. Use an IPS that meets the requirements of AASHTO M 328 and ASTM E 950, Class 1 and the following:

1. Certify the IPS according to AASHTO R 56 at least every 2 years. If a system component is replaced, re-certify the system. Perform the certification at a site approved by the Department.
2. The data system provides the raw profile data in an ASCII format acceptable to the Department.
3. The computer program uses a high-pass filter set at 300 feet and reads an ASCII or text file for computing the International Roughness Index (IRI) in inches per mile.
4. The current version of *ROADRUF*, *ProVal*, or other Department approved pavement profile analysis software is used to compute the IRI.

C. Procedure. Perform the following steps:

1. Operate the IPS according to AASHTO R 57 and ASTM E 950.
2. On a daily basis before data collection, check the equipment and operating system for operational stability and calibration. Perform necessary calibration procedures according to equipment

manufacturer's procedures and applicable standards. Operators shall maintain a log documenting the calibration history.

3. Ensure that the operators of the IPS have completed a profile training course, such as NHI Course 131100, have been trained specifically on the IPS they will be operating, and are proficient in the operation of the IPS.
4. Make provisions to automatically start and stop the IPS recording at the beginning and end of testing.
5 Ensure retroreflective traffic striping tape or other approved mechanism is placed at the beginning and end of each direction of travel for automatically triggering the start and stop of profile measurements.
6. Collect at least 0.05-mile of data before the area to be tested to allow the system to stabilize before profile measurements are obtained. Collect data in a continuous run through the length to be tested. If the run is interrupted, discard the results and re-run the length.
7 Test the full extent of each wheel path of each lane in the longitudinal direction of travel. The wheel path is defined as being located approximately 3 feet on each side of the centerline of the lane and extending for the full length of the lane. Lanes are defined by striping.
8 Run three tests each wheel path and report average of three runs each wheel path.
9. Exclude locations where the traffic striping includes turn lanes that cause the through traffic lane to cross over a longitudinally paved joint, ramps, and lanes such as acceleration and deceleration lanes of less than 1,000 feet of continuous through treatment.
10 Report single IRI value average of 3 runs unless otherwise directed. The single IRI value shall be each 0.01 mile length for each lane, ramp, and shoulder and 0.005 mile for each overlaid bridge structure.

FHWA ATTACHMENT NO. 1

REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTRUCTION CONTRACTS

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements forsupplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall notuse convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under

this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts

should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminateon the grounds of race, color, religion, sex, national origin, age or disabilityin the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The

employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 “Contract provisions and related matters” with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH–1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing

work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d.If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a.Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment.A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;

(2) the prime contractor remains responsible for the quality of the work of the leased employees;

(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transactionrequiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and1200.

1**. Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tierparticipant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous.A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check theExcluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from

participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

FHWA ATTACHMENT NO. 2

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246)

1. As used in these Specifications:
   a. Covered area means the geographical area in which the Project is located.
   b. Director means Director, Office of Federal Contract Compliance Programs, United States Department of Labor or any person to whom the Director delegates authority.
   c. Employer identification number means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, US Treasury Department Form 941.
   d. Minority includes:
      (1) Black (a person having origins in any of the black African racial groups not of Hispanic origin);
      (2) Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of race);
      (3) Asian and Pacific Islander (a person having originals in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
      (4) American Indian or Alaskan Native (a person having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participating or community identification).
2. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
3. The Contractor shall implement the specific affirmative action standards provided in paragraphs 6a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction Contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.
4. Neither the provisions of any collective bargaining agreement nor the failure by a union with whom the Contractor has a collective bargaining agreement to refer either minorities or women shall excuse the Contractor's obligations under these Specifications, Executive Order 111246, or the regulations promulgated pursuant thereto.
5. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the US Department of Labor.
6. The Contractor shall take specific affirmative action to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The contractor shall specifically ensure that all foreman, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment with specific attention to minority or female individual working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred back to the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the contractor a minority person or women sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the source compiles under 6b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on site supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and females and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction Contraction and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

7. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (6a through p). The efforts of a Contractor association, joint contractor union, Contractor-Community, or other similar group of which the Contractor is a member and participant may be asserted as fulfilling any one or more of its obligations under 6A through p of these Specifications provided that the Contractor actively participates in the group, make every effort to assure that the group has a positive impact on the employment of minorities and females in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work force participation, make a good faith effort to meet its individual goals and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

8. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women both minority and nonminority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

9. The Contractor shall not use the goals or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

10. The Contractor shall not enter any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

11. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspensions, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246 as amended.

12. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 6 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the

Contractor fails to comply with the requirements of the Executive Order, the implementing regulations or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

13. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone number, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (such as mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

14. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (such as those under the Public Works Employment Act of 1977 and the community Development Block Grant Program).

15. Noncompliance by the Contractor with the requirements of the Affirmative Action Program for Equal Employment Opportunity may be cause for delaying or withholding monthly and final payments pending corrective and appropriate measures by the Contractor to the satisfaction of the Department.

FHWA ATTACHMENT NO. 3

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL OPPORTUNITY (EXECUTIVE ORDER 11246)

1. The goals for minority and female participation, in the covered area, expressed in percentage terms for the Contractor's aggregate work force in each trade, on all construction work are as shown on Page 2.

   These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and nonfederally involved construction.

   The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4. (3) a, and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

2. The Contractor will provide the Department with written notification in triplicate within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification will list the name, address and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.

3. As used in this Notice and in the Contract resulting from this solicitation the covered area is the county or counties in which the Project is located.

4. If a project is located in more than one county, the minority work hours goal, only, will be determined by the county which serves as the primary source of hiring or, if workers are obtained almost equally from one or more counties, the single minority goal will be the average of the affected county goals.

WORK HOUR GOALS IN EACH TRADE FOR MINORITY AND FEMALE PARTICIPATION

COUNTY	MINORITY PARTICIPATION PERCENT	FEMALE PARTICIPATION PERCENT
Atlantic	18.2	6.9
Bergen	15	6.9
Burlington	17.3	6.9
Camden	17.3	6.9
Cape May	14.5	6.9
Cumberland	16	6.9
Essex	17.3	6.9
Gloucester	17.3	6.9
Hudson	12.8	6.9
Hunterdon	17	6.9
Mercer	16.4	6.9
Middlesex	15	6.9
Monmouth	9.5	6.9
Morris	17.3	6.9
Ocean	17	6.9
Passaic	12.9	6.9
Salem	12.3	6.9
Somerset	17.3	6.9
Sussex	17	6.9
Union	17.3	6.9
Warren	1.6	6.9

FHWA ATTACHMENT NO. 4

STATE OF NEW JERSEY EQUAL EMPLOYMENT OPPORTUNITY FOR CONTRACTS FUNDED BY FHWA

The parties to this Agreement do hereby agree that the provisions of NJSA 10:2-1 through 10:2-4 and NJSA 10:5-31 et seq (PL 1975, c 127, as amended and supplemented) dealing with discrimination in employment on public contracts, and the rules and regulations promulgated pursuant thereunto, are hereby made a part of this contract and are binding upon them.

During the performance of this contract, the Contractor agrees as follows:

a. The Contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status or sex. The Contractor will take affirmative action to ensure that such applicants are recruited and employed, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status or sex. Such action shall include but not be limited to the following: employment, upgrading, demotion, or transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Division of Civil Rights/Affirmative Action setting forth provisions of this nondiscrimination clause;

b. The Contractor or subcontractor, where applicable will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status or sex;

c. The Contractor or subcontractor, where applicable, will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the Division of Civil Rights/Affirmative Action, advising the labor union or workers' representative of the contractor's commitments under this act and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

d. In the hiring of persons for the performance of work under this contract or any subcontract hereunder, or for the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under this contract, no contractor, nor any person acting on behalf of such contractor or subcontractor, shall, by reason of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex, discriminate against any person who is qualified and available to perform the work to which the employment relates;

e. No contractor, subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee engaged in the performance of work under this contract or any subcontract hereunder, or engaged in the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under such contract, on account of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex;

f. There may be deducted from the amount payable to the contractor by the contracting public agency, under this contract, a penalty of $50.00 for each person for each calendar day during which such person is discriminated against or intimidated in violation of the provisions of the contract; and

g. This contract may be canceled or terminated by the contracting public agency, and all money due or to become due hereunder may be forfeited, for any violation of this section of the contract occurring after notice to the contractor from the contracting public agency of any prior violation of this section of the contract.

The notices referred to in paragraphs a and c may be obtained at the preconstruction conference.

FHWA ATTACHMENT NO. 5

DISADVANTAGED BUSINESS ENTERPRISE UTILIZATION ATTACHMENT
FHWA FUNDED CONTRACTS

I UTILIZATION OF DISADVANTAGED BUSINESSES AS CONTRACTORS, MATERIAL SUPPLIERS AND EQUIPMENT LESSORS.

The New Jersey Department of Transportation (NJDOT) advises each contractor or subcontractor that failure to carry out the requirements set forth in this attachment shall constitute a breach of contract and, after the notification of the applicable federal agency, may result in termination of the agreement or contract by the Department or such remedy as the Department deems appropriate. Requirements set forth in this section shall also be physically included in all subcontracts in accordance with USDOT requirements.

II POLICY

It is the policy of NJDOT that Disadvantaged Business Enterprises, as defined in 49 CFR, Part 26; Titles I & V of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA); the Transportation Equity Act for the 21st Century (TEA-21); and Section V, Part B below, shall have equal opportunity to participate in the performance of contracts financed in whole or in part with federal funds under this agreement. Consequently, the DBE requirements of 49 CFR, Part 26, Subsections A, C and F apply to this agreement.

III CONTRACTOR'S DBE OBLIGATION

The NJDOT and its Contractor agree that Disadvantaged Business Enterprises, as defined in 49 CFR Part 26, Subpart A; and in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and the Transportation Equity Act for the 21st Century (TEA-21), and Section V, Part B below, have equal opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with federal funds provided under this agreement. In this regard, the NJDOT and all Contractors shall take all necessary and reasonable steps in accordance with 49 CFR, Part 26 to ensure that Disadvantaged Businesses are given equal opportunity to compete for and to perform on NJDOT federally funded contracts. The NJDOT and its Contractors shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of USDOT assisted contracts.

IV COMPLIANCE

To signify and affirm compliance with the provisions of this attachment, the bidder shall complete the Schedule of DBE Participation (Form CR-266F) included in the bid package and all forms and documents required in Sections VII and VIII of these provisions which will be made a part of the resulting contract.

V GOALS FOR THIS PROJECT

A. This Project includes a goal of awarding **10** percent of the total contract value to subcontractors, equipment lessors and/or material suppliers that qualify as Disadvantaged Business Enterprises (DBEs).

   1. Failure to meet the minimum goal placed on this project, or to provide a "good faith effort" to meet the minimum goal, may be grounds for rejection of the bid as being non-responsive.

   2. As a source of information only, a Disadvantaged Business Enterprise Directory is available from the Division of Civil Rights and Affirmative Action. Use of this listing does not relieve the Contractor of their responsibility to seek out other DBE's not listed, prior to bid. If a contractor proposes to use a DBE contractor not listed in the DBE Directory, the proposed DBE firm must submit a completed certification application to the Division of Civil Rights and Affirmative Action, fifteen (15) days prior to bid date.

B. DEFINITIONS

1. Disadvantaged Business Enterprise is a firm, "Owned and controlled" by socially and economically disadvantaged individuals that is also a small business concern, as defined pursuant to Section 3 of the Small Business Act and Small Business Administration Regulations (13 CFR, Part 121) which also does not exceed the revenue cap on averaged annual gross receipts applicable to the firm's particular Standard Industrial Classification (SIC Code).

2. Owned and Controlled is defined as a firm which is at least fifty-one (51%) percent owned by one or more disadvantaged individuals, or in the case of a publicly owned business, at least fifty-one (51%) percent of the stock is owned by one or more disadvantaged individuals, and whose management and daily business operations are controlled by one or more such individuals.

3. Any individual in one of the following groups who is also a U.S. Citizen or lawfully admitted permanent resident presumed to be socially and economically disadvantaged under the DBE Program.
   (a) Black Americans – includes any persons having origins in any of the black racial groups of Africa;
   (b) Hispanic Americans - includes persons of Mexican, Puerto Rican, Cuban, Dominican, Central or South American, or other Spanish or Portuguese culture; or origin, regardless of race;
   (c) Native American - includes persons who are American Indians, Eskimos, Aleuts or Native Hawaiians;
   (d) Asian-Pacific Americans - includes persons whose origins are from Japan, China, Taiwan, Korea, Burma (Myanmar), Vietnam, Laos, Cambodia (Kampuchea), Thailand, Malaysia, Indonesia, the Philippines, Brunei, Samoa, Guam, the U.S. Trust Territories of the Pacific Islands (Republic of Palau) the Commonwealth of the Northern Mariana Islands, Macao, Fiji, Tonga, Kiribati, Juvalu, Nauru, Federated States of Micronesia or Hong Kong;
   (e) Subcontinent Asian Americans - includes persons whose origins are from India, Pakistan, Bangladesh, Bhutan, the Maldives Islands, Nepal or Sri Lanka;
   (f) Women - regardless of race;
   (g) Other - Any additional groups whose members are designated as socially and economically disadvantaged by the Small Business Administration, at such time as the SBA designation becomes effective; or a determination made by the NJDOT's Division of Civil Rights and Affirmative Action, on a case-by-case basis;

VI COUNTING DBE PARTICIPATION

A. Each DBE is subject to a certification procedure to ensure its DBE eligibility status prior to award of contract. In order to facilitate this process it is advisable for the bidder to furnish the names of proposed DBE's to the Department fifteen (15) days before bid opening. Once a firm is determined to be a bona fide DBE by the Division of Civil Rights and Affirmative Action, the total dollar value of the contract awarded to the DBE is counted toward the applicable DBE goal.

B. The Contractor may count toward its DBE goal only expenditures to DBE's that perform a commercially useful function in the work of a contract. A DBE is considered to perform a commercially useful function when it is responsible for execution of a distinct element of the work of a contract and carrying out its responsibility by actually performing, managing and supervising the work involved. To determine whether a DBE is performing a commercially useful function, the Contractor shall evaluate the amount of work subcontracted, industry practice and other relevant factors.

C. If a DBE does not perform or exercise responsibility for at least 30 percent of the total cost of its contract with its own workforce, or the DBE subcontracts a greater portion of the work of a contract than would be expected on the basis of normal industry practice for the type of work involved, you must presume that it is not performing a commercially useful function.

D. If the prime Contractor is a certified DBE, payments made to the Contractor for work performed by the Contractor will be applied toward the DBE goal. Payments made to the Contractor for work performed by non-DBE's will not be applied toward the goal.

E. The prime Contractor may count 60 percent of its expenditures to DBE suppliers who are not Manufacturers, provided that the DBE supplier performs a commercially useful function in the supply process. The contractor may count 100% of its expenditure to DBE suppliers who are also manufacturers. Manufacturers receive 100% credit toward the DBE goal.

F. When a DBE subcontractor sublets part of the work of its contract to another firm, the value of the subcontract work may be counted towards the DBE goals only if the subcontractor itself is a DBE. Work that a DBE subcontractor subcontracts to a non-DBE firm, does not count toward DBE goals.

VII GOOD FAITH EFFORT

To demonstrate sufficient reasonable efforts to meet the DBE contract goals, a bidder shall document the steps it has taken to obtain DBE participation, including but not limited to the following:

A. Attendance at a pre-bid meeting, if any, scheduled by the Department to inform DBE's of subcontracting opportunities under a given solicitation.

B. Advertisement in general circulation media, trade association publications, as well as minority-focus media for at least 20 days before bids are due. If 20 days are not available, publication for a shorter reasonable time is acceptable.

C. Written notification to DBE's that their interest in the contract is solicited;

D. Efforts made to select portions of the work proposed to be performed by DBEs in order to increase the likelihood of achieving the stated goal;

E. Efforts made to negotiate with DBE's for specific sub-bids including at a minimum:
   1. The names, addresses and telephone numbers of DBE's that were contacted;
   2. A description of the information provided to DBE's regarding the plans and Specifications for portions of the work to be performed; and
   3. A statement of why additional agreements with DBE's were not reached;

F Information regarding each DBE the bidder contacted and rejected as unqualified and the reasons for the bidder's conclusion;

G. Efforts made to assist the DBE in obtaining bonding or insurance required by the Bidder or the Department.

NOTE: If the Division of Civil Rights and Affirmative Action determines that the apparent successful low bidder has failed to meet the requirements of this section, the bidder will be afforded the opportunity for administrative consideration prior to the award or rejection of the contract. As part of the administrative reconsideration process, the bidder will have the opportunity to provide written documentation or argument concerning the issue of whether it met the goal or made adequate good faith efforts to do so. NJDOT will send the bidder a written decision on reconsideration, explaining the basis for finding that the bidder did or did not meet the goal or make adequate good faith efforts to do so. The result of the reconsideration process is not administratively appealable to the USDOT.

VIII AFFIRMATIVE ACTION PLANS

A. General contractors are required to submit their firm's Affirmative Action Program annually to the Division of Civil Rights and Affirmative Action. Until such time as these programs are submitted and approved, Contractors must have their programs in the Division of Civil Rights and Affirmative Action no later than seven (7) State business days after the date of receipt of bids.

B. This program will include, but is not limited to the following:
   1. The name of the Contractor's D/ESBE Liaison Officer to administer the firm's Disadvantaged Business Program.

2. An explanation of the affirmative action methods used in seeking out and considering Disadvantaged Business Enterprises as subcontractors, material suppliers or equipment lessors.
3. An explanation of affirmative action methods intended to be used in seeking out and considering Disadvantaged Business Enterprises as subcontractors, material suppliers or equipment lessors. This refers to the Contractor's ongoing responsibility, i.e., Disadvantaged Business Enterprise/Affirmative Action activities after the award of the contract and for the duration of said project.

C. The following shall be submitted either with the bid or to the Division of Civil Rights and Affirmative Action no later than seven (7) State business days after the date of receipt of bids.
1. DBE Form CR-266F- Schedule of DBE Participation. List all DBE's participating in the contract listing the scope of work, dollar value and percent of total contract to be performed.
2. Supplement to DBE Form CR-266F - A list of all subcontractors who submitted bids or quotes on this project.
3. Request for Exemption - In the event that the bidder fails to meet the specified goal, they must submit within seven State business days of the bid, a written request for exemption to the goal. This request must include a written statement addressing Items A through G in Article VII of this attachment in addition to an accounting of the reason(s) why each items in the bid proposal was not subcontracted. Submittal of such request does not imply Departmental approval. An assessment of the material will be conducted by the Department's Division of Civil Rights and Affirmative Action.

IX AFFIRMATIVE ACTION AFTER AWARD OF THE CONTRACT

If at any time following the award of contract, the Contractor intends to sublet any portion(s) of the work under said contract, or intends to purchase material or lease equipment not contemplated during preparation of bids, said Contractor shall take affirmative action:

1. To notify the RE, in writing, of the type and approximate value of the work which the Contractor intends to accomplish by such subcontract, purchase order or lease.
2. To signify and affirm compliance with the provisions of this Section, the Contractor shall submit the Post-Award DBE Certification Form to the Regional Supervising Engineer with his application to sublet or prior to purchasing material or leasing equipment. Post Award DBE forms may be obtained from the RE.
3. To give disadvantaged firms equal consideration with non-minority firms in negotiation for any subcontracts, purchase orders or leases.
4. If a prime contractor fails to meet its original DBE obligation, they must request an exemption to the goal following criteria in Section VIII (C)(4) and provide a good faith effort thereof. This request must include a written statement addressing each of the Good Faith Efforts outlined in Section VII, A-G.

X CONSENT BY DEPARTMENT TO SUBLETTING

The Department will not approve any subcontract proposed by the Contractor unless and until said Contractor has complied with the terms of this attachment.

XI SELECTION AND RETENTION OF SUBCONTRACTORS

A. The Contractor is further obligated to provide the RE with a listing of firms, organizations or enterprises solicited and those utilized as subcontractors on the proposed project. Such listing shall clearly delineate which firms are classified as disadvantaged.

B. Efforts made to identify and retain a Disadvantaged Business Enterprise as a substitution subcontractor when the arrangements with the original DBE proved unsuccessful, shall be submitted in writing to the Department's D/ESBE Liaison Officer for approval. Work in the category concerned shall not begin until such approval is granted in writing.

C. Notification of a subcontractor's termination will be sent to the Department by the Contractor through the RE. Said termination notice will include the subcontractor's ethnic classification and reason for termination.

XII CONCILIATION

In cases of alleged discrimination regarding these DBE provisions and guidelines, an investigation will be undertaken by the Federal Office of Contract Compliance in conjunction with the Division of Civil Rights and Affirmative Action of the New Jersey Department of Transportation and the Federal Highway Administration.

XIII DOCUMENTATION

A. The Department or the federal funding agencies may at any time require such information as is deemed necessary in the judgment of the Department to ascertain the compliance of any bidder or contractor with the terms of these provisions.

B. Record and Reports.

The Contractor shall keep such records as are necessary to determine compliance with its Disadvantaged Business Enterprise Utilization obligations. The records kept by the Contractor will be designed to indicate:

1. The names of disadvantaged subcontractors, equipment lessors and material suppliers contacted for work on this project.
2. The type of work to be done, materials to be utilized or services to be performed other than the work of the prime contractor on the project.
3. The actual dollar value of work subcontracted and awarded to DBE's.
4. The progress being made and efforts taken in seeking out and utilizing Disadvantaged Business Enterprises. This would include solicitations, quotes and bids regarding project work items, supplies, leases, etc.
5. Documentation of all correspondence, contacts, telephone calls, etc., to obtain the services of Disadvantaged Business Enterprises on this project.
6. Records of all DBE's and non-DBEs who have submitted quotes/bids to the Contractor on the project.

C. Submit reports, as required by the Department, on those contracts and other business transactions executed with Disadvantaged Business Enterprises in such form and manner as may be prescribed by the Department.

D. All such records must be maintained for a period of three (3) years following acceptance of final payment and will be available for inspection by the Department.

XIV PAYMENT TO SUBCONTRACTORS

The Contractor agrees to pay its subcontractors in accordance with the Specifications.

XV NON-COMPLIANCE

Failure by the bidder to comply with the Specifications may result in rejection of the bid. The Contractor may further be declared ineligible for future Department contracts.

FHWA ATTACHMENT NO. 5 (A)

INCENTIVE PROGRAM DISADVANTAGED BUSINESS ENTERPRISE UTILIZATION ATTACHMENT FOR FHWA FUNDED CONTRACTS

I PURPOSE.

To ensure that certified Disadvantaged Business Enterprises (DBE's), as defined in 49 CFR Part 26, have the maximum opportunity to compete for and perform on Department construction projects.

II INTENT.

To encourage prime contractors to utilize the services of DBE's who have not previously been prime contractors or subcontractors on Department projects, and afford DBE's the opportunity to again experience in Department construction contract work.

III ELIGIBILITY.

Only prime contractors and DBE's certified prior to the date of bid, or prospective DBE's that have submitted to the Division of Civil Rights/Affirmative Action on or before the day of bid a completed "New Jersey Department of Transportation Disadvantaged Business Enterprise Disclosure Affidavit" (PR-131) and all required documentation and have never been either prime contractor or subcontractor on Department construction projects will be eligible for participation in this program. A list of those eligible DBE's will be available from the Division of Civil Rights/Affirmative Action. Any bidder who submits the name of a certified first-time DBE as part of its goal commitment is also eligible. Any DBE participating in the program must submit to the prime contractor a certification that they have never been either a prime contractor or subcontractor on a Department construction project under their present name or any other name. The prime contractor shall submit this certification with their required DBE submission.

IV INCENTIVE.

Prime contractors utilizing first-time DBE's will be given a credit toward their goal percentage identified in companion document "*Disadvantaged Business Enterprise Utilization Attachment For FHWA Funded Contracts*", dated September 1987, revised January 1989, September 1992 and May 1995, equal to the actual dollar amount subcontracted to a first time DBE with the total project credit limited to two percent (2%) of the total bid price but not to exceed $200,000. This extra credit will reduce the goal percentage award as well as be applicable to the reduced goal percentage.

V PROGRAM REQUIREMENTS.

A. A prime contractor may present any number of first time DBE's for each project. Credit will be given only for the actual amount subcontracted up to the limits established in IV above.

B. The prime contractor shall be responsible for the entire DBE goal percentage established for the project.

C. Failure to use a first time DBE shall cause the original goal award percentage prior to applying first time DBE credits to remain in effect.

D. Failure to meet the goal award percentage, coupled with a lack of good faith effort as determined by the Division of Civil Rights/Affirmative Action, will be considered to be non-compliance on the part of the prime contractor who may be placed in show cause and subsequently be grounds for rejection of the bid as nonresponsive.

FHWA ATTACHMENT NO.6

EQUAL EMPLOYMENT OPPORTUNITY SPECIAL PROVISIONS

1. General

   a. Equal employment opportunity requirements not to discriminate and to take affirmative action to assure equal employment opportunity as required by Executive Order 11246 and Executive Order 11375 are set forth in Required Contract Provisions (Form FHWA-1273) and these Special Provisions which are imposed pursuant to Section 140 of Title 23 USC, as established by Section 22 of the Federal Aid Highway Act of 1968. The requirements set forth in these Special Provisions shall constitute the specific affirmative action requirements for project activities under this contract and supplement the Equal Employment Opportunity requirements set forth in the Required Contract Provisions.

   b. The Contractor will work with the State agencies and the Federal Government in carrying out Equal Employment Opportunity obligations and in their review of activities under the contract.

   c. The Contractor and all subcontractors holding subcontracts, not including material suppliers, of $10,000 or more, will comply with the following minimum specific requirement activities of Equal Employment Opportunity. The Contractor will include these requirements in every subcontract of $10,000 or more with such modification of language as is necessary to make them binding on the subcontractor. (The equal employment opportunity requirements of Executive Order 11246, as set forth in Volume 6, Chapter 4, Section 1, Subsection 1 of the Federal-Aid Highway Program Manual, are applicable to material suppliers as well as contractors and subcontractors).

   d. Noncompliance by the Contractor with the requirements of the Affirmative Action Program for Equal Employment Opportunity may be cause for delaying or withholding monthly and final payments pending corrective and appropriate measures by the Contractor to the satisfaction of the Department.

2. Equal Employment Opportunity Policy

   The Contractor will accept as its operating policy the following statement which is designed to further the provisions of equal employment opportunity to all persons without regard to their race, color, religion, sex, or national origin, and to promote the full realization of equal employment opportunity through a positive continuing program:

   It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, or national origin. Such action shall include employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, preapprenticeship, and on-the-job training.

3. Equal Employment Opportunity Officer

   The Contractor will designate and make known to the Department contracting officers an equal opportunity officer (hereinafter referred to as the EEO Officer) who will have the capability, authority and responsibility to effectively implement and promote an active contractor program of equal employment opportunity.

4. Dissemination of Policy

   a. All members of the Contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommended such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the Contractor's equal employment opportunity policy and contractual responsibilities to provide equal employment opportunity in each grade and classification of employment. To ensure compliance, the following minimum actions will be taken:

(1) An initial project site meeting with key supervisory and office personnel will be conducted before or at the start of work, and then not less than once every 6 months, at which time the Contractor's equal employment opportunity program will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.
(2) All new supervisory and office personnel will be given a thorough indoctrination by the EEO Officer or other knowledgeable company official covering all major aspects of the Contractor's equal employment opportunity obligations within 30 days following their reporting for duty with the Contractor.
(3) All personnel engaged in direct recruitment for the project will be instructed by the EEO Officer or appropriate company official concerning the Contractor's procedures for locating and hiring minority and female employees.

b. In order to make the Contractor's equal employment opportunity policy known to all employees, prospective employees and potential sources of employees, i.e., schools, employment agencies, labor unions (where appropriate), college placement officers, etc., the Contractor will take the following actions:
(1) Notices and posters setting forth the Contractor's equal employment opportunity policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.
(2) The Contractor's equal employment opportunity policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, and/or other appropriate means.

5. Recruitment

a. When advertising for employees, the Contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer". All such advertisements will be published in newspapers or other publications having a large circulation among minority groups in the area from which the project work force would normally be derived.

b. The Contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority and female applicants, including, but not limited to, State employment agencies, schools, colleges and minority-oriented organizations. To meet this requirement, the Contractor will, through his EEO Officer, identify sources of potential minority and female employees, and establish procedures with such sources whereby applicants may be referred to the Contractor for employment consideration.

In the event the Contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, he is expected to observe the provisions of that agreement to the extent that the system permits the Contractor's compliance with the equal employment opportunity contract provisions. (The US Department of Labor has held that where implementation of such agreements have the effect of discriminating against minorities or females, or obligates the Contractor to do the same, such implementation violates Executive Order 11246, as amended).

c. The Contractor will encourage his present employees to refer minority and female applicants for employment by posting appropriate notices or bulletins in areas accessible to all such employees. In addition, information and procedures pertaining to the referral of applicants will be discussed with employees.

6. Personnel Actions

Wages, working conditions and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, or national origin. The following procedures shall be followed:

a. The Contractor will conduct a project site inspection at the start of work, and periodically thereafter, to ensure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The Contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The Contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the Contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The Contractor will promptly investigate all complaints of alleged discrimination made to the Contractor in connection with its obligations under this contract, and will resolve or attempt to resolve such complaints, within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, corrective action shall include such other persons. Upon completion of each investigation, the Contractor will inform complainants of available avenues of appeal.

7. Training Special Provisions

As part of the Contractor's equal employment opportunity affirmative action program, training shall be provided as follows:

The Contractor shall provide on-the-job training aimed at developing full journey people in the type of craft or job classification involved.

The number of training positions will be__10__, where feasible, consisting of at least__2__ APPRENTICES and __8__TRAINEES. TRAINEE HOURS=5,500.

Apprentices are defined as registered members of an approved apprenticeship program recognized by the United States Department of Labor (USDOL) Bureau of Apprenticeship and Training (BAT) or a New Jersey State apprenticeship agency recognized by USDOL BAT (e.g., New Jersey Department of Education). Graduates of the Pre-Apprenticeship Training Cooperative Program shall be classified as apprentices. Trainees are defined as skilled, semi-skilled or lower level management individuals receiving training per one of the approved NJDOT "Revised Standard Training Guidelines" (available from the Division of Civil Rights).

Where feasible, at least 50% of the training positions will be assigned to Skilled Crafts which include but are not limited to Carpenters, Dockbuilders, Electricians, Ironworkers and Operating Engineers.

a. Contractor Submission and NJDOT Approval of the Initial Training Program.

At or after the preconstruction conference and prior to the start of work, the Contractor shall submit a training program to the RE for his or her review and comments prior to Division of Civil Rights review and approval. The Contractor's training program shall include:
(1) the number of trainees or apprentices to be trained in all selected Training Positions,
(2) the Standard Program Hours for all positions,
(3) an estimate of the Minimum Available Hours actually feasible on the project toward completion of the Standard Program Hours per position,
(4) a training schedule of Estimated Start Dates for the apprentices or trainees, developed and coordinated with the project's work progress schedule,
(5) Training Guidelines for all positions, and
(6) which training will be provided by the Contractor and which by Subcontractors.

The number of apprentices and trainees shall be distributed among the work classifications on the basis of the Contractor's needs and the availability of journeypeople in the various crafts within a reasonable area of recruitment. The Contractor shall submit timely, revised training programs as required throughout the project to ensure that feasible and Maximum Available Training is provided. Maximum Available Training is defined as bringing each apprentice or trainee onto the project when work first becomes available in his/her craft and providing all available training until hours are no longer available.

b. Assignment of Training to Subcontractors

In the event that portions of the contract work are subcontracted, the Contractor shall determine how many, if any, of the apprentices or trainees are to be trained by subcontractors, provided,

however, that the Contractor shall retain the primary responsibility for meeting the training requirements imposed by these Training Special Provisions. The Contractor shall also ensure that these Training Special Provisions are made applicable to such subcontracts.

c. Requirements for Recruitment, Selection and Approval of Apprentices and Trainees
   (1) Apprentices or trainees should be in their first year of apprenticeship or training. The Contractor shall interview and screen trainee candidates to determine if their actual work experience is equivalent to or exceeds that offered by the training program prior to submitting candidates, via the RE, to the Division for review and approval or disapproval.
   (2) Training and upgrading of minorities (e.g., Blacks, Asians or Pacific Islanders, Native Americans or Alaskan Natives, Hispanics) and females toward journeyperson status is a primary objective of these Training Special Provisions. Accordingly, the Contractor shall make every effort to enroll minorities and females, by conducting systematic and direct recruitment through public and private sources likely to yield minority and female apprentices or trainees, to the extent that such persons are available within a reasonable area of recruitment. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.
   (3) No employee shall be employed as an apprentice or trainee in any position in which he or she has successfully completed a training course leading to journeyperson status or in which he or she has been employed as a journeyperson. The Contractor shall satisfy this requirement by including appropriate questions in the employment application or by other suitable means and by submitting an accurate and complete "Apprentice/Trainee Approval Memorandum." (Form CR-1) Regardless of the methods used, the Contractor's records should document the findings in each case.
   (4) Skilled craft trainees may complete up to 3,000 total training hours on NJDOT projects, with an extension of an additional 1,000 hours permitted on a case-by-case basis. Semi-skilled and lower-level management trainees attain journeyperson status upon completion of a training guideline and may complete up to three (3) different positions.

d. Apprenticeship and Training Programs
   (1) The minimum length and type of training for each position will be established in the training program selected by the Contractor and approved by NJDOT and the Federal Highway Administration. NJDOT will approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the Contractor and to qualify the average apprentice or trainee for journeyperson status in the craft concerned by the end of the training period.
   (2) Apprenticeship programs registered with the US Department of Labor, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by USDOL BAT and training programs approved but not necessarily sponsored by the US Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training shall also be considered acceptable provided such programs are being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the NJDOT Division of Civil Rights prior to commencing work on the positions covered by the Contractor's training program. The Division will review guidelines developed by the Contractor for approval or disapproval in accordance with the Training Guideline Approval Process described in the "Revised Standard Training Guidelines". The Division will also review existing guidelines for revision based on the same process.
   (3) It is the intention of these provisions that training be provided in construction crafts rather than clerk-typist or secretarial-type positions. Training is permitted in lower level management positions (e.g., timekeepers), where the training is oriented toward project site applications. Training in semi-skilled laborer positions is permitted provided that significant and meaningful training is available on the project site. Some offsite, classroom training (e.g., safety, first aid instruction) may be permitted as long as such training is an integral part of an approved training program and does not comprise a significant part of the overall training.

e. Reimbursement of the Contractor for Providing Training

(1) The Contractor will be credited for each apprentice or trainee employed on the construction site who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such apprentices or trainees as provided hereinafter. Payment will be made under the pay item Trainees at the bid price in the Proposal per person-hour of training given an employee on this contract in accordance with an approved training program. If approved, payment will be made for training persons in excess of the number specified herein. This reimbursement will be made even though the Contractor receives additional training program funds from other sources, provided such other sources do not specifically prohibit the Contractor from receiving other reimbursement. Offsite, classroom training reimbursement may only be made to the Contractor when the company does one or more of the following and the apprentices or trainees are concurrently employed on a Federal-aid project: contributes to the cost of the training and/or provides instruction to apprentices or trainees or pays their wages during the offsite, classroom training (e.g., safety, first aid instruction) period.
(2) The Contractor shall pay apprentices and trainees according to the project-specific New Jersey Department of Labor Prevailing Wage Rate Determination for the project.

f. Documentation Required to be Signed by Apprentices or Trainees and provided to NJDOT
(1) At the start of training, the Contractor shall provide the RE and each apprentice or trainee with an applicable "Training Guideline" and, at the conclusion of training, an accurate and complete "Training Certificate for Reporting Hours to NJDOT" (Form CR-3), showing hours of training satisfactorily completed.
(2) The Contractor shall maintain and submit an accurate and complete "NJDOT Contractor's 1409 Quarterly Training Report" (Form-CR-1409) to the RE within ten (10) days of the end of each training quarter (e.g., January 10, April 10, July 10, October 10); a copy shall also be given to each apprentice or trainee.
(3) The Contractor shall maintain and submit accurate and complete "Biweekly Training Reports" (Form CR-2) to the RE, and each apprentice or trainee, as periodic reports documenting performance under these Training Special Provisions.

g. Training and Promotion
(1) The Contractor shall assist in locating, qualifying, and increasing the skills of minority and female employees, and applicants for employment.
(2) The Contractor shall advise employees and applicants for employment of available training programs and entrance requirements.
(3) The Contractor shall periodically review the training and promotion potential of minority and female employees and encourage eligible employees to apply for such training and promotion.

h. Determining Good Faith Compliance
(1) Per the approved program or guideline, the Contractor shall provide Maximum Available Training to apprentices and trainees by beginning their training as soon as feasible with the start of craft work utilizing the skill involved on the project construction site and by retaining them as long as training opportunities exist in their crafts or until their training program positions are completed.
(2) The Contractor shall recall apprentices or trainees released due to reductions in force when the work scope permits and they are available to return. When they are unavailable to resume training on the project site, the Contractor shall submit written proof of recall efforts and replacement candidates and/or positions in a timely manner. The Contractor shall not terminate apprentices or trainees prior to completion of their training program positions without NJDOT consultation and authorization. Apprentices or trainees are not required to be on board for the entire length of the contract.
(3) The Contractor shall have fulfilled the contractual responsibilities under these Training Special Provisions if the company has provided Acceptable Training to the number of apprentices or trainees specified in this contract and/or by providing the remaining hours required to complete training positions begun by apprentices or trainees on other projects. The number trained shall be determined on the basis of the total number enrolled on the contract for a significant period.
(4) The Contractor shall be responsible for demonstrating all steps that have been taken in pursuance of enrolling minorities and females in the training program positions, prior to a

determination as to whether the Contractor is in compliance with these Training Special Provisions.

(5) The Contractor shall submit to the RE written training program summaries at the 50% time and/or cost stage of the contract and also prior to project completion, describing all good faith actions and particularly addressing Maximum Available Training for incomplete training positions, per the procedure found in the revised "Instructions for Implementing the Training Special Provisions".

i. Enforcement Measures and Contractor's Rating

(1) Payment will not be made if either the failure to provide the required training or the failure to hire the apprentice or trainee as a journeyperson is caused by the Contractor and evidences a lack of good faith on the part of the Contractor in meeting the requirements of these Training Special Provisions.

(2) Per established procedures and scheduled Contract Compliance Reviews, the Contractor's performance will be rated and reviewed periodically by the Department.

(3) Noncompliance with these Training Special Provisions may be cause for delaying or withholding monthly and final payments, pending corrective and appropriate measures by the Contractor to the satisfaction of the Department, per Item 1d of these EEO Special Provisions.

8. Unions

If the Contractor relies in whole or in part upon unions as a source of employees, the Contractor will make maximum effort to obtain the cooperation of such unions to increase opportunities for minorities and females within the unions, and to effect such union referrals to the construction project. Actions by the Contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The Contractor will use maximum effort to develop, in cooperation with the unions, joint training programs aimed at qualifying more minorities and females for union membership and increasing their skills in order to qualify for higher paying employment.

b. The Contractor will use maximum effort to incorporate an equal employment opportunity clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, or national origin.

c. The Contractor will obtain information concerning the referral practices and policies of the labor unions except that to the extent such information is within the exclusive possession of the labor unions and they refuse to furnish this information to the Contractor, the Contractor shall so certify to the Department and shall set forth what efforts have been made to obtain this information.

d. In the event the unions are unable to provide the Contractor with a reasonable flow of minority and female referrals within the time limit set forth in the collective bargaining agreement, the Contractor will through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, or national origin, making full efforts to obtain qualified and/or qualifiable minorities and females. (The US Department of Labor has held that it shall be no excuse that the union with which the Contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees). In the event the union referral practice prevents the Contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such Contractor shall immediately notify the Department.

9. Subcontracting

a. The Contractor will use maximum effort to solicit bids from and to utilize minority subcontractors or subcontractors with meaningful minority and female representation among their employees. Contractors may use lists of minority-owned construction firms as issued by the Department.

b. The Contractor will use maximum effort to ensure subcontractor compliance with the equal employment opportunity obligations.

10. Documents and Reports

a. The Contractor will maintain such documents as are necessary to determine compliance with the contract's equal employment opportunity requirements. Documents will include the following:
   (1) the number of minorities, non-minorities, and females employed in each work classification on the Project.
   (2) the progress and efforts being made in cooperation with unions to increase employment opportunities for minorities and females (applicable only to Contractors who rely in whole or in part on unions as a source of their work force).
   (3) the progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees, and
   (4) the progress and efforts being made in securing the services of minority and female subcontractors or subcontractors with meaningful minority and female representation among their employees.

b. All such documents must be retained for a period of 3 years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the Department and the Federal Highway Administration.

c. The contractor and each subcontractor must submit monthly employment and wage data to the Department via a web based application using electronic Form CC-257R. Instructions for registering and receiving the authentication code to access the web based application can be found at:
   http://www.state.nj.us/transportation/business/civilrights/pdf/cc257.pdf

   Instructions on how to complete Form CC257 are provided in the web application. Submit Form CC-257R through the web based application within 10 days following the end of the reporting month. Submission of this form also satisfies the requirement of the form FHWA 1391.

   All employment and wage data must be accurate and consistent with the certified payroll records. The contractor is responsible for ensuring that their subcontractors comply with these reporting requirements. Failure by the contractor to submit Monthly Employment Utilization Report may impact the contractor's prequalification rating with the Department.

FHWA ATTACHMENT NO.7

SPECIAL CONTRACT PROVISIONS FOR INVESTIGATING, REPORTING AND RESOLVING EMPLOYMENT DISCRIMINATION AND SEXUAL HARASSMENT COMPLAINTS

The contractor hereby agrees to the following requirements in order to implement fully the nondiscrimination provisions of the Supplemental Specifications.

The Contractor agrees that in instances when it receives from any person working on the project site a verbal or written complaint of employment discrimination, prohibited under N.J.S.A. 10:5-1 et seq., 10:2-1 et seq., 42 U.S.C. 2000(d) et seq., 42 U.S.C. 2000 (e) et seq. and Executive Order 11246, it shall take the following actions:

1. Within one (1) working day commence an investigation of the complaint which shall include but not be limited to interviewing the complainant, the respondent, and all possible witnesses to the alleged act or acts of discrimination or sexual harassment.
2. Prepare and keep for its use and file a detailed written investigative report which includes the following information:
   a) Investigatory activities and findings.
   b) Dates and parties involved and activities involved in resolving the complaint.
   c) Resolution and corrective action taken if discrimination or sexual harassment is found to have taken place.
   d) A signed copy of resolution of complaint by complainant and contractor.

   In addition to keeping in its files the above-noted detailed written investigative report, the contractor shall keep for possible future review by the Department all other records, including but not limited to, interview memos and statements.
3. Upon the request of the Department, provides to the Department within ten (10) calendar days a copy of its detailed written investigative report and all other records on the complaint investigation and resolution.
4. Take appropriate disciplinary action against any contractor employee, official or agent who has committed acts of discrimination or sexual harassment against any contractor employee or person working on the project. If the person committing the discrimination is a subcontractor employee, then the contractor is required to attempt to effectuate corrective and/or disciplinary action by the subcontractor in order to establish compliance with project's contract requirements.
5. Take appropriate disciplinary action against any contractor employee, official or agent who retaliates, coerces or intimidates any complaint and/or person who provides information or assistance to any investigation of complaints of discrimination or sexual harassment. If the person retaliating, coercing or intimidating a complainant or other person assisting an investigation is a subcontractor's employee, then the contractor is required to attempt to effectuate corrective and/or disciplinary action by the subcontractor in order to establish compliance with the project's contract requirements.
6. Ensure to the maximum extent possible that the privacy interests of all persons who give confidential information in aid of the contractor's employment discrimination investigation are protected.

In conjunction with the above requirements, the contractor shall develop and post a written sexual harassment policy for its work force.

Failure by the contractor to comply with the above requirements may be cause for the New Jersey Department of Transportation to institute against the contractor any and all enforcement proceedings and/or sanctions authorized by the contract or by state and/or federal law.

Attachment No. 1

Stormwater Pumping Station Specifications - Birdsall Services Group, Inc. (Construction)

SECTION 034100

PRE-CAST STRUCTURES

PART 1 - GENERAL

1 .01 WORK INCLUDED

A. The work of this item consists of the construction of manholes and chambers in conformity with the lines, grades, dimensions, and details shown on the Drawings and in accordance with the provisions of these Specifications. All round manholes shall be a minimum of four (4') foot internal diameter, unless otherwise noted.

1 .02 RELATED WORK

A. Division 221113 - Ductile Iron Pipe and Appurtenances

1. 03 SYSTEM DESCRIPTION (NOT APPLICABLE)

1. 04 REFERENCES

A. American Society for Testing and Materials

B. American Association of State Highway and Transportation Officials - Standards

1.05 SUBMITTALS

A. Manholes and Chambers

B. Castings and Hatches

C. Manhole Steps and Ladders

D. Shop drawings including calculations demonstrating anti-lift and buoyancy, for all manholes and structures, based on groundwater elevations at grade. Anti-lift and buoyancy calculations shall be signed and sealed by a New Jersey Licensed Professional Engineer.

PART 2 - PRODUCTS

2.01 Bases, riser sections, and conical sections shall conform to the latest requirements of ASTM Designation C-478. Rectangular chambers shall be designed to meet the

requirements of ASTM C913 "Pre-cast Concrete Water and Wastewater Structures." Concrete for pre-cast manholes shall have a minimum compressive strength of 4,000 psi. All joints between sections shall be tongue and groove joints with recesses for rubber "O" ring gaskets.

2 .02 Manhole steps shall be as specified below and shall be installed, in line vertically, during manufacture of the manhole sections. Steps shall not be installed by drilling and mortaring in place following casting of the manhole sections.

2.03 All surfaces and openings for pipe shall be smooth, sound, and free of spalling. Holes shall be accurately located so that clearance around the installed pipe will be not more than two (2") inches on the side. For sealing, the Contractor shall use non-shrink mortar and flexible rubber manhole sleeves or boots. Sleeves or boots shall be required and shall be mechanically clamped or cast into the structure in accordance with the manufacturer's recommendations. The sleeves or boots shall be made to fit around the pipe and shall be clamped with stainless steel bands around the entering and exiting pipes, providing a watertight seal which will accommodate pipe movements up to two (2") inches radially, or 22° angularly in any direction. Rubber for sleeves or boots shall be a composition that is resistant to common ingredients of sewage, industrial waste, and oils.

2.04 Rubber "O" ring gaskets for joints between pre-cast structures shall conform to the requirements for rubber gaskets, as specified under the latest ASTM Designation C443, " Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets."

2.05 Steps shall be of extruded 606 1- T6 aluminum or shall be polypropylene step. Steps shall be cast into the walls of base, risers and conical top sections, and shall be aligned vertically and spaced so as to be on equal centers in the assembled manhole at a maximum distance apart of twelve (12") inches. Steps shall be located a minimum of six (6") inches from the ends of base, riser, and top sections, and shall be securely embedded by mortar or cast in place polypropylene inserts. Step dimensions shall meet the requirements of OSHA Standard 1910.27 for fixed ladders. Steps shall be set in place on the inside of the structure beginning two (2') feet above the bottom, and spaced not more than twelve (12") inches center to center, as shown on the Drawings. Steps shall conform to all OSHA requirements.

2 .06 Manhole cover and frame castings shall be constructed of gray iron conforming to the latest ASTM Designation A-48, Class 30 specification.

A. Manhole frames and covers shall be water tight and bolted similar to Campbell Foundry Company, Pattern No. 1539B or equal.

B. Large diameter manhole frames and covers shall be supplied with integral access covers. The access cover permits entry without removing the larger

perimeter cover. Covers shall be similar to Campbell foundry Company, Pattern No. 4430 and 4431 or equal.

C. Lettering on the manhole cover shall be cast two (2") inches high, in accordance with the detail on the Drawings.

2.08 COATINGS

1. The interior surfaces of all pre-cast concrete structures shall be uncoated.

2. Outer Surface: The entire outer surface of all pre-cast concrete structures shall be coated with two (2) coats of an approved coating material.

a) Coating material shall be two (2) coats (8 mils/coat) of M.A.B. ply-tile black epoxy, or equal.

2.09 Flat slab tops shall be constructed in accordance with the latest ASTM Designation C-478 specification.

2.10 Foundation materials shall be coarse aggregate as specified under Section 02210.

2.11 Concrete grading rings, if used, shall conform to the latest requirements of ASTM Designation C-139 specification.

2.12 Removable Bar Screens and frame shall be constructed of 304L Stainless Steel in accordance with AMS 5511, ASTM A 240, ASTM A 666.

PART 3 - EXECUTION

3 .01 The Contractor shall excavate and dewater, in accordance with Section 02200 - Earthwork and Section 02731 - Site Piping and Fittings, to install manholes and chambers at the locations and to the grades shown on the Drawings or as directed by the Engineer.

3 .02 Manholes shall be placed on a twelve (12") inch thick foundation of coarse aggregate. The limit of excavation for this foundation shall be the outside diameter of the manhole plus one (1') foot all around. When drop manholes are constructed, the widths shall be extended so that the manhole drop is placed on foundation material.

3.03 REMOVABLE BAR SCREEN

A. Removable bar screens shall be constructed in accordance with the details as shown on the contract drawings.

3 .04 PRE-CAST MANHOLES

A. Pre-cast base sections shall be installed on a foundation as specified above and indicated on the details. The joint surfaces, gaskets and gasket groove of the manhole base shall be wiped clean, be free of all dirt and grit, and liberally soaped before joining with a lubricant recommended by the manufacturer in preparation for receiving the rise, cone or slab top section. After snapping the gasket into the recess, tension shall be equalized by running a screwdriver shaft or other suitable tool around the joint under the gasket. The riser or cone section with gasket in place should then be lowered into the bell of the manhole base, taking care that no dirt gets into the joint or on the gasket. Additional riser or cone sections should be joined in a similar manner. Manhole sections shall be set vertical, in true alignment, so that the steps are aligned to form a continuous ladder.

B. All lift holes shall be plugged with rubber stoppers and filled with mortar to ensure a watertight repair. All manhole joints shall be mortared and troweled to a smooth surface on the inside and outside surfaces.

C. The exterior and interior of the manhole shall be supplied with two (2) – eight (8) mil coatings of Bitumastic as manufactured by Koppers Co., Inc. or equal.

D. Where new pipe is to be connected into an existing manhole, the Contractor shall core drill all holes into manholes and shall perform all cutting, patching necessary for channel and bench reconstruction to channel flow into the existing sewer. Any damage to the existing manhole caused by the construction operations shall be repaired to the satisfaction of the Engineer. PVC pipe shall be sealed using Fernco manhole adapters, CertainTeed Manhole Adapters, Kor-N-Seal boots, or equal, and non-shrink grout. No separate payment shall be made for this work.

E. Doghouse manholes shall be constructed of pre-cast reinforced concrete manhole sections over the existing pipe. The bottom section of the doghouse manhole shall be a standard riser section embedded a minimum of six (6") inches into the reinforced concrete foundation while the concrete is still wet and properly supported until the concrete has achieved sufficient strength to support the riser section as shown on the typical doghouse manhole detail. The doghouse manhole foundation shall be poured on a minimum of twelve (12") inches of coarse aggregate material.

F. The top of all manholes shall be brought to grade by using not more than five (5) courses of brick. Masonry and frames shall be set level in full beds of mortar and be able to handle heavy traffic loads. Joints shall not exceed

½" and shall be pointed. Frames and covers shall be match marked to prevent rocking of covers.

G. Construction of manholes, regardless of type, must be carried on in a manner to ensure watertight work. Any leaks in manholes shall be repaired to the satisfaction of the Engineer, or the entire work shall be removed and rebuilt.

H. Backfilling and compaction shall conform to the methods specified in Section 02200. As soon as practical after the pipes and structures have been placed, the concrete bottom and walls have acquired a suitable degree of hardness, and all other work necessary has been accomplished, backfilling shall be completed to the surface. No broken concrete, blacktop, wood blocks, or other unsuitable materials will be placed against the masonry structures when backfilling. Unequal soil pressures shall be avoided by placing the fill evenly around the structure to the surface. Machinery used for compaction will be of such type that it will not cause cracking or injury to the structure.

I. Benches and inverts shall be of concrete. Inverts shall have a steel trowel finish and benches a wood float finish. Inverts shall have a cross-section of the exact shape of the sewers which are connected, and changes in size shall be made gradually and evenly, unless otherwise specifically directed. Half pipe inverts may be used in straight-through manholes.

J. Structures shall be constructed in a manner that will prevent flotation due to groundwater. Contractor shall submit the method and supporting buoyancy calculations for anti-flotation of manholes. For purpose of calculations, groundwater level shall be assumed to be at ground surface.

K. Manhole frames and covers shall be installed using masonry or pre-cast concrete grading rings as necessary to bring top of frame to final grade as shown on the Drawings. Masonry, grading rings, and frames shall be set level in full beds of mortar and be able to handle heavy traffic loads. Joints shall not exceed ½" and shall be pointed. Frames and covers shall be match marked to prevent rocking of covers. Two (2) lifting tools shall be provided.

L. Drop manholes shall be used when the difference between the incoming sewer pipe invert and the manhole invert is two (2') feet or more. Drop connections shall be constructed in accordance with the details included in the Drawings.

3 .04 BENCH AND CHANNEL RECONSTRUCTION

A. Where new pipe is to be connected into an existing manhole, the Contractor shall core drill all holes into manhole and shall perform all cutting, patching necessary for channel and bench reconstruction to channel flow into the existing sewer. Any damage to the existing manhole caused by the construction operations shall be repaired to the satisfaction of the Engineer. PVC pipe shall be sealed using appropriate manhole adapters, similar to CertainTeed Manhole Adapters, Kor-N-Seal boots, or equal, and non-shrink grout. No separate payment shall be made for this work.

B. The concrete used to construct benches and channels shall have a minimum 28-day compressive strength of 4,000 psi; and shall contain "Thorogard," a liquid admixture to accelerate setting time, manufactured by Thoro Systems Products, or equal.

C. Waterproofing cement, masonry coating, and bonding agent to be used for manhole, channel or bench reconstruction shall be similar to "Waterplug," "Thoroseal Foundation Coating," and "Acryl 60," respectively, as manufactured by Thoro System Products, or equal.

D. If required, the existing bench shall be chipped and cut away to allow for a new channel to be constructed and provide a good, sound surface for bonding with new concrete channel and bench. In addition, all existing bench and channel concrete or masonry found to be cracked, spalled, or otherwise showing evidence of disintegration, leakage, or structural failure shall also be cut out to sound surface.

E. All loose concrete, rust on reinforcing rods, and other foreign materials shall be removed and the cavity cleaned with water or air under pressure, where necessary. Cavities shall be patched with waterproofing cement.

F. After all cavities have been patched and prior to pouring concrete for the new channels and bench, the Contractor shall apply two (2) brush coats of foundation coating to the repair area of the manhole. A bonding agent admixture shall be added to the foundation coating. All surfaces to be coated shall be structurally sound, clean, and free of dirt, loose mortar particles, paint, films, protective coatings, efflorescence, laitance, etc. Each foundation coat shall be applied in strict conformance with the manufacturer's requirements, and shall be applied at the minimum rate of two (2) pounds per square yard.

G. Benches and channels shall be of concrete. Channels shall have a steel trowel finish and benches a wood float finish. Channels shall have a cross-section of the exact shape of the sewers to which they are connected, and changes in direction shall be made gradually and evenly, unless otherwise

specifically directed. Half pipe inverts may be used in straight through manholes.

H. All concrete products shall be applied strictly in accordance with manufacturer recommendations.

3 .05 LEAKAGE TEST - MANHOLES

A. If in the opinion of the Engineer, the groundwater table is so low that any manhole leakage cannot be visually observed, the Contractor shall perform exfiltration tests on each manhole.

B. Manholes shall be filled with water to the top of the cone section.

C. The Contractor may allow water to set in manholes for a period of time to allow for absorption. At the end of this period, the manhole shall be refilled to the top of the cone and the test time of at least four (4) hours begun. At the end of the test time, the amount of water required to refill the manhole to the top of the cone shall be determined. A calculation shall be made to determine the 24-hour leakage rate per foot of manhole depth. The leakage for each manhole shall not exceed one (1) gallon per vertical foot for a 24-hour period. If the test fails this requirement, but the leakage does not exceed three (3) gallons per vertical foot per 24-hours period, repairs shall be made as approved or directed by the Engineer to bring the leakage within the allowable rate of one gallon per foot per 24-hour period. If leakage exceeds three (3) gallons per vertical foot, per 24-hour period, the manhole will be rejected. The contractor shall then uncover the manhole as necessary, and shall disassemble and reconstruct or replace it as directed by the Engineer. The manhole shall then be retested. This procedure shall be repeated until the manhole passes the leakage test.

END OF SECTION 034100

SECTION 220523

SLUICE GATES

PART 1 - GENERAL

1. SCOPE

   A. This Section covers Stainless Steel Channel Gates and operators.

   B. The specified sluice gates shall serve to isolate the pump bay from incoming storm event flows at each pumping station.

2. GENERAL

   A. The equipment provided under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the drawings, specifications, engineering data, instructions and recommendations of the equipment manufacturer unless exceptions are noted by the engineer.

   B. Gates and operators shall be supplied with all the necessary parts and accessories indicated on the drawings, specified or otherwise required for a complete, properly operating installation and shall be the latest standard product of a manufacturer regularly engaged in the production of water control gates.

3. GOVERNING STANDARDS

   A. Except as modified or supplemented herein, all gates and operators shall conform to the applicable requirements of AWWA C513, latest edition.

4. QUALITY ASSURANCE

   A. The manufacturer shall have experience in the production of substantially similar equipment, and shall show evidence of satisfactory operation in at least 50 installations. The manufacturer's shop welds, welding procedures and welders shall be qualified and certified in accordance with the requirement of the latest edition of ASME, Section IX.

   B. Gates shall be shop inspected for proper operation before shipping.

   C. The manufacturer shall be ISO 9001 : 2000 certified.

D. The manufacturer shall submit, for approval by the purchaser, drawings showing the main dimensions, general construction and materials used in the gate and lift mechanism.

PART 2 - PRODUCTS

1. CHANNEL GATES

A. General Design

1. Gates shall be self-contained and of the non-rising stem configuration.

B. Frame

1. The gate frame shall be constructed of structural members or formed plate. The frame shall be suitable for mounting on a concrete wall (CW) at the end of a channel.

2. The guide slot shall be of UHMWPE (ultra high molecular weight polyethylene).

3. The frame configuration shall be of the flush-bottom type.

C. Slide

1. The slide shall consist of a flat plate reinforced with formed plates or structural members to limit its deflection to 1/720 of the gate's span under the design head.

D. Guides and Seals

1. Guides shall be made of UHMWPE (ultra high molecular weight polyethylene) and shall be of such length as to retain and support at least two thirds (2/3) of the vertical height of the slide in the fully open position.

2. Side seals shall be made of UHMWPE (ultra high molecular weight polyethylene) of the self-adjusting type. A compression cord shall ensure contact between the UHMWPE guide and the gate in all positions. The sealing system shall maintain efficient sealing in any position of the slide and let the water flow only in the open part of the gate.

3. Seals shall maintain the specified leakage rate in both seating and

unseating conditions. The bottom seal shall be made of resilient neoprene set into the bottom member of the frame and shall form a flush-bottom.

2. OPERATORS AND STEM

A. Stem and Couplings

1. The operating stem shall be of stainless steel designed to transmit in compression at least two (2) times the rated output of the operating manual mechanism with a 40 lbs (178 N) effort on the crank or handwheel.

2. The stem shall have a slenderness ratio (L/r) less than 200. The threaded portion of the stem shall have machine cut threads of the Acme type.

3. For stems in more than one piece and with a diameter of 1 ¾ inches (45 mm) and larger, the different sections shall be joined together by solid bronze couplings. Stem with a diameter smaller than 1 ¾ inches (45 mm) shall be pinned to an extension tube.

4. The couplings shall be grooved and keyed and shall be of greater strength than the stem.

B. Gates having width equal to or greater than two times their height shall be provided with two lifting mechanisms connected by a tandem shaft.

C. Stem Guides

1. Stem guides shall be fabricated from type 304L stainless steel. The guide shall be equipped with a UHMWPE bushing.

2. Guides shall be adjustable and spaced in accordance with the manufacturer's recommendation. The L/r ratio shall not be greater than 200.

D. Operating Nut

1. The operating nut shall be a 2" square operating nut and shall be compatible with standard gate valve keys. Material shall be Type 304L Stainless Steel.

E. Lifting Mechanism

1. Manual operators of the types listed in the schedule shall be provided by the gate manufacturer.

2. All bearings and gears shall be totally enclosed in a weather tight housing. The pinion shaft of crank-operated mechanisms shall be constructed of stainless steel and supported by roller or needle bearings.

3. Each manual operator shall be designed to operate the gate under the maximum specified seating and unseating heads by using a maximum effort of 40 lbs (178 N) on the crank or handwheel and shall be able to withstand, without damage, an effort of 80 lbs (356 N).

4. The crank shall be removable and fitted with a corrosion resistant rotating handle. The maximum crank radius shall be 15 inches (381 mm) and the maximum handwheel diameter shall be 24 inches (610 mm).

F. Yoke

1. Self-contained gates shall be provided with a yoke made of structural members or formed plates. The maximum deflection shall be 1/360 of the gate's span.

3. PERFORMANCE

A. Leakage

1. Channel gates shall be substantially watertight under the design head conditions. Leakage shall not exceed 0.05 U.S. gallon per minute per foot (0.60 l/min per meter) of seal periphery under the design seating head and unseating head.

B. Design Head

1. The slide gates shall be designed to withstand the maximum design head (maximum design head shall be taken as the height of the slide unless otherwise shown in the schedule).

C. Seal Performance Test

1. The gate's sealing system should have been tested through a cycle test in an abrasive environment and should show that the leakage requirements are still obtained after 25,000 cycles with a minimum deterioration.

PART 3 - EXECUTION

A. Installation

1. Gates and appurtenances shall be handled and installed in accordance with the manufacturer's recommendations.

B. Field Tests

1. Following the completion of each gate installation, the gates shall be operated through at least two complete open/close cycles. If an electric or hydraulic operator is used, limit switches shall be adjusted following the manufacturer's instructions.

2. Gates shall be checked for leakage by the contractor.

END OF SECTION 220523

SECTION 221113

DUCTILE IRON PIPING AND APPURTENANCES

PART I - GENERAL

1.01 SUMMARY

A. Furnish and install restrained or flanged ductile iron pipe, valves, and fittings.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

B. References-Ductile Iron Piping

1. American Society for Testing and Materials (ASTM), latest editions:

a. A276: Standard Specification for Stainless and Heat Resisting Steel Bars and Shapes.

b. A307: Standard Specification for Bolts and studs, 60,000 psi Tensile Strength.

c. A536: Standard Specification for Ductile Iron Castings.

2. American Water Works Association (AWWA), latest editions:

a. C110: Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids (ANSI A21.10).

b. C115: Flanged Ductile-Iron Pipe with Threaded Flanges (ANSI A21.15).

c. C150: Thickness Design of Ductile Iron Pipe (ANSI A21.50).

d. C151: Ductile Iron Pipe, Centrifugally Cast, for Water and Other Liquids (ANSI A21.51).

3. American National Standards Institute (ANSI), latest editions:

   a. B16.1: Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800 (ANSI/ASME).

   b. B16.21: Nonmetallic Flat Gaskets for Pipe Flanges (ANSI/ASME).

   c. B16.42: Ductile Iron Pipe Flanges and Flanged Fittings (ANSI/ASME).

   d. B18.2.1: Square and Hex Bolts and Screws (Inch Series) (ANSI/ASME).

   e. B18.2.2: Square and Hex Nuts (Inch Series) (ANSI/ASME).

4. Manufacturers' Standardization Society of the Valve and Fittings Industry (MSS), latest publications:

   a. SP-58: Pipe Hangers and Supports - Materials, Design and Manufacture (ANSI/MSS).

   b. SP-69: Pipe Hangers and Supports - Selection and Application.

1.03 SYSTEM DESCRIPTION

A. Furnish all labor and materials, supervisions, appliances, piping and appurtenances for and properly connect, adjust, test, and place in continuous services all at the locations and to the elevations indicated and specified for the proper completion of the Work.

B. Piping and appurtenances shall be placed in service to convey stormwater.

   1. Stormwater has a specific gravity approximately equal to that of water.

   2. Typical solids content:

      a. Untreated stormwater: 3.5% - 5.0%

C. All ductile iron pipe and fittings shall be designed for stormwater and approved for use by the Ductile Iron Pipe Research Association.

1.04 QUALITY ASSURANCE-DUCTILE IRON

A. Manufacturer's inspection and testing at foundry in accordance with industry standard specifications.

1. Certificate of compliance of pipe with AWWA C115.

2. Provision of certificate of compliance of fittings with AWWA C110.

B. The Owner reserves the right to inspect and test by independent service at manufacturer's plant or elsewhere at his own expense.

C. Wherever the work disturbs existing conditions or work already completed, restore the same to its original condition in every detail. All such replacement and repair shall meet the approval of the Resident Engineer.

D. Pipe and fittings are not necessarily completely indicated or detailed on the Drawings. The Drawings are schematic only, and indicate pipe and fittings in a general way. It is the Contractor's responsibility to furnish all materials and cement lined ductile iron pipe and fittings required, and in conformance with all applicable codes.

E. Perform Work in accordance with applicable codes and authorities having jurisdiction.

F. Furnish materials which are new, unused and as specified, or if not particularized herein, which are the best of their respective kind free of defects and imperfections and suitable for the service intended, subject to the approval of the Engineer.

G. Provide workmanship which is first class in every respect. Have installation performed by workmen thoroughly experienced in such work.

1.05 SUBMITTALS-DUCTILE IRON

A. Make detail drawings for pipe and fittings to a scale of not less than ¼" to one (1) foot, indicating piping layout in plan and elevation as may be required to clearly indicate all pipe and fittings. Completely dimension the drawings and indicate connections to equipment and reference to approved Shop Drawings of such equipment.

B. Include a complete schedule of pipe, fittings, and specials with mark numbers on the schedules and on drawings corresponding to the mark numbers which will be on the pipe, fittings, and specials when delivered to the job site, as called for hereinafter. Clearly detail special castings indicating all pertinent dimensions.

C. Indicate location and type of pipe supports, hangers, anchors and concrete reaction blocking.

D. Certificate of Compliance of pipe with AWWA C115.

E. Certificate of compliance of fittings with AWWA C110.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Pipe Materials:

1. Design of pipe conforming to AWWA C150.

2. Type of pipe: flanged pipe manufactured in accordance with C151 and meeting the requirements of AWWA C115.

3. All ductile iron pipe shall have a minimum Class 50 wall thickness.

4. All ductile iron pipe shall be designed to withstand a maximum rated working pressure of 250 psi.

B. Fittings:

1. All fittings rated for a working pressure of at least 250 psi.

2. All fittings manufactured in accordance with and meeting the requirements of applicable standards as follows:

a. Flanged fittings: AWWA C110.

3. Flanged fittings:

a. Faced and drilled in accordance with AWWA C110 except for special drilling or tapping as necessary for correct alignment and bolting.

b. If flanged fittings not available under AWWA C110, provide fittings conforming to ANSI-ASME B16.1, with 125# flanges, rated for a minimum specified working pressure of 250 psi.

4. Nonstandard fittings:

a. Design of such fittings shall be acceptable to the Engineer.

b. Fittings shall be of the same diameter, thickness and pressure rating as standard fittings.

c. Manufactured to meet the requirements of same specifications as standard fittings excepting such features that render the fitting non-standard (e.g. laying length, end style, etc.).

5. Adapters:

a. Provide for joining pipe of different types, unless otherwise indicated.

b. Provide ends conforming to these Specifications for appropriate type of joint to receive adjoining pipe.

6. Filling rings:

a. Provide flat-faced filling rings (flange filler pieces) where necessary for proper assembly of adjoining piping or equipment.

b. Provide rings of suitable length with parallel or nonparallel faces and corresponding drilling as required.

c. Filling rings shall maintain the minimum rated working pressure of the pipeline.

d. Filling rings shall be ductile iron or cast iron and shall be faced and drilled in accordance with AWWA C110 or ANSI B16.1, 125# standard.

e. Provide 1/8" thick full-faced red rubber or SBR gaskets and all accessories necessary for proper installation.

7. Blind flanges/companion flanges:

a. Provide as necessary and where indicated on the Drawings.

b. All flanges shall maintain the minimum rated working pressure of the pipeline.

c. Provide flat-faced flanges of ductile or cast iron, faced and drilled in accordance with AWWA C110 or ANSI B16.1, 125# standard.

d. Provide 1/8" thick full-faced red rubber or SBR gaskets and all accessories necessary for proper installation.

C. Flanged Joints:

1. Provide flanged joints for all piping.

2. Flat-faced flanges confirming to AWWA C115.

3. Flanges shall be coated with the manufacturer's standard rust-preventive coating immediately after machining in accordance with AWWA C115 Part 15-10.4.

4. Joint gaskets shall be 1/8" thick, full-faced red rubber or SBR.

5. Provide all accessories necessary for proper assembly of joints.

D. Dresser-style Couplings:

1. Acceptable manufacturers:

   a. Dresser Manufacturing Div. Dresser Industries, Inc.; Bradford, PA, or equal.

2. Sleeves for use exposed or submerged shall be steel or epoxy coated steel.

3. Unless otherwise specified or shown the middle ring shall be furnished without a pipe stop and shall have the following minimum dimensions:

Pipe Diameter	Thickness	Length
3-inch - 8-inch	½ inch	7 inches
8-inch - 14 inch	½ inch	7 inches
16-inch - 24 inch	½ inch	7 inches

4. Bolts and nuts shall be stainless steel for submerged service.

5. Gasketed, sleeve-type couplings of diameter appropriate to piping in which being installed.

   a. Dresser Style 38 Coupling or equal.

6. Each coupling shall minimally consist of the following:

   a. One (1) steel middle ring.

   b. Two (2) steel followers.

   c. Two (2) wedge section gaskets.

   d. Sufficient number of trackhead steel bolts, nuts, and washers for proper assembly of coupling.

7. Gasket material: EPDM

8. Where joints or ends of pipe are not sufficiently anchored and the possibility of pullout from the coupling exists, provide joint harness consisting of a minimum of two (2) steel tie-bolts and an appropriate number of receiver lugs welded to the pipe on either side of the joint.

9. Couplings shall maintain the maximum working pressure rating of the pipe.

E. Bolts and Nuts:

1. Provide all bolts, nuts, and washers necessary for proper assembly of all joints and fittings.

2. Number and size of bolts conforming to same standard as joint or fitting.

3. Make flanged joints with:

a. Bolts.

b. Bolt studs with nut on each end.

c. Studs with nuts where flange is tapped.

4. Materials:

a. All flanged joints for pipe 10" diameter and smaller: type 316 stainless steel nuts, bolts, and washers.

F. Pipe Supports:

1. Shall conform to the requirements of MSS Standard Practice SP-58 except as supplemented by the requirements of these specifications or by drawings.

2. Provide supports where necessary for proper support of piping system and where specifically indicated on the drawings.

3. Attach supports, hangers, guides, anchors and brackets to the building structure. The Contractor shall be responsible for the safety and appearance of the work as well as the effect of such attachment on the existing building. Provide supplementary structural steel as necessary.

4. Furnish standard pipe hangers such as those manufactured by ITT Grinnell Corporation or equal.

5. For pipe supported from underneath furnish adjustable pipe roll stand support and support roll stand by means of concrete piers, structural steel or steel brackets as required.

7. Use of flat strap hangers will not be permitted.

8. All anchor bolts shall be 316 stainless steel.

G. Marking:

1. Mark all pipe and fittings in accordance with the appropriate standard under which it was manufactured.

2. Marking shall minimally include the following:

a. Thickness/weight class.

b. Size.

c. Manufacturer's name/initials.

d. Year cast.

e. Mark number.

f. Bends shall be marked with fraction of the circle.

H. CHECK VALVES

1. Elastomeric Check Valve:

a. Shall be elastomeric, slip-in flow operated check type. The check valve must be able to open with 1" or less of hydrostatic pressure.

b. Construction is to be all rubber. The valve shall be ply reinforced throughout the body, disc, and bill, which is cured and vulcanized into a one-piece unibody construction. A separate valve body or pipe used as the housing is not acceptable.

c. The valve shall be manufactured with no metal, mechanical hinges, or fasteners which would be used to secure the disc or bill to the valve housing. The port area of the valve shall contour down, which shall allow passage of flow in one direction while preventing reverse flow. The entire valve shall fit within the pipe I.D. Once installed, the check

valve shall not protrude beyond the face of the structure or end of the pipe.

d. Valve will be furnished with a set of stainless steel expansion clamps. The clamps, which will secure the valve in place, shall be installed in the cuff portion of the valve, based on installation orientation, and shall expand outwards, by means of a turnbuckle. Each clamp shall be pre-drilled allowing for the valve to be pinned and secured into position in accordance with the manufacturer's installation instructions.

e. Manufacturer must have flow test data from an accredited hydraulics laboratory to confirm pressure drop and hydraulic data. Company name, plant location, valve size patent number, and serial number shall be bonded to the check valve.

2. Swing Check Valve:

a. The air cushioned swing check valve shall be constructed per ANSI/AWWA C508 with heavy cast iron body with integral flanges and stainless steel body seat. A ductile iron disc arm shall be positively attached to a stainless steel shaft supported in bronze bushings located completely above the waterway. A cast iron disc shall be attached to the arm at a single point and contain a renewable resilient disc seat retained by a stainless steel follower ring and screws.

b. The shaft shall pass through a stuffing box and be sealed by flow friction packing with an adjustable packing gland. O-ring shaft seals are not acceptable.

c. The valve shall be full-ported at a disc travel of no more than 25° and close tightly when the inlet pressure decreases below the outlet pressure. An external, adjustable, bronze air cushion chamber, side mounted directly on the valve body and connected to the valve shaft, shall provide non-slam operation.

d. Minimum rated working pressure shall be 175 psig.

2.02 MECHANICAL JOINT DUCTILE IRON PIPE

A. Mechanical Joint Ductile Iron Pipe (DIP) shall be centrifugally cast pipe conforming to the American National Standard for Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids. ANSI/AWWA Designation A21.51/C-151, latest revision. The pipe sizes shall be as shown on the Drawings. All DIP pipe and fittings 16" in diameter or less shall be a thickness class 52 unless otherwise shown on the

Drawings. All pipe fittings shall have joints with body thickness and radii of curvature conforming to the latest ANSI/AWWA Designation A21.10/C110. Pipe shall be furnished in nominal 16 foot to 20 laying lengths.

B. Joints shall employ a single, elongated gasket of such size and shape as to provide an adequate compressive force against the spigot and socket after assembly to affect a positive seal under all combinations of joint and gasket tolerances. Gaskets shall be vulcanized natural or vulcanized synthetic rubber, resistant to common ingredients of sewage, oils, and groundwater. Gaskets shall be free of porous areas, foreign material, and visible defects.

C. The lubricant shall be suitable for lubricating the parts of the joint assembly. The lubricant shall be nontoxic and shall not support the growth of bacteria and shall have no deteriorating effects on the gasket material.

D. Push-on joint and mechanical joints shall conform to AWWA C1111 (ANSI A21.11), latest revision. Joints shall be U.S. Pipe "Tyton" Joint or approved equal.

E. Ductile iron pipe shall be cement lined. Linings shall conform to AWWA C104-71 (ANSI A21.4 – 1971) with bituminous seal coat. Cement lining shall be 1/8" thick for all pipes twelve (12") inches diameter and smaller and 3/16" thick for all pipes 14" diameter and larger.

F. All buried ductile iron piping and all underground appurtenances shall receive outside bituminous coating in accordance with AWWA C106-70.

G. Mechanical Ductile Iron Fittings: All ductile iron fittings shall be Class 250 suitable for use with the pipe specified above conforming to the latest edition of American National Standard for Gray Iron and Ductile Iron Fittings, 3in. through 48 in. for Water and Other Liquids. ANSI/AWWA Designation A21.10/C-110. Fittings shall be externally coated with a uniform thickness of hot applied coal tar coating and the inside shall be cement lined and only mechanical joint fittings shall be used in pressure main lines. End plugs shall be setscrew type, as manufactured by the U.S. Pipe, or approved equal. Bolts and gaskets shall conform to the latest edition of ANSI/AWWA Designation A21.11/C-111.

H. Mechanical Joint Retainer Glands: Standard mechanical joint retainer glands are designed to provide a method for restraining mechanical joint pipe fittings against possible joint separation, a rupture or blow-out caused by internal water pressures. Mechanical joint retainer glands must meet the specifications of AWWA C-111 (ANSI A21.11) American Standard for rubber gasket joints. Glands shall be ductile iron and set screws shall be heat treated AISC-4140 steel.

PART 3 - EXECUTION

3.01 GENERAL

A. Pipelines shall be located substantially as indicated on the Drawings, but the right is reserved to the Owner to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons.

B. Where fittings, etc. are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required.

3.02 INSPECTION

A. All pipe and fittings will be subject to inspection and approval by the Resident Engineer after delivery to the site. Do not use broken, cracked, misshaped, imperfectly coated, damaged or otherwise unsatisfactory pipe or fittings.

B. Such inspection by the Resident Engineer shall not relieve the Contractor of full responsibility for the material installed.

3.03 HANDLING

A. Unload pipe, fittings and accessories from cars or trucks with hoists or by skidding. Under no circumstances shall pipe be dropped. Do not skid or roll pipe on skidways against pipe already on the ground. Do not damage coating and linings; but, should damage occur, make repairs or replacement to the satisfaction of the Resident Engineer.

B. Use proper and suitable tools and appliances for the safe and convenient handling and laying of the pipe and fittings. Take care to prevent pipe coating from being damaged, particularly on the inside of the pipe and fittings.

3.04 INSTALLATION

A. Install pipe, fittings, valves, specials, and accessories in accordance with the configurations shown and information provided on the Drawings.

B. All piping system components shall be handled with padded slings or other appropriate equipment. The use of cables, hooks, or chains will not be permitted.

C. Piping Support:

1. Furnish and install supports to hold piping at lines and grades indicated or specified.

2. Support pipe and appurtenances connected to equipment to prevent any strain imposed on equipment.

3. Support piping within buildings and structures from floors, walls, ceilings or beams. For floor support, use saddle stands or concrete piers as indicated or permitted. Shape pipe saddles to fit pipe and be capable of screw adjustment. Construct concrete piers to conform accurately to the bottom one-third to one-half of pipe. Support piping along walls by wall brackets with attached pipe rolls, saddles or with adjustable hanger rods. Support piping from ceilings with rod hangers of type capable of screw adjustment and with adjustable concrete inserts or beam clamps.

4. Use hangers and supports conforming to MSS-SP-58.

D. Pipe and Fittings:

1. Remove and replace defective pieces.

2. Clear off all debris and dirt before installing and keep clean until accepted.

3. Install accurately to lines and grades indicated or required. Provide accurate alignment, both horizontally and vertically.

E. Joints and Couplings

1. Bolted joints: - General

a. Remove rust-preventive coatings from machined surfaces.

b. Clean pipe ends, sockets, sleeves, housings, and gaskets and smooth all burrs and other defects.

c. Use torque wrench to tighten to correct range of torque not to exceed values recommended by the manufacturer and applicable standards.

2. Flanged joints:

a. Make up tight.

b. Do not put strain on nozzles, valves, and other equipment.

c. Properly position and align connecting flanges and use no external force to bring them together.

3. Dresser-style couplings:

a. All couplings shall be assembled in the field.

b. Tighten bolts using torque wrench to torque values recommended by manufacturer of coupling.

F. Temporary plugs: when pipe laying not in progress, close open ends of pipe with temporary watertight plugs.

G. Appurtenances: set valves, fittings and appurtenances as indicated.

3.05 FIELD QUALITY CONTROL

A. Clean off all dirt, dust, oil, grease and other foreign material, before conducting pressure and leakage tests.

B. Piece piping in existing pipelines:

1. Where piece piping or fittings have been installed in existing pipelines for which the Resident Engineer has determined that pressure and leakage tests as previously specified cannot properly be performed, new piping shall be tested under actual operating conditions for a minimum of two (2) hours.

2. Piping installation shall be thoroughly inspected for leaks.

C. After testing on any section of pipe has been completed to the satisfaction of the Resident Engineer, carefully drain the piping of all water.

D. Demonstrate to the satisfaction of the Resident Engineer that all piping is free from obstructions and other foreign material.

END OF SECTION 221113

SECTION 221329

SUBMERSIBLE SUMP PUMPS

PART 1 - GENERAL

1. SUMMARY

A. This Section includes all labor, equipment and materials necessary to provide, install, test and place into service non-clog centrifugal submersible pumps and appurtenances for pumping stormwater, complete as detailed herein and as shown on the Drawings.

B. The specified submersible sump pumps shall serve to dewater the pump bay at each pumping station. The Contractor shall provide and install the necessary piping, fittings, valving and supports required to provide a complete and properly functioning system at each pumping station.

2. SYSTEM DESCRIPTION

A. Submersible pumps and appurtenances shall be placed in service in each pumping station as indicated in previous specification sections and as shown on the Drawings:

1. Two (2) duplex electric submersible pumps supplied with submersible motor, close coupled volute, cast iron construction discharge elbow, 675 feet of submersible power cable, and accessories.

2. One (1) spare pump, complete, per pumping station.

3. One (1) spare mechanical seal, per pumping station.

4. Pumps shall be designed for continuously submerged service.

5. Pumps shall be suitable for continuous operation at full nameplate load while the motor is completely submerged, partially submerged, or totally non-submerged.

6. The pump, mechanical seals, and motor units provided under this specification shall be from the same manufacturer in order to achieve standardization of operation, maintenance, spare parts, manufacturer's service and warranty.

7. The pumps shall be heavy duty, electric submersible, centrifugal non-clog units designed for handling raw, unscreened sewage and wastewater and shall be fully guaranteed for this use.

3. RELATED WORK

A. Division 034100 – Pre-Cast Structures

B. Division 16000 - Electrical

C. Division 221113 - Ductile Iron Pipe and Appurtenances

4. QUALITY ASSURANCE

A. All pumps supplied shall be the product of the same manufacturer.

B. The pumps provided shall be capable of operating in an ambient liquid temperature of 104° F. Mutual motors with a maximum ambient temperature rating below 104° F shall not be acceptable.

C. All pumps, motors, and accessories shall be supplied as a complete package from the pump manufacturer, who shall have responsibility for the entire system.

D. The pump manufacturer shall be regularly engaged in the production of equipment similar to that specified. The pumping equipment and appurtenances shall be designed, constructed and installed in accordance with the best practices and methods, and shall operate satisfactorily in the installation as shown on the Drawings, over the entire range of conditions specified.

5. SUBMITTALS

A. Shop Drawings

1. Submit the following in accordance with the General Conditions:

a. A listing of pump components indicating materials of construction.

b. Detailed fabrication and installation drawings, including required modifications to existing suction and discharge piping and concrete pump supports.

c. Manufacturer's data for all accessories.

d. Certified bearing frame analysis and bearing calculations, verifying compliance with the specified bearing life.

e. Certified pump support frame and motor support frame structural calculations including requirements for anchorage.

f. Certified pump performance curves, as specified in the section entitled "Tests on Pumping Equipment."

g. Manufacturer's certification that all materials furnished are in compliance with this Specification Section.

h. Manufacturer's installation instructions.

i. Complete operation and maintenance manuals.

6. DELIVERY, STORAGE, AND HANDLING

A. Materials and equipment shall be boxed, crated or otherwise completely enclosed and protected during shipment, handling, and storage. Such boxes, crates or protection shall be clearly labeled with manufacturer's name, brand or model designation, and type or grade. Complete packing lists and bills of materials shall be included with each shipment. Each item of equipment shall be tagged or marked with the same identification number or mark as shown on the packing lists and bills of materials.

B. Protect stored pumps and appurtenances for damage due to exposure to sunlight, heat, dirt, freezing and thawing, and vandalism.

C. Store and handle all equipment in accordance with the manufacturer's recommendations.

7. WARRANTY

D. Equipment and appurtenances shall be provided with a manufacturer's warranty of not less than one (1) year from date of final acceptance.

PART 2 - PRODUCTS

1. Manufacturers

   A. It shall be noted that this is a non-proprietary specification. Pumps to be provided shall meet the below pump characteristics, specifically the design point pumping rate and total dynamic head (TDH). To minimize spare part costs, reduce operator and maintenance training and be able to diagnose pump problems quickly, the Owner requires that the same pumps be provided at all stations for this project. Any "or equal" submersible pump and mechanical mixing system proposed by the Contractor shall be submitted with the Contractor's Bid in order to receive consideration as an equal to the specified pump characteristics.

   B. Pumps shall be submersible, non-clog wastewater pumps equipped with submersible electric motor, connected for operation on 480 volts, 3 phase, 60 hertz, 4 wire service.

Refer to the following Pump Characteristics Schedule for the pumps required:

PUMP CHARACTERISTICS SCHEDULE

Pump Station	**PS 1**	**PS 2**	**PS 3**	**PS 4**
Number of Pumps	2	2	2	2
Capacity	200 gpm	200 gpm	200 gpm	200 gpm
TDH	20 feet	20 feet	20 feet	20 feet
Pump Model	NP 3085 MT 3	NP 3085 MT 3	NP 3085 MT 3	NP 3085 MT 3
Motor HP	3 HP	3 HP	3 HP	3 HP
Impeller Diameter	152 mm	152 mm	152 mm	152 mm
Speed	1700 rpm	1700 rpm	1700 rpm	1700 rpm
Minimum Water-to-Wire Efficiency	64%	64%	64%	64%

C. Pump Design Configuration:

1. The pumps shall be supplied with a mating cast iron discharge connection and shall be automatically and firmly connected to the discharge connection.

2. The pumps shall be guided by no less than two (2) guide bars extending from the top of the station to the discharge connection.

3. Sealing of the pump to the discharge connection shall be accomplished by a machined metal to metal watertight contact. Sealing of the discharge interface with a diaphragm, O-ring, or profile gasket will not be acceptable.

4. No portion of the pump shall bear directly on the sump floor.

5. There shall be no need for personnel to enter the pump bay.

6. Each pump shall be furnished with a pump lift system consisting of a minimum of 33 feet of high tensile strength proof-tested stainless steel chain and forged grip eye for use in removing the pump.

D. Pump Construction:

1. Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. The lifting handle shall be of stainless steel.

2. All exposed nuts or bolts shall be of stainless steel construction.

3. All metal surfaces coming into contact with stormwater, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

4. Sealing design shall incorporate metal to metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile or Viton rubber O-rings. Fittings will the result of controlled compression of rubber O-rings in two planes and O-ring contact of four (4) sides without the requirement of a specific torque limit.

5. Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal.

6. No secondary sealing compounds, elliptical O-rings, grease, or other devices shall be used.

E. Cooling System:

1. Motors are sufficiently cooled by the surrounding environment or pumped media. A water cooling jacket is not required.

F. Cable Entry Seal:

1. The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal.

2. The cable entry shall consist of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the body containing a strain relief function, separate from the function of sealing the cable. The assembly shall provide ease of changing the cable when necessary using the same entry seal.

3. The cable entry junction chamber and motor shall be sealed from each other, which shall isolate the stator housing from foreign material gaining access through the pump top.

4. Epoxies, silicones, or other secondary sealing systems shall not be considered equal.

G. Motor:

1. The pump motor shall be a NEMA B design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber.

2. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%.

3. The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31.The stator shall be heat-shrink fitted into the cast iron stator housing.

4. The use of multiple step dip and bake-type stator insulation process is not acceptable. The use of pins, bolts, screws or other fastening devices used to locate or hold the stator and that penetrate the stator housing are not acceptable.

5. The motor shall be designed for continuous duty while handling pumped media of up to 104°F. The motor shall be capable of no less than fifteen (15) evenly spaced starts per hour.

6. The rotor bars and short circuit rings shall be made of aluminum. Three thermal switches shall be embedded in the stator end coils, one per phase winding, to monitor the stator temperature. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the motor control panel.

7. The junction chamber shall be sealed off from the stator housing and shall contain a terminal board for connection of power and pilot sensor cables using threaded compression type terminals. The use of wire nuts or crimp-type connectors is not acceptable.

8. The motor and the pump shall be produced by the same manufacturer.

9. The motor service factor (combined effect of voltage, frequency and specific gravity) shall be 1.15. The motor shall have a voltage tolerance of +/- 10%. The motor shall be designed for continuous operation in up to a 40°C ambient and shall have a NEMA Class B maximum operating temperature rise of 80° C.

10. A motor performance chart shall be provided upon request exhibiting curves for motor torque, current, power factor, input/output kW and efficiency. The chart shall also include data on motor starting and no-load characteristics.

11. Motor horsepower shall be sufficient so that the pump is non-overloading throughout its entire performance curve, from shut-off to run-out.

12. The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet or greater.

H. Bearings:

1. The integral pump/motor shaft shall rotate on two (2) bearings. The motor bearings shall be sealed and permanently grease lubricated with high temperature grease.

2. The upper motor bearing shall be a single deep groove ball type bearing to handle radial loads.

3. The lower bearing shall be a two (2) row angular contact ball bearing to handle the thrust and radial forces. The minimum L_{10} bearing life shall be 50,000 hours at any usable portion of the pump curve.

I. Mechanical Seals:

1. Each pump shall be provided with a positively driven dual, tandem mechanical shaft seal system consisting of two seal sets, each having an independent spring.

2. The lower primary seal, located between the pump and seal chamber, shall contain one (1) stationary and one (1) positively driven rotating corrosion resistant tungsten-carbide ring. The upper secondary seal, located between the seal chamber and the seal inspection chamber, shall contain one (1) stationary and one (1) positively driven rotating corrosion resistant tungsten-carbide seal ring. All seal rings shall be individual solid sintered rings. Each seal interface shall be held in place by its own spring system. The seals shall not depend upon direction of rotation for sealing.

3. Mounting of the lower seal on the impeller hub is not acceptable. Shaft seals without positively driven rotating members or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces are not acceptable.

4. The seal springs shall be isolated from the pumped media to prevent materials from packing around them, limiting their performance.

5. Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and shall provide capacity for lubricant expansion. The seal lubricant chamber shall have one drain and one inspection plug that are accessible from the exterior of the motor unit. The seal system shall not rely upon the pumped media for lubrication.

6. Seal lubricant shall be FDA Approved, nontoxic.

7. The area about the exterior of the lower mechanical seal in the cast iron housing shall have cast in an integral concentric spiral groove. This groove shall protect the seals by causing abrasive particulate entering the seal cavity to be forced out away from the seal due to centrifugal action.

8. A separate seal leakage chamber shall be provided so that any leakage that may occur past the upper, secondary mechanical seal will be captured prior to entry into the motor stator housing. Such seal leakage shall not contaminate the motor lower bearing. The leakage chamber shall be equipped with a float type switch that will signal if the chamber should reach 50% capacity.

J. Pump Shaft:

1. The pump and motor shaft shall be a single piece unit. The pump shaft is an extension of the motor shaft.

2. The shaft shall be stainless steel – ASTM A479 S43100-T.

3. Shafts using mechanical couplings shall not be acceptable. Shaft sleeves will not be acceptable.

K. Impeller:

1. The impeller shall be of ASTM A-48, Class 35B gray iron dynamically balanced, semi-open, multi-vane, back swept, screw-shaped, non-clog design. The impeller leading edges shall be mechanically self-cleaned automatically upon each rotation as they pass across a spiral groove located on the volute suction.

2. The screw-shaped leading edges of the gray iron impeller shall be hardened to Rc 45 and shall be capable of handling solids, fibrous materials, heavy sludge and other matter normally found in wastewater. The screw shape of the impeller inlet shall provide an inducing effect for the handling of up to 5% sludge and rag-laden wastewater. The impeller to volute clearance shall be readily adjustable by the means of a single trim screw. The impellers shall be locked to the shaft, held by an impeller bolt and shall be coated with alkyd resin primer.

3. The impeller shall be capable of momentarily moving axially upwards a distance of 15mm/0.6-in. to allow larger debris to pass through and immediately return to normal operating position.

4. The impeller shall be coated with a polymeric, two component high strength coating to prevent the metal surfaces from corrosion and erosion.

L. Volute/Suction Cover

1. The pump volute shall be a single piece gray cast iron, ASTM A-48, Class 35B, non-concentric design with smooth passages of sufficient size to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as specified.

2. The volute shall have a replaceable suction cover insert ring in which are cast spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide trash release pathways and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed. The insert ring shall have a guide pin integral to the casting and shall be cast of (ASTM A-48, Class 35B gray iron) and provide effective sealing between the multi-vane semi-open impeller and the volute housing.

3. The inside of the volute shall be coated with a polymeric, two component high strength coating to prevent the metal surfaces from corrosion and erosion.

M. Motor Protection

1. Each pump motor stator shall incorporate three thermal switches, one per stator phase winding and be connected in series, to monitor the temperature of the motor. The thermal switches shall open at 125°C (260°F), stop the motor and activate an alarm.

2. A float switch shall be installed in the seal leakage chamber and will activate if leakage into the chamber reaches 50% chamber capacity, signaling the need to schedule an inspection. The Float Leakage Sensor (FLS) is a small float switch used to detect the presence of water in the stator chamber. When activated, the FLS will stop the motor and send an alarm both local and/or remote. USE OF VOLTAGE SENSITIVE SOLID STATE SENSORS AND TRIP TEMPERATURE ABOVE 125°C (260°F) SHALL NOT BE ALLOWED.

3. The thermal switches and float switch shall be connected to a control and status monitoring unit.

N. Explosion-Proof Pumps

1. The pump system including the pump, motor and power cable shall be approved for use in areas classified as hazardous locations in accordance with the NEC Class I, Div. 1, Group C and D service as determined and approved by a U.S. nationally recognized testing laboratory (U.L., FM, CSA) at the time of the bidding of the project.

2. As required by Factory Mutual (FM) the motor shall be capable of operating in pumped media up to **104 DEGREES F**. Motor thermal switches shall monitor and protect the motor from excessive temperature. An internal Float Switch shall be available in the motor chamber.

O. Shop Testing:

1. Pumps shall be tested in the facility of the manufacturer prior to shipment.

2. Impeller, motor rating and electrical connections shall be checked for compliance with this specification.

3. Prior to submergence, each pump shall be dry run to establish correct rotation.

4. Each pump shall be run submerged in water.

5. Motor and cable insulation shall be tested for moisture content or insulation defects.

6. Each pump shall be tested in accordance with the latest test code of the Hydraulic Institute at the manufacturer to determine head versus capacity and kilowatt draw required.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install pumps and accessories in accordance with the configuration shown on the Contract Drawings and in accordance with manufacturer's standards.

B. All materials required for installation of pumps shall be on site before starting the work required.

C. Inspect material for defects in workmanship and material. Clean out debris and foreign material from pumps, valves and piping, test operating mechanisms to check proper functioning, and check nuts and bolts for tightness. Repair equipment which is defective at no cost to Owner.

3.02 FIELD TESTING

A. Field inspection and testing of the pumps shall be performed in accordance with the section entitled "Tests on Pumping Equipment."

B. Pumps shall be tested in the presence of the Resident Engineer.

3.03 SERVICES OF MANUFACTURER'S REPRESENTATIVE

A. The services of the manufacturer's representative shall be provided by the pump supplier during installation, testing, startup and adjustment. The services shall be for the pump, and all associated equipment provided under this Contract.

B. The services of the manufacturer's representative shall be provided for the minimum hours as listed below:

1. Sixteen (16) hours for installation assistance, inspection and certification of installation The Contractor shall engage the services of a manufacturer's erecting engineer or qualified manufacturer's representative to be present at and assist in the start-up of each pump supplied under this Contract. The duration of service shall be as required to complete the successful startup of the pumps. A minimum of eight (8) hours per pump shall be provided.

2. Eight (8) hours for startup and performance testing

3. Eight (8) hours for Owner's personnel training. Such training shall include both field and classroom training, and shall be conducted in two (2) separate sessions, each session to be no less than four (4) hours in duration. The first training session shall be conducted immediately following start-up of the pumps. The second training session shall be conducted within one (1) week following start-up of the pumps.

C. Additional on-site time shall be provided at the supplier's expense as necessary to assure that equipment is installed and operating correctly and in accordance with the Specifications.

D. The Owner's personnel shall have the right to witness the activities of representative during installation, testing, startup and adjustment.

E. Training shall be scheduled at least two (2) weeks in advance so as to provide the Owner an opportunity to adjust work schedules to permit all interested personnel to attend

END OF SECTION 221329

SECTION 221429

PROPELLER PUMPS

PART 1 - GENERAL

1. SUMMARY

A. This Section includes all labor, equipment and materials necessary to provide, install, test and place into service submersible propeller pumps and appurtenances for pumping stormwater, complete as detailed herein and as shown on the Drawings.

B. The specified submersible propeller pumps shall serve to lift incoming storm event flows at each pumping station. The Contractor shall provide and install the necessary piping, fittings, valving and supports required to provide a complete and properly functioning system at each pumping station.

C. It is the intention of this specification to have devices and their appurtenances supplied such that they occupy a minimum footprint area.

2. SYSTEM DESCRIPTION

A. Propeller pumps and appurtenances shall be placed in service in each pumping station as indicated in previous specification sections and as shown on the Drawings:

1. Five (5) electric submersible propeller pumps supplied with explosion proof submersible motor, close coupled volute, A36 heavy duty steel pump column and discharge elbow, six hundred seventy five (675') feet of submersible power cable, motor monitoring unit for installation in control panel, and accessories.

2. The pump/motor unit(s) shall be close coupled to form one integrated direct drive unit. The pump/motor unit shall be designed for installation into a discharge column onto a seat at the bottom of the column. The pump/motor unit shall be held in place by its own weight and the pumping head.

3. One (1) spare pump, complete, per pumping station.

4. One (1) spare mechanical seal, per pumping station.

5. Pumps shall be designed for continuously submerged service.

6. Pumps shall be suitable for continuous operation at full nameplate load while the motor is completely submerged, partially submerged, or totally non-submerged.

7. The pump, mechanical seals, motor monitoring devices, and motor units provided under this specification shall be from the same manufacturer in order to achieve standardization of operation, maintenance, spare parts, manufacturer's service and warranty.

8. The pumps shall be heavy duty, electric subm ersible, centrifugal units designed for handling stormwater and shall be fully guaranteed for this use.

3. RELATED WORK

A. Division 034100 – Pre-Cast Structures

B. Division 16000 - Electrical

C. Division 221113 - Ductile Iron Pipe and Appurtenances

4. QUALITY ASSURANCE

A. All pumps supplied shall be the product of the same manufacturer.

B. Each pump shall be tested and approved in accordance with national and international standards including but not limited to IEC34-1, HI, CSA and ISO 9906.

C. Duty points shall be guaranteed either by ISO 9906 or Hydraulic Institute. The use of obsolete standards such as ISO 2548 or ISO 3555 shall not be allowed. For closed coupled pumps, overall efficiency shall always be guaranteed.

D. The pumps provided shall be capable of operating in an ambient liquid temperature of 104° F. Mutual motors with a maximum ambient temperature rating below 104° F shall not be acceptable.

E. All pumps, motors, and accessories shall be capable of operating in a saltwater and abrasive environment.

F. All pumps, motors, and accessories shall be supplied as a complete package from the pump manufacturer, who shall have responsibility for the entire system.

G. The pump manufacturer shall be regularly engaged in the production of equipment similar to that specified. The pumping equipment and appurtenances shall be designed, constructed and installed in accordance with the best practices and methods, and shall operate satisfactorily in the installation as shown on the Drawings, over the entire range of conditions specified.

5. SUBMITTALS

A. Shop Drawings

1. Submit the following in accordance with the General Conditions:

a. A listing of pump components indicating materials of construction.

b. Detailed fabrication and installation drawings, including required modifications to existing suction and discharge piping and concrete pump supports.

c. Manufacturer's data for all accessories.

d. Certified bearing frame analysis and bearing calculations, verifying compliance with the specified bearing life.

e. Certified pump support frame and motor support frame structural calculations including requirements for anchorage.

f. Certified pump performance curves, as specified in the section entitled "Tests on Pumping Equipment."

g. Manufacturer's certification that all materials furnished are in compliance with this Specification Section.

h. Manufacturer's installation instructions.

i. Complete operation and maintenance manuals.

6. DELIVERY, STORAGE, AND HANDLING

A. Materials and equipment shall be boxed, crated or otherwise completely enclosed and protected during shipment, handling, and storage. Such boxes, crates or protection shall be clearly labeled with manufacturer's name, brand or model designation, and type or grade. Complete packing lists and bills of materials shall be included with each shipment. Each item of equipment shall be tagged or marked with the same identification number or mark as shown on the packing lists and bills of materials.

B. Protect stored pumps and appurtenances for damage due to exposure to sunlight, heat, dirt, freezing and thawing, and vandalism.

C. Store and handle all equipment in accordance with the manufacturer's recommendations.

7. WARRANTY

D. Equipment and appurtenances shall be provided with a manufacturer's warranty of not less than one (1) year from date of final acceptance.

PART 2 - PRODUCTS

1. Manufacturers

A. It shall be noted that this is a non-proprietary specification. Pumps to be provided shall meet the below pump characteristics, specifically the design point pumping rate and total dynamic head (TDH). To minimize spare part costs, reduce operator and maintenance training and be able to diagnose pump problems quickly, the Owner requires that the same pumps be provided at all stations for this project. Any "or equal" propeller pump system proposed by the Contractor shall be submitted with the Contractor's Bid in order to receive consideration as an equal to the specified pump characteristics.

B. Pumps shall be submersible propeller equipped with submersible electric motor, connected for operation on 480 volts, 3 phase, 60 hertz, 4 wire service.

Refer to the following Pump Characteristics Schedule for the pumps required:

PUMP CHARACTERISTICS SCHEDULE

Pump Station	**L St.**	**22nd Ave**	**Barnegat Ave.**	**Island Ave.**	**Eisenhower Ave.**
Number of Pumps	5	5	5	5	5
Capacity, Minimum	9,000 gpm	9,000 gpm	9,000 gpm	9,000 gpm	9000 gpm
TDH, Minimum	20 feet	20 feet	20 feet	16 feet	20 ft
$NPSH_R$, Maximum	27 feet	27 feet	27 feet	27 feet	27 feet
Pump Model	PL 7040 LT 3	PL 7040 LT 3	PL 7040 LT 3	PL 7040 LT 3	PL 7040 LT 3
Motor HP	80 HP	80 HP	80 HP	80 HP	80 HP
Propeller Diameter	417 mm	417 mm	417 mm	410 mm	417 mm
Speed	1180 rpm	1180 rpm	1180 rpm	1180 rpm	1180 rpm
Minimum Hydraulic Efficiency	80%	80%	80%	80%	80%

C. Pump Design Configuration:

1. The pumps shall be automatically and firmly installed in a discharge column having an inside diameter of 600 mm (24 inches), maximum. The entire weight of the pump/motor unit shall be borne by the pump seat at the bottom of the discharge column. Sealing of the pumping unit to the seat of the discharge column to prevent back-flow shall be accomplished by an O-ring between the bell-mouth and the pump seat.

2. No portion of the pump/motor unit shall bear on the sump floor directly or on a sump floor mounted stand.

3. There shall be no need for personnel to enter the pump bay.

4. Each pump shall be furnished with a pump lift system consisting of a minimum of 25 feet of high tensile strength proof-tested stainless steel chain and forged grip eye for use in removing the pump.

D. Pump Construction:

1. Major pump components shall be of cast iron EN GJL-250 or ASTM-No35B with smooth surfaces devoid of blow holes or other casting irregularities. EN GJS-500-7 or ASTM- No 80-55-06 is also allowed. All exposed nuts or bolts shall be made of stainless steel A2 acc. to ISO 3506-1 or ASTM 304 or better. The lifting handle shall be of stainless steel.

2. All exposed nuts or bolts shall be of stainless steel construction.

3. The outer surfaces of the pump shall be protected by suitable painting system including a two-component high-solid top coating.

4. All metal surfaces coming into contact with stormwater, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

5. Sealing of mating surfaces shall incorporate metal-to-metal contact between machined surfaces. Pump/Motor unit mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile or Viton rubber O-rings.

6. Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal.

7. No secondary sealing compounds, elliptical O-rings, grease, or other devices shall be used.

E. Propeller:

1. The propeller shall be made of stainless steel EN 10 283 1.4408 or ASTM A743 CF-8M and be of non-clog type design having blades with back-swept leading edges for low clogging performance.

2. The impeller vanes shall be self-cleaned upon each rotation as they pass across a sharp relief groove located in the wear ring keeping the blades clear of debris, maintaining an unobstructed pumping. Mass moment of inertia shall be provided by the pump manufacturer.

F. Cooling System:

1. Motors are sufficiently cooled by the surrounding environment or pumped media. A water cooling jacket is not required.

G. Power and Monitoring Cable:

1. The power cable shall be sized to the IEC or NEC standards and shall be of sufficient length to reach the junction box without the need of any splices.

2. The outer jacket shall be made of chlorinated polyethylene rubber CPE: type 5GM5 with low water absorption and with mechanical flexibility to withstand the pressure at the cable entry. The power cable shall be approved for conductor temperature up to minimum 90 degree C.

3. The motor and cable shall be capable of continuous submergence without loss of watertight integrity to a depth of at least 20m (65 feet).

4. A cable handling system shall be provided to restrain the cables and protect the cables from the turbulence in the column.

H. Watertight Cable Transit:

1. A cable support and protection system shall be provided to limit movement of the electrical cables within the discharge tube. The cables shall be prevented from coming into contact with the inside walls of the pump tube, or any other surfaces which might abrade the cable jacket. Further, the cables shall be supported with proper strain relief, to prevent damage to the cable entry at the pump motor top.

2. In a closed tube (i.e. with bolted cover), a watertight cable transit shall also be provided. For the purpose of inspection, the cable transit shall allow for removal of the tube cover without disturbing the watertight integrity of the cables' penetration through the tube wall. Watertight sealing shall be effected by means of individual, field-adjustable rubber modules. The use of epoxy, silicone, or other secondary sealing materials shall not be considered

acceptable.

3. The cable support and protection system shall consist of the following components:

   a. Cable transit, including steel frame, rubber modules, and compression wedge.

   b. Stainless steel guide wire assembly, field-adjustable for length, including shackles, thimbles, and wire nuts.

   c. Spring-loaded tensioners for guide wire and electrical cables, including shackles.

   d. Kellems-type cable grips for electrical cables.

   e. Cross beam for mounting inside tube.

   f. Cable holder for tensioners, mounted to cross beam.

   g. Vulcanized adhesive tape, electrical tape, and polypropylene tubes for bundling of electrical cables to guide wire.

4. Electrical cables shall be bundled to the guide wire at regular intervals, first at 20" above the pump, then at every 40" thereafter.

5. The guide wire, connected to the pump at one end and the cross beam at the other, shall be pulled taut using a spring-loaded tensioner.

6. The electrical cables, affixed to the cross beam using Kellems grips, shall be pulled taut using spring-loaded tensioners.

7. The cable protection system shall allow for removal of the pump for inspection, and re-installation of the pump after inspection, without the need to remove any bolts, screws, or pins.

I. Motor:

1. The pump motor shall be a NEMA B design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber.

2. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%.

3. The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31. The stator shall be heat-shrink fitted into the cast iron stator housing.

4. The use of multiple step dip and bake-type stator insulation process is not acceptable. The use of pins, bolts, screws or other fastening devices used to locate or hold the stator and that penetrate the stator housing are not acceptable.

5. The motor shall be designed for continuous duty while handling pumped media of up to 104°F. The motor shall be capable of no less than fifteen (15) evenly spaced starts per hour.

6. The rotor bars and short circuit rings shall be made of aluminum. Three thermal switches shall be embedded in the stator end coils, one per phase winding, to monitor the stator temperature. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the motor control panel.

7. The junction chamber shall be sealed off from the stator housing and shall contain a terminal board for connection of power and pilot sensor cables using threaded compression type terminals. The use of wire nuts or crimp-type connectors is not acceptable.

8. The motor and the pump shall be produced by the same manufacturer.

9. The motor service factor (combined effect of voltage, frequency and specific gravity) shall be 1.15. The motor shall have a voltage tolerance of +/- 10%. The motor shall be designed for continuous operation in up to a 40°C ambient and shall have a NEMA Class B maximum operating temperature rise of 80° C.

10. A motor performance chart shall be provided upon request exhibiting curves for motor torque, current, power factor, input/output kW and efficiency. The chart shall also include data on motor starting and no-load characteristics.

11. Motor horsepower shall be sufficient so that the pump is non-overloading throughout its entire performance curve, from shut-off to run-out.

12. The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet or greater.

J. Motor Cable Entry Seal:

1. The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal.

2. The cable entry shall consist of dual cylindrical elastomer sleeves, flanked by stainless steel washers, all having a close tolerance fit against the cable and the cable entry. The sleeves shall be compressed by the cable entry unit, thus providing a strain relief function. The assembly shall permit easy changing of the cable.

3. The cable entry junction chamber and motor shall be sealed from each other, which shall isolate the stator housing from foreign material gaining access through the pump top.

4. Epoxies, silicones, or other secondary sealing systems shall not be considered equal.

K. Bearings:

1. The integral pump/motor shaft shall rotate on two (2) bearings. The motor bearings shall be sealed and permanently grease lubricated with high temperature grease.

2. The upper motor bearing shall be a single deep groove ball type bearing to handle radial loads.

3. The lower bearing shall be a two (2) row angular contact ball bearing to handle the thrust and radial forces. The minimum L_{10} bearing life shall be 50,000 hours at any usable portion of the pump curve.

L. Mechanical Seals:

1. Each pump shall be provided with a positively driven dual, tandem mechanical shaft seal system consisting of two seals, each having an

independent spring system. The seal material shall consist of corrosion resistant wolfram carbide (Corrosion resistant tungsten carbide).

2. The seals shall require neither maintenance nor adjustment and shall be capable of operating in either clockwise or counter clockwise direction of rotation without damage or loss of seal function.

3. The outer primary seal, located between the pump and seal chamber, shall contain one stationary and one positively driven rotating corrosion resistant tungsten-carbide ring. The inner secondary seal, located between the seal chamber and the seal inspection chamber shall be an active seal. The inner seal shall contain one stationary and one positively driven rotating corrosion resistant tungsten-carbide seal ring. The rotating inner seal ring shall have small back-swept grooves laser inscribed upon its face to act as a micro pump as it rotates, returning any fluid that should enter the dry motor chamber back into the lubricant chamber.

4. All seal rings shall be individual solid sintered rings. Shaft seals without positively driven rotating members or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces are not acceptable. The seal springs shall be isolated from the pumped media to prevent materials from packing around them, limiting their performance.

5. Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and shall provide capacity for lubricant expansion. The seal lubricant chamber shall have one drain and one inspection plug that are accessible from the exterior of the motor unit. The seal system shall not rely upon the pumped media for lubrication.

6. Seal lubricant shall be FDA Approved, nontoxic.

7. In the case of a seal cavity, the area about the exterior of the lower mechanical seal in the cast iron housing shall have casted-in, an integral concentric spiral groove. This groove shall protect the seals by centrifugal action causing abrasive particulate entering the seal cavity area to be forced out away from the seal.

8. The following seal types shall not be considered acceptable or equal to the dual independent seal specified: shaft seals without positively driven rotating members, or conventional double mechanical seals containing either a common single or double spring acting between the

upper and lower seal faces. No system requiring a pressure differential to offset pressure and to affect sealing shall be used.

9. Any leakage that occurs from the mechanical seals shall be gathered in a separate leakage chamber. A float type leakage sensor shall be located in the leakage chamber to detect liquid intrusion. If activated, the control shall stop the motor and activate an alarm. The manufacturer shall provide a control and status relay to be mounted into any control panel to provide simple interface with the sensors mounted internally to the pump motor unit.

M. Pump Shaft:

1. The pump and motor shaft shall be a single piece unit. The pump shaft is an extension of the motor shaft.

2. The pump shaft shall be of stainless steel EN 1.4057 or AISI 431.

3. Shafts using mechanical couplings shall not be acceptable. Shaft sleeves will not be acceptable.

N. Motor Protection

1. Each pump motor stator shall incorporate three thermal switches, one per stator phase winding and be connected in series, to monitor the temperature of the motor. The thermal switches shall open at 125°C (260°F), stop the motor and activate an alarm.

2. A float switch shall be installed in the seal leakage chamber and will activate if leakage into the chamber reaches 50% chamber capacity, signaling the need to schedule an inspection. The Float Leakage Sensor (FLS) is a small float switch used to detect the presence of water in the stator chamber. When activated, the FLS will stop the motor and send an alarm both local and/or remote. USE OF VOLTAGE SENSITIVE SOLID STATE SENSORS AND TRIP TEMPERATURE ABOVE 125°C (260°F) SHALL NOT BE ALLOWED.

3. The thermal switches and float switch shall be connected to a control and status monitoring unit.

O. Explosion-Proof Pumps

1. The pump system including the pump, motor and power cable shall be approved for use in areas classified as hazardous locations in

accordance with the NEC Class I, Div. 1, Group C and D service as determined and approved by a U.S. nationally recognized testing laboratory (U.L., FM, CSA) at the time of the bidding of the project.

2. As required by Factory Mutual (FM) the motor shall be capable of operating in pumped media up to **104 DEGREES F**. Motor thermal switches shall monitor and protect the motor from excessive temperature. An internal Float Switch shall be available in the motor chamber.

P. Formed Suction Intake (FSI) Device:

1. Each pump shall be provided with a specially-engineered FSI device designed by the pump manufacturer. The FSI shall be constructed of fabricated steel and connected to the inlet of the pump discharge tube. The pump manufacturer shall have unit responsibility for supplying the pump, discharge column, and FSI.

2. The FSI shall be comprised of two sections: diffuser and 90° bend. The diffuser shall incorporate inlet chamfers and a central flow-directing vane to minimize pre-swirl. The 90° bend shall be without sharp turns, to prevent turbulence and minimize dynamic losses. The bend shall be reducing in cross-section, with the inlet area not less than the outlet area.

3. The design of the FSI shall have been verified by the pump manufacturer, through both CFD analysis and physical scale model tests. The FSI shall be capable of normalizing lateral approach flows up to 1m/s, and shall produce a uniform flow distribution – with pre-swirl <3° – at the pump propeller plane.

4. The dimensions of the FSI shall be smaller than those of a Type 10 FSI design, based on equivalent flow rate and discharge column diameter, with no loss of hydraulic performance.

5. The FSI shall be constructed of 304L stainless steel. All welding shall be in accordance with American Welding Society (AWS) D1.1 Structural Welding Code.

6. The FSI shall be designed to rest atop the sump floor, with the weight of the pump and discharge column supported separately, independent of the FSI.

Q. Shop Testing:

1. Pumps shall be tested in the facility of the manufacturer prior to shipment.

2. Propeller, motor rating and electrical connections shall be checked for compliance with this specification.

3. Prior to submergence, each pump shall be dry run to establish correct rotation.

4. Each pump shall be run submerged in water.

5. Motor and cable insulation shall be tested for moisture content or insulation defects.

6. Each pump shall be tested in accordance with the latest test code of the Hydraulic Institute at the manufacturer to determine head versus capacity and kilowatt draw required.

R. Level Transducer:

1. The level transmitter system shall consist of a submersible pressure sensing element cased in a 316L SST housing. The level sensor's electronics shall be capable of withstanding lightning strikes and meet RCTA/DO 160D for lightning direct effects and surge protection for FAA and MIL-STD test and NASA standard electrical surge requirements. All Level Sensors shall be corrosion resistant and clog free.

2. Level Sensor shall be supplied with 500 feet of polyurethane shielded and vented cable. The level transmitter's unique cable venting system shall allow for barometric pressure differential compensation while keeping the elements out, using a Gortex filter encapsulated tip. A "Steelcage" design shall give full protection and allow sensing to water levels no matter how much debris/mud/sand or rags build up.

3. Material, mechanical, and electrical statistics shall be as follows:

Level Sensor Electrical
Supply Voltage: 8 - 38 Vdc
Output: 4-20 mA
Zero Balance: ± 1% Full Scale Output (FSO)
FSO Setting: ± 1% FSO
Resolution: Infinite (±0.001% FSO usable)
Response Time: < 5 mS

Insulation Resistance: 1000 MO @ 50 Vdc
Reverse Polarity: Protected
Warm-Up: < 10 mS
Power Supply Effect: = ± 0.002% FSO per V input
EMI/RFI: Internal Filtering
Lightning Protected: MOV and dual gas discharge tube
Short Circuit Protected: Up to 40 Vdc

Level Sensor Performance
Static Accuracy: ± 0.5% FSO (BFSL, RSS)
(combined effects of non-linearity, hysteresis & repeatability)
Repeatability: ± 0.1% FSO
Temperature Effects: ± 1.5% FSO over comp range
(combined effects of Zero & FSO with reference at 70°F)
Long Term Stability: ± 0.25% FSO per year

Level Sensor Mechanical
Pressure Range: 10psi (23 ft)
Proof Pressure: 2x Full Scale
Burst pressure: 5x Full Scale
Materials: 316L SST plus cable
Pressure Port: Flush mount per outline
Electrical Connector: 1/2 inch-NPT Male submersible conduit fitting with 500 ft of polyurethane cable
Dimensions: 3 inch diameter x 6 inch long
Weight: Nominal 20 oz (.57 kg)
Compensated Temp Range: 20 to 170°F (-6 to 76°C)
Operating Temp Range: 0 to 200°F (-17 to 93°C)
Storage temp range: -20 to 250°F (-28 to 121°C)

S. Air Release/Vacuum Relief Valve:

1. The Air Release and Vacuum Break Valve shall consist of a stainless steel body, Stainless steel direct acting float and solid large orifice and "Anti-Surge" floats in H.D.P.E. – stainless steel nozzle and stainless steel top cap and EPDM rubber seals and seat.

2. The valve shall have an integral "Anti-Surge" Orifice mechanism which shall operate automatically to limit transient pressure rise or shock induced by closure to less than 1.5 x valve rated working pressure.

3. The intake orifice area shall be equal to the normal size of the valve i.e., a 150mm (6") valve shall have a 150mm (6") intake orifice.

Large orifice sealing shall be effected by the flat face of the control float seating against an EPDM rubber "O" ring housed in a dovetail groove circumferentially surrounding the orifice.

4. Discharge of pressurized air shall be controlled by the seating & unseating of a small orifice nozzle on an EPDM rubber seal affixed into the control float. The nozzle shall have a flat seating land surrounding the orifice so that damage to the rubber seal is prevented.

5. The valve construction shall be proportioned with regard to material strength characteristics, so that deformation, leaking or damage of any kind does not occur by submission to 1.5 times the designed working pressure. Connection to the valve inlet shall be facilitated by screwed ends conforming to PN10, ratings of BS EN 1092 OR SABS 1123 Standards or ANSI B16.5 Class 150. AS 4087 Fig. B7, AS 2129 Table E.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install pumps and accessories in accordance with the configuration shown on the Contract Drawings and in accordance with manufacturer's standards.

B. All materials required for installation of pumps shall be on site before starting the work required.

C. Inspect material for defects in workmanship and material. Clean out debris and foreign material from pumps, valves and piping, test operating mechanisms to check proper functioning, and check nuts and bolts for tightness. Repair equipment which is defective at no cost to Owner.

3.02 FIELD TESTING

A. Field inspection and testing of the pumps shall be performed in accordance with the section entitled "Tests on Pumping Equipment."

B. Pumps shall be tested in the presence of the Resident Engineer.

3.03 SERVICES OF MANUFACTURER'S REPRESENTATIVE

A. The services of the manufacturer's representative shall be provided by the pump supplier during installation, testing, startup and adjustment. The services shall be for the pump, and all associated equipment provided under this Contract.

B. The services of the manufacturer's representative shall be provided for the minimum hours as listed below:

1. Sixteen (16) hours for installation assistance, inspection and certification of installation The Contractor shall engage the services of a manufacturer's erecting engineer or qualified manufacturer's representative to be present at and assist in the start-up of each pump supplied under this Contract. The duration of service shall be as required to complete the successful startup of the pumps. A minimum of eight (8) hours per pump shall be provided.

2. Eight (8) hours for startup and performance testing

3. Eight (8) hours for Owner's personnel training. Such training shall include both field and classroom training, and shall be conducted in two (2) separate sessions, each session to be no less than four (4) hours in duration. The first training session shall be conducted immediately following start-up of the pumps. The second training session shall be conducted within one (1) week following start-up of the pumps.

C. Additional on-site time shall be provided at the supplier's expense as necessary to assure that equipment is installed and operating correctly and in accordance with the Specifications.

D. The Owner's personnel shall have the right to witness the activities of representative during installation, testing, startup and adjustment.

E. Training shall be scheduled at least two (2) weeks in advance so as to provide the Owner an opportunity to adjust work schedules to permit all interested personnel to attend

END OF SECTION 221429

Attachment No. 2

Stormwater Pumping Station Specifications - Ronald A. Sebring (Architect)

BUILDING SPECIFICATIONS

PUMP STATION ELECTRICAL BUILDINGS ROUTE 35, MILEPOST 0 TO 4

L Street, Borough of Seaside Park
Island Avenue, Borough of Seaside Park
Barnegat and 8th Avenue, Borough of Seaside Park
22nd Avenue, Borough of Seaside Park
Eisenhower Avenue, Township of Toms River

RONALD A. SEBRING ASSOCIATES, LLC, ARCHITECTURE-PLANNING-DESIGN
405 RICHMOND AVENUE, POINT PLEASANT BEACH, NJ 08742
(732) 701-9444 FAX (732) 701-9919 E-Mail: architects@rasallc.com

RONALD A. SEBRING, R.A., NCARB
NEW JERSEY REGISTERED ARCHITECT C-6933

March 29, 2013

SECTION 03 30 00
CAST IN PLACE CONCRETE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies cast in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.
B. Scope: Provide all materials, labor, equipment, and appliances required to complete work of this Section, including, but not necessarily limited to, the following:
   1. Concrete Piles
   2. Concrete Columns
   3. Grade Beams
   4. Grade Slabs

1.3 REFERENCES

A. Codes and Standards: Comply with provisions of the latest editions of the following codes, specifications and standards, except where more stringent requirements are shown or specified:

   1. ASTM..... American Society of Testing and Materials "Listed Standard"
   2. ACI 301..... "Specifications for Structural Concrete for Buildings".
   3. ACI 318..... "Building Code Requirements for Reinforced Concrete".
   4. CRSI..... Concrete Reinforcing Steel Institute, "Manual of Standard Practice".
   5. NJDOT..... New Jersey Department of Transportation "Standard Specifications".

1.4 QUALITY ASSURANCE

A. Concrete Testing Service: Employ, at Contractor's expense, a testing laboratory approved by Architect to design concrete mixes and perform material evaluation tests related to the concrete mixes. Materials and installed work may require testing and retesting, as directed by Architect, at any time during the progress of work. Allow free access to material stockpiles and facilities. Tests, not specifically indicated to be done at Owner's expense, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joint systems, curing compounds, and others as requested by Architect.
B. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design tests as specified.
C. Material Certificates: Provide materials certificates for cement, aggregates, admixtures, reinforcing, welded wire fabric, non-shrink grout, curing compounds and non-slip aggregates. Material certificates

shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

D. Concrete Mix Designs: Provide mix designs with strength tests for each class and type of concrete for review by the Architect prior to placement of concrete.
E. Reinforcement Shop Drawings: Provide reinforcement shop drawings for review and approval by the Architect prior to placement of concrete.

PART 2 – PRODUCTS

2.1 FORM MATERIALS

A. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system when shown on drawings. Provide form material of sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.
B. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
C. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
D. Use flexible spring steel forms or laminated boards to form radius bends.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ANSI/ASTM A 615, Grade 60, deformed, epoxy coated.
B. Steel Wire: ANSI/ASTM A 82, plain, cold-drawn, steel.
C. Welded Wire Fabric (WWF): ANSI/ASTM A 185, size as specified on drawings.
D. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI recommendations, unless otherwise acceptable.
E. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.3 CONCRETE MATERIALS

A. Portland Cement: ANSI/ASTM C 150, Type I, Conforming to Section 914 of NJDOT Standard Specifications.
B. Use one brand of cement throughout project, unless otherwise acceptable to Architect.
C. Aggregates:
    1. Normal Weight Aggregates: ANSI/ASTM C 33, and as herein specified. Provide aggregates from a single source for exposed concrete.
    2. Local aggregates not complying with ANSI/ASTM C 33 but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Architect.
D. Water: Potable.
E. Air-Entraining Admixture: ANSI/ASTM C 260.
F. Products: Subject to compliance with requirements, provide one of the following:
    1. "Air-Mix" or "Perma Air"; Euclid Chemical Co.
    2. "Daravair"; Grace Construction Products.
    3. "MB-VR" or "MB AE 90"; Master Builders.

4. "Sika AER"; Sika Chemical Corp.

G. Water-Reducing Admixture: ANSI/ASTM C 494, Type A, and contain not more than 0.05% chloride ions. Products: Subject to compliance with requirements, provide one of the following:
   1. "Eucon WR-75"; Euclid Chemical Co.
   2. "WRDA with Hycol"; Grace Construction Products.
   3. "Pozzolith 220N"; "MBL-82" or "Polyheed 997"; Master Builders Inc.
   4. "Plastocrete 161"; Sika Chemical Corp.

H. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G and contain not more than 0.05% chloride ions. Products: Subject to compliance with requirements, provide one of the following:
   1. "Eucon 37"; Euclid Chemical Co.
   2. "Daracem 100"; Grace Construction Products.
   3. "Rheobuild 1000" Master Builders Inc.
   4. "Sikament 86"; Sika Chemical Corp.

I. Non-Corrosive, Non-Chloride Accelerator Admixture: ASTM C 494, Type C or E, and contain no more chloride ions than are present in municipal drinking water. The manufacturer must have long-term test data (at least a year), from an independent testing laboratory, concerning corrosion using an acceptable accelerated corrosion test method such as that using electrical potential measures. Products: Subject to compliance with requirements, provide one of the following:
   1. "Accelguard 80"; Euclid Chemical Co.
   2. "Daraset"; Grace Construction Products.
   3. "Pozzolith NC-534" or " Pozzutec 20"; Master Builders Inc.
   4. "Plastocrete 161FL"; Sika Chemical Corp.

J. Water-Reducing, Retarding Admixture: ASTM C 494, Type D, and contain not more than 0.05% chloride ions. Products: Subject to compliance with requirements, provide one of the following:
   1. "Eucon Retarder 75"; Euclid Chemical Co.
   2. "Daratard-17"; Grace Construction Products.
   3. Pozzolith 100XR", "Pozzolith 122R" or "Polyheed RI"; Master Builders Inc.
   4. "Plastiment"; Sika Chemical Co.

K. Calcium chloride, or admixtures containing more than 0.05% chloride ions are not permitted. Thiocyanate-based chemical admixtures shall contribute less than 0.30% thiocyanate ions by weight of cement when the manufacturer's maximum recommended dosage is used. Certification of conformance to the above-mentioned requirements and the chloride content of the admixture will be required from the admixture manufacturer prior to review of mix design.

2.4 RELATED MATERIALS

A. Non-Shrink Grout: CRD-C-621-89a, Grade "C" (equipment grouting) or Grade "B" (Construction Grouting), Corps of Engineers Specification for Non-Shrink Grout, Type D, Non-metallic. In addition, the manufacturer shall furnish data from an independent laboratory indicating that the grout, when placed at a fluid consistency, shall achieve 95% bearing under a 4' x 4' base plate. Products: Subject to compliance with requirements, provide one of the following:
   1. "Euco NS"; The Euclid Chemical Co.
   2. "Masterflow 928" or "Set Grout"; Master Builders.
   3. "Five Star Grout"; U.S.Grout Co.
   4. "Sika Grout 212"; Sika Chemical Corp.

B. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss. Available Products: Subject to

compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

1. "Eucobar,"; Euclid Chemical Co.
2. "E-Con"; L&M Construction Chemicals, Inc.
3. "Confilm"; Master Builders, Inc.
4. "SikaFilm"; Sika Chemical Corp.

C. Liquid Membrane-Forming Curing and Sealing Compound: Water-based acrylic type, 30% solids content minimum, and have test data from an independent testing laboratory indicating a maximum moisture loss of 0.55 kg per sq m in 72 hours when applied at the coverage rate recommended by the manufacturer. Products offered by manufacturers to comply with the requirements for membrane-forming curing and compounds include the following:

1. "Super Diamond Clear VOX"; The Euclid Chemical Corp.
2. "Mastercure 200W"; Master Builders.
3. "Dress & Seal #30 WB"; L&M Construction Chemicals Inc.

D. Bonding and Repair Materials: Bonding Materials: Polyvinyl acetate, rewettable type. Use only in areas not subject to moisture.

1. "Euco Weld"; Euclid Chemical Co.
2. "Weldcrete"; Larsen Co.

E. Epoxy Adhesive: The compound shall be a two (2) component, 100% solids, 100% reactive compound suitable for use on dry or damp surfaces:

1. "Euco Epoxy" #452MV or #620; Euclid Chemical Co.
2. "Sikadur 32,Hi-Mod"; Sika Chemical Corp.
3. "Concresive Liquid LPL"; Master Builders

F. Polymer Patching Mortar: Free-flowing, polymer-modified cementitious coating.

1. "Euco Thin Coat" or "Verticoat LPL"; Euclid Chemical Co.
2. "Sikatop 121, 122, or 123"; Sika Chemical Corp.
3. "Emaco 300, 310, or 350"; Master Builders

G. Bonding Admixture: The compound shall be a latex, non-rewettable type.

1. "SBR Latex" or "Flex-con"; Euclid Chemical Co.
2. "Daraweld C"; W. R.Grace.
3. "MB Primer"; Master Builders.
4. "SikaLatex" or "SikaLatex R"; Sika Chemical Corp.

H. Moisture Barrier: Provide moisture barrier cover over prepared base material where indicated. Use only materials which are resistant to decay when tested in accordance with ANSI/ASTM E 154, as follows: Polyethylene sheet not less than 8 mils thick. Overlap a minimum of 6 inches at all joints.

I. Joint Filler: Closed cell extruded neoprene gasket conforming to ASTM C509, Grade 4, black.

2.5 PROPORTIONING AND DESIGN OF MIXES

A. Design Mix Meeting: Prior to the preparation of any design mix containing high range water-reducing admixture, a meeting shall be held. The purpose of the meeting is to assure that all parties involved are aware of all of the requirements pertaining to the use of this type of concrete to assure that quality concrete is obtained. The meeting shall be attended by the Contractor,

Concrete Subcontractor (if any), Concrete Supplier, Pumping Subcontractor (if any), Testing Laboratory preparing design mix and the Admixture Manufacturer's Representative.

B. Prepare design mixes for each type and strength of concrete by either laboratory the trial batch or field experience methods as specified in ACI 301. If trial batch method is used, use an independent testing facility acceptable to Architect. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to Architect. If trial batch mixes are used, the mix design shall achieve an average compressive strength 1200 psi greater than the specified strength.
C. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Architect.
D. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:
    1. Concrete for Building Construction: 4,000 psi 28-day compressive strength. Minimum cement content: 600 lbs/cu.yd; Maximum Water/cement ratio: 0.40.
E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.
F. Use water-reducing admixture or high range water-reducing admixture (super plasticizer) in all concrete.
G. Use non-corrosive accelerating admixture in concrete slabs placed at ambient temperatures below 50°F (10°C).
H. Use air-entraining admixture in exterior exposed concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having air content within following limits:
    1. Concrete structures exposed to freezing and thawing or subjected to hydraulic pressure, and slabs 6% for 3/4" - 1" aggregate.
    2. Other Concrete: 2% to 4% air.
I. Use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.
J. Slump Limits: Proportion and design mixes to result in concrete slump at truck as follows:
    1. Ramps and sloping surfaces: Not more than 3".
    2. Reinforced foundation systems: Not less than 1" and not more than 3".
    3. Concrete containing HRWR admixture (super plasticizer): Not more than 8" after addition of admixture nor more than 3" prior to addition of admixture.
    4. Other concrete: Not less than 1" and not more than 4".

2.6 CONCRETE MIXES

A. Ready-Mix Concrete: Comply with requirements of ANSI/ASTM C 94. and as herein specified.
B. Delete references for allowing additional water to be added to batch for material with insufficient slump. Addition of water to the batch will not be permitted.
C. Redosage with the specified high-range water reducing admixture may be done with the prior approval of the Architect regarding dosage and time periods.
D. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ANSI/ASTM C 94 may be required.
E. When air temperature is between 85°F (30°C) and 90°F (32°C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90°F (32°C), reduce mixing and delivery time to 60 minutes.

PART 3 – EXECUTION

3.1 FORMS

A. Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.
B. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.
C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.
D. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
E. Chamfer exposed corners and edges, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
F. Form Ties: Factory-fabricated, adjustable-length, removable or snap off metal form ties, designed to prevent form deflection, and to prevent spilling concrete surfaces upon removal.
G. Unless otherwise indicated, provide ties so portion remaining within concrete after removal is at least 1-1/2" inside concrete. Unless otherwise shown, provide form ties which will not leave holes larger than 1" diameter in concrete surface.
H. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.
I. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms and bracing after concrete placement is required to eliminate mortar leaks and maintain proper alignment.

3.2 PLACING REINFORCEMENT

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.
B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
C. Accurately position, support and secure reinforcement (including welded wire fabric) against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.
D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and tie splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.3 JOINTS

A. Construction Joints: Locate and install construction joints, which are not shown on drawings, so as not to impair strength and appearance of the structure, as acceptable to Architect.
B. Provide keyways at least 1-1/2" deep in construction joints in walls, slabs and between walls and footings; accepted bulkheads designed for this purpose may be used for slabs.
C. Place construction joints of members perpendicular to the main reinforcement. Continue reinforcement across construction joints or structural members.
D. Isolation Joints in Slabs-on-Ground: Construct isolation joints in slabs-on-ground at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated.
E. Sealant materials are specified in Division-7 Sections of these specifications.
F. Contraction (Control) Joints in Slabs-on-Ground: Construct contraction joints in slabs-on-ground to form panels of patterns as shown by saw cutting or by inserting an approved plastic strip into fresh concrete until the top surface of the strip is flush with the slab surface.
G. Install plastic strip into concrete using tool recommended by manufacturer. Prior to the concrete being floated, remove the top section of the insert. If saw cutting is used, "Soff-Cut" saw shall be used immediately after final finishing and to a depth of 1".

3.4 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto.
B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

3.5 PREPARATION OF FORM SURFACES

A. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.
B. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
C. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.6 CONCRETE PLACEMENT

A. Pre-placement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.
B. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.
C. General: Comply with ACI 304, and as herein specified.
D. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

E. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
F. Do not allow concrete to drop more than 5 feet in concrete which will be exposed to view. Do not allow concrete to drop more than 7 feet in concrete which will not be exposed.
G. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309 recommended practices.
H. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
I. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
J. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
K. Bring slab surfaces to correct level with straightedge and strikeoff. Use highway straightedges, bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
L. Maintain reinforcing in proper position during concrete placement operations.
M. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified. When air temperature has fallen to or is expected to fall below 40°F (4° C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F (10°C), and not more than 80°F (27°C) at point of placement. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Only the specified non-corrosive non-chloride accelerator shall be used. Calcium chloride, thiocyanate or admixtures containing more than 0.05% chloride ions are not permitted.
N. Hot Weather Placing: When high temperatures, low humidity and dry winds create conditions suitable for plastic cracking, the evaporation retarder "Eucobar" by The Euclid Chemical Co. or "Confilm" by Master Builders may be required to be applied by spray one or more times during the finishing operation. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90°F (32°C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete. Wet forms thoroughly before placing concrete. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

3.7 MONOLITHIC SLAB FINISHES

A. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified.
B. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power driven floats, or both Consolidate surface with power-driven floats, or by hand-floating is area is small or inaccessible to power units. Check and level surface plane to a tolerance of F_f20/Fl_l17. Cut down high spots and fill low spots, refloat surface to a uniform, smooth, granular texture.

C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint or other thin-film finish coating system. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation free of trowel marks, uniform in texture and appearance, and with a surface leveled to a tolerance of FF25/FL20. Surface defects which would telegraph through applied floor covering system are to be ground smooth.

D. Non-Slip Aggregate Finish: Apply non-slip aggregate finish to all exterior concrete steps. After completion of float finishing and before starting trowel finish, uniformly spread 25 lbs. of dampened non-slip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as herein specified. After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose non-slip aggregate.

E. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, walks and ramps, and elsewhere as indicated. Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.8 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply in accordance with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

C. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by. moisture-retaining cover curing, and by combinations thereof, as herein specified

D. Provide moisture curing by following methods.

E. Keep concrete surface continuously wet by covering with water. Use continuous water-fog spray. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.

F. Provide moisture-cover curing as follows:

G. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

H. Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walks, and curbs as follows:

I. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete

J. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

K. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces, by application of appropriate curing method.

L. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

3.9 REMOVAL OF FORMS

A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50°F (10°C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.
B. Formwork supporting weight of concrete, such as beam soffits, joints, slabs and other structural elements, may not be removed until concrete has attained design compressive strength (f'_c) but in no case shall the forms be removed in less than 14 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or membrane.
C. Form facing material may be removed 4 days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

3.10 RE-USE OF FORMS

A. Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Architect.

3.11 MISCELLANEOUS CONCRETE ITEMS

A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
B. Grout Application: All column base and leveling plates, beam bearing plates, elevator equipment and sills, equipment bases and other locations noted on the drawings shall be grouted with the specified non-shrink grout.
C. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections and terminations slightly rounded.

3.12 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.
B. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar before bonding compound has dried. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

C. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spills, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry-pack mortar, or precast cement cone plugs secured in place with bonding agent.

D. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

E. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope.

F. Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects, as such, include crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

G. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.

H. Repair methods not specified above may be used, subject to acceptance of Architect.

3.13 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. The Contractor shall employ a testing laboratory approved by the Architect to inspect formwork and reinforcement, test concrete and to submit test and inspection reports. All technicians used on the project shall have successfully completed the ACI concrete technician course. The testing laboratory shall certify that the technicians used on this project meet this requirement.

B. Sampling and testing for quality control during placement of concrete shall include the following for each truck at point of delivery:

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
2. Slump: ASTM C 143; one test for each concrete truck load at point of discharge. If Super Plasticizer is used, conduct an additional slump test after Super Plasticizer is introduced and mixed.
3. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C231 pressure for normal weight concrete; one for each set of compressive strength test specimens. Air content shall be tested for each truck.
4. Concrete Temperature: Test hourly when air temperature is 40°F (4°C) and below, and when 80°F (27°C) and above; and each time a set of compression test specimens made
5. Compression Test Specimen: ASTM C 31; one set of 6 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
6. Compressive Strength Tests: ASTM C 39; one set for each truck load regardless of quantity, with 2 specimens tested at 7 days, 2 specimens tested at 28 days, and 2

specimens retained in reserve for later testing if required. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive by more than 500 psi.

C. Test results shall be reported in writing to the, Architect and Contractor **on same day that tests are made**. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete slump, air content and temperature at time of placement; compressive breaking strength and type of break for both 7-day tests and 28-day tests.

D. Inspection Results shall be reported in writing to Architect and Contractor **on same day that inspections are made.** Reports shall contain location, size, grade, spacing, and form clearance of reinforcing, slump, temperature of concrete, air temperature, and air content. Condition of forms shall be noted on the report. The Architect and Contractor are to be notified verbally at the time of inspection of deviations from approved drawings so that the reinforcing and mix may be corrected prior to concrete placement. Report shall note all deviations which were not corrected prior to concrete placement.

E. If specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service shall conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

F. Compression testing and sampling is required for all concrete and grout.

G. Testing agency shall be present throughout placement of concrete and indicate in their report the time of completion of off loading.

H. Testing agency shall compare delivery and batch tickets with design mix and indicate compliance in their report and include a copy of the delivery or batch ticket with the report.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Divisions 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Extent of structural steel work is shown on drawings, including schedules, notes and details to show size and location of members, typical connections and type of steel required.
B. Products furnished but not installed under this section:
   1. Anchor bolts for installation into concrete.
   2. Loose base plates and bearing plates set on concrete.
   3. Steel Beams

1.3 RELATED SPECIFICATION SECTIONS

A. The following Sections contain requirements that relate to this Section:
   1. Division 01 Section "Quality Control" for independent testing agency procedures and administrative requirements.
   2. Division 03 Section "Cast in Place Concrete"

1.4 SUBMITTALS

A. Submit the following for formal review and approval by the Architect.

   1. Product Data: Submit manufacturer's specifications and installation instructions for the following products:
      a. High-strength bolts (each type), including nuts and washers.
      b. Structural steel primer paint.
      c. Shrink resistant non-metallic grout.
      d. Composite metal shear studs.

   2. Shop Drawings:
      a. Prepared under direct supervision of registered professional engineer, including:

         1) Complete erection drawings, details and schedules for fabrication and shop assembly of members,
         2) Details, schedules, procedures and diagrams showing sequence of erection.

      b. Indicate profiles, spacing and locations of members, including:

         1) Fabrication details.
         2) Size and weight of members.
         3) Location of shop and field connections.
         4) Locations and details of anchors, base/bearing plates and leveling plates.
         5) Details of holes, cuts, camber and splices.

6) Layout and location of composite shear studs.
7) Identify high-strength bolted slip-critical, direct-tension, or tensioned shear/bearing connections.

c. Indicate welds by standard AWS A2.1 and A2.4 symbols distinguishing between shop and field welds; and show size, length and type of each weld.
d. Provide setting drawings, templates and directions for installation of anchor bolts and other anchorage to be installed as work by other sections.
e. Obtain detailed drawings of the Work by other trades including locations and sizes of openings in floors and roofs and the Work requiring holes in structural steel, mounting brackets, and supports attached to the structural steel.
f. Submit shop drawings in the phases, to coordinate with requirements of the Work. Identify phasing of the Work in Submittal Schedule as required by General Conditions and Supplementary Conditions.

3. Test Reports: Submit copies of required quality control test reports and inspections specified including tests conducted on shop and field bolted and welded connections. Include data on type(s) of tests conducted and test results.

B. Submit the following for information.. The Architect will review but not approve or disapprove these submittals.

1. Mill Certificates: Provide fabricator's certification that the structural steel furnished for this Project complies with the requirements of the Contract Documents.
2. Mill Test Reports: Provide certified mill test reports of chemical analysis and physical test for each heat number of structural steel.
3. Welder's Certificates: Provide welder's certificates for welders employed for this Work, veriflying current AWS qualifications.
4. Galvanized Steel: Certification that steel to be galvanized contains elements within the ranges listed below:
   a. carbon < 0.25%
   b. phosphorus < 0.05%
   c. manganese < 1.35%
   d. silicon within the range 0 to 0.04% or 0.15 to 0.25%

5. Qualification Data: Submit fabricator and installer qualifications verify years of successful experience; including list of completed projects with similar scope of work identified by name, location, date, Architect and Structural Engineer and their phone numbers.

1.5 PERFORMANCE REQUIREMENTS

A. Interface with other systems:

1. Coordinate primer with finish paint.
2. Provide templates and instructions for installing anchors in other Work.

B. Structural Performance: Engineer structural steel connections required by the Contract Documents to be selected or completed by the fabricator to withstand design loadings indicated.
C. Source Quality Control: Materials and fabrication procedures are subject to inspection and tests in mill, shop and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve

Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

1.6 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the latest editions of the following, except as otherwise indicated:

AISC Steel Construction Manual - thirteenth edition including the AISC "Code of Standard Practice for Steel Buildings and Bridges."
AISC "Allowable Stress Design Specification for the Design, Fabrication and Erection of Structural Steel for Buildings", including "Commentary" and Supplements thereto as issued.
AISC "Specifications for Architecturally Exposed Structural Steel".
AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.
American Welding Society (AWS) D1.1 "Structural Welding Code - Steel".
ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, sheet Piling and Bars for Structural Use".
Hot-dip galvanizing fabrication practices: Conform to the requirements of ASTM A143, A384 and A385 unless otherwise specified.
SSPC "Steel Structures Painting Manual".

B. Designer/Engineer Qualifications: Connections not specifically detailed on the Contract Drawings are to be designed under the direct supervision of a Registered Professional Engineer, licensed in the Project jurisdiction, specializing in structural steel engineering.
C. Installer Qualifications: Minimum fo 5 years documented, successful experience with work comparable to the Work of this Project.
D. Fabricator Qualifications: Company specializing in structural steel fabrication having a minimum of 5 years documented, successful experience with work comparable to the Work of this Project.
E. Galvanizing Applicator: Company specializing in hot-dip galvanizing after fabrication having a minimum of 5 years documented, sucessful experience and approved by the manufacturer and/or fabricator.
F. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure". If recertification of welders is required during extent of this Project, retesting will be Contractor's responsiblity.

1.7 CONNECTION DESIGN AND MEMBER DETAILING

A. Member Detailing and Design of Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site without causing delay in the work.

1. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

B. Design connections as "Framed Beam Connections: in accordance with Part 4 of the AISC Manual, except as otherwise indicated.

1. For noncomposite beams, reaction shall be end reaction on member, as defined in the AISC "Uniform Loaded Beam Tables", or reaction shown on the Drawings, whichever is greater.
2. For composite beams, use reaction shown on the Drawings.
3. Single sided connections for spandrel beams are not acceptable.

4. Bolts: A325 or A490. Connections may be designed using Type N Bolts, except at hanger connections and where other slip-critical connections (designated as SC) are indicated on the Drawings; design slip-critical connections using Type SC bolts.

C. Shop and Field Connections:

1. Shop connections are to be welded unless indicated otherwise on the Drawings.
2. Bolt field connections with high-strength bolts except where welded connections or other connections are indicated.
3. Bolts: 3/4 inch diameter minimum.
4. Fillet welds: 1/4 inch minimum, unless otherwise noted.

D. Except where seated connections are shown or required, frame beams and girders into columns. Reinforce beam webs at seated connections for stability and to prevent buckling.

E. Moment Connections:

1. Where a moment connection is noted on plans, provide a moment connecton at the beam to column connection or supporting beam to beam framing connection.
2. Unless noted otherwise or as a wind moment connection, the moment connection is to develop the full strength of the beam in bending. Use plates, top and bottom of the beam, to accomplish development.
3. Cantilevers require full moment connections "thru" column or supporting beam, unless beam rides over supporting member or column.
4. For moment connections "thru" columns, add beam stiffener plates minimum 3/8 inches thick. When the beam is parallel to the column web, the stiffener plates are to be equal to the flange thickness of the column and installed in line with the column flanges. When the beam is perpendicular to the column web, the stiffener plates are to be equal to the web thickness and installed in line with the column web. In addition, when beam is perpendicular to the column web, install column cap plate stiffeners equal to the column web thickness. The cap plate stiffeners are to be installed on both sides of the column web in line with the beam web.
5. Where a moment connection is indicated at a beam to beam connection, the supporting beam is to be continuous and a full moment and shear connection provided for the terminated beam.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site at such intervals to insure uninterrupted progress of work.

1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.

B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry or attached to other construction, in ample time to not delay work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

D. Do not store materials on the structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.9 TEMPORARY BRACING

A. The steel erector/contractor is responsible for the design, strength, adequacy, safety and means and methods of construction of shoring and temporary bracing of Structural Steel Work at all stages of erection, until such time that permanent members and construction are in place and final connections are completed.

1.10 PROJECT CONDITIONS

A. Field verify all existing measurements and elevations prior to beginning fabrication process. Architect will not review or take responsibility for any existing dimensions.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Metal Surfaces, General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names and roughness in accordance with the AISC "Specifications for Architecturally Exposed Structural Steel". Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.

B. Structural Steel Shapes, Plates and Bars: ASTM A 36. Select steel from list below or revise if necessary. distinguish locations if more than one steel type is proposed.

C. Bolts, Nuts, and Washers:

1. Unheaded Rods: ASTM A 36 (ASTM A 36M).
2. Unheaded Rods: ASTM A 572, Grade 50 (ASTM A 572M, Grade 345).
3. Anchor bolts: ASTM A307, nonheaded type unless otherwise indicated.
4. Standard threaded fasteners:

    a. Plain washers: ANSI B27.2, Type A.
    b. Beveled washers: ANSI B27.4.
    c. Nuts and bolts: ASTM A307, Grade A.

5. High-Strength Threaded Fasteners: Quenched and tempered medium-carbon steel.

    a. Bolts: Heavy hexagon ASTM A325.
    b. Nuts: Heavy hexagon ASTM A563, Grade DH.
    c. Washers: Hardened ASTM F436.
        (1) Beveled at channel flanges

6. Direct Tension Indicator Fasteners: Load indicator washers to conform to ASTM F959, or tension control bolts may be used.

D. Electrodes for Welding: Comply with AWS Code.

1. Welding Materials: AWS D1.1; type required for materials being welded.

E. Structural Steel Primer Paint: SSPC - Paint 13.

1. Acceptable products:

a. Glidden 5205 Glid-Guard Red Alkyd Metal Primer.
b. Southern Coatings Enviro-Guard Heavy Duty Primer 1-2900.
c. Con-Lux Ferrox 25.
d. MAB Rust-O-Lastic Shop Primer Red Alkyd 24-R-181 or Rust-Oleum 7669.

2. Where faying surfaces of slip-critical joints are permitted by Architect to be painted, provide Class A paint (providing a minimum slip coefficient of 0.33) in accordance with Test Method to Determine Slip Coefficient for Coatings used in Bolted Joints, in Appendix A of the RCSC Specification for Structural Joints. Manufacturer's certification shall include a certified copy of the test report.

F. High Performance Primer Paint: Polyurethane coating system equivalent to Series 66 Hi-Build Epoxoline by Tnemec Company, Inc. to receive epoxy field coat as specified in Section 09900.

G. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds and repair painting galvanized steel, complying with Military Specifications DOD-P-21035 (Ships) or SSPC-Paint-20.

H. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404, Size No. 2. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

I. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time.

1. Pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives.
2. Acceptable products:

a. Euco N.S. by Euclid Chemical Co.
b. Five Star Grout by Five Star Grout Corp.
c. Masterflow 713 by Master Builders.

2.2 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final approved shop drawings. Provide camber in structural members where indicated.

B. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.

C. Where finishing is required, complete structural steel assemblies, including welding of units, before starting shop-priming of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs and other defects.

D. Fabricate architecturally exposed structural steel with exposed surfaces smooth, square, and free of survface blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.

1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating , and shop priming.

2. Comploy with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.

E. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded.

F. Finishing: Accurately mill ends of columns and other members trnasmitting loads in bearing.

G. Shear Connectors: Prepare steel surfaces as recommended by manufactuerer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's printed instructions.

H. Connections:

1. Welded Connections: Comply with AWS D1.1 Code for procedures, appearance and quality of welds and methods used in correcting welding work.

a. Join members with continuous welds, except where bolted connections are indicated.
b. Stress relieve welded assemblies by heat treatment.
c. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.
d. Grind welds smooth.

2. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.
3. Bolted connections: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints Using ASTM A325 or A490 Bolts" (RCRBSJ).

a. Shear-bearing connections: Bolts in connections not within slip-critical category, nor subject to tension loads, nor required to be fully tensioned bearing type connections shall be installed in properly aligned holes, tightened to snug-tight condition. Snug-tight condition is defined as tightness that exists when all plies in a joint are in firm contact. This may be attained by a few impacts of an impact wrench or full effort of a man using an ordinary spud wrench.
b. Slip-critical Connections: Connections subject to direct tension, and fully pretensioned bearing connections, fasteners, together with washers of size and quality specified, shall be installed in properly aligned holes and tightened by one of methods described in Subsections 8(d) (1) through 8(d) (4), of referenced standard, to at least minimum tension specified when all fasteners are tight.

I. Bolt field connections, except where welded connections or other connections are indicated.

1. Provide high-strength threaded fasteners for all bolted connections, except where unfinished bolts are indicated.

J. Holes for Bolted Connections and Other Work:

1. Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings.

2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning.
3. Drill holes in bearing plates.
4. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.

2.3 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel indicated for galvanizing according to ASTM A 123.
B. Fabricate structural steel in accordance with Class I, II, or III guidelines as described in AGA's Recommended Details for Galvanized Structures.
C. Use fabrication practices for products in accordance with applicable portions of ASTM A143, A384 and A385, except as specified herein. Avoid fabrication techniques which could cause distortion or embrittlement of steel.
D. Consult Architect regarding potential warpage problems or potential handling problems during the galvanizing process which may require modification of design before fabrication proceeds.
E. Remove welding slag and burrs prior to delivery for galvanizing.
F. Provide holes and/or lifting lugs to facilitate handling during the galvanizing process that are suitable to Architect and fabricator.
G. Remove, by blast cleaning or other methods, surface contaminants and coatings which would not be removable by normal chemical cleaning process in galvanizing operation.
H. Application of Coating:

1. All exterior exposed structural steel shall be galvanized including all exterior wall lintels.
2. Steel members, fabrications and assemblies: Comply with ASTM A123.
3. Bolts, nuts and washers and iron and steel hardware components: Comply with ASTM A153.
4. Coating weight: Conform with paragraph 5.1 or ASTM A123 or Table 1 of ASTM A153, as appropriate.

Provide post-galvanizing treatments as recommended by AGA for conditions applicable to Work.

2.4 SHOP FINISH

A. Shop Painting:

1. General: Shop paint structural prime steel, except those members or portions of members as otherwise specified the following:

a. Do not paint surfaces which are to be field welded or high-strength bolted in slip-critical type connections.
b. Do not paint members or portions of members which are shown to be embedded in concrete.
c. Do not paint top flange surfaces of beams to receive composite metal shear studs.
d. Galvanize surfaces.

2. Surface Preparation: After inspection and before shipping, clean steelwork to be painted. Remove loose rust, loose mill scale and spatter, slag or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:

a. SP-1 "Solvent Cleaning".
b. SP-3 "Power Tool Cleaning".

3. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with Manufacturer's instructions and at a rate to provide dry film thickness of not less than 1.5 mils. Use painting methods which result in full coverage of joints, corners, edges and exposed surfaces.

    a. Apply 2 coats of paint to surfaces which are inaccessible after assembly and erection. Change color of second coat to distinguish it from first.
    b. Paint embedded steel which is partially exposed on exposed portions and initial 2" of embedded areas only.

B. Shop Painting Galvanized Metal with High Performance Paint:

1. Clean by SSPC-SP1 "Solvent Cleaning", followed by SSPC-SP2 "Hand Tool Cleaning" or SSPC-SP3 "Power Tool Cleaning" to remove oil and grease, soil, cement spatter, and other surface dirt.
2. Cleaned surfaces are to be rinsed thoroughly, and allowed to dry completely before coating.
3. Apply prime coat as soon as possible after cleaning. Provide smooth, uniform dry film thickness of 4.0 to 6.0 mils.

2.5 SHOP QUALITY CONTROL

A. Contractor's Responsibilities:

1. Visual inspection:

    a. Perform visual inspection of all welds.
    b. Inspect bolted connections in accordance with AISC Specifications for "Structural Joints Using ASTM A325 or A490 Bolts".

2. Repair all discrepancies in dimensional tolerances of connection assembly and defects requiring corrective procedures.

B. Testing and Inspection Agency Responsibilities:

1. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:

    a. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
    b. Perform visual inspection of all welds.
    c. In addition to visual inspection, shop-welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.

        (1) Liquid Penetrant Inspection: ASTM E 165.
        (2) Magnetic Particle Inspection: ASTM E 709; performed on roof pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
        (3) Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T".
        (4) Ultrasonic Inspection: ASTM E 164.

2. Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using aSTM A 325 or A 490 Bolts."

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Before erection proceeds, and with the steel erector present, verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Surveys: Employ a registered professional engineer or land surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies in writing to Architect within 48 hours. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with Architect.

B. Temporary Shoring and Bracing:

2. Provide temporary supports required for stability and for resistance to wind and seismic forces until these elements are complete and are capable of providing this support.
3. Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads.
4. Do not remove temporary members and connections until permanent members are in place, final connections are made and concrete slabs are cured.
5. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

C. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.

D. Setting Base and Leveling/Bearing Plates:

1. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces.
2. Clean bottom surface of base and bearing plates.
3. Set loose and attached base plates and bearing plates for structural members on wedges, shims, or setting nuts, or other adjusting devices.
4. Tighten anchor bolts after supported members are positioned and plumbed.
5. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or leveling/bearing plate prior to packing with grout.
6. Pack non-shrink grout solidly between bearing surfaces and bases or plates so that no voids remain. Comply with grout manufacturer's instructions.

3.3 ERECTION

A. Field Assembly:

1. Set structural frames accurately to lines and elevations indicated.
2. Align and adjust various members forming part of complete frame or structure before permanently fastening.
3. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly.

4. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
5. Level and plumb individual members of structure within specified AISC tolerances.
6. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
7. Splice members only where indicated and accepted on final approved shop drawings.
8. Complete field connections prior to loading member.
9. On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.
10. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
11. Gas Cutting: Do not use gas thermal cutting torches in field during erection for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to the Architect. Finish gas-cut sections equal to a sheared appearance when permitted.
12. Direct Tension Indicator: Bolts shall be installed in all holes of the connection and brought to snug tight condition. All fasteners shall then be tightened, progressing systematically from the most rigid part of the connection to the free edges in a manner that will minimize relaxation of previously tightened fasteners prior to final twist-off or yielding of the control or indicator element of the individual devices. Proper tensioning of the bolts may require more than a single cycle of systematic tightening.

B. Comply with AISC Specifications for bearing, adequacy of temporary connections, alighment and removal of paint on surfaces adjacent to field welds.

C. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

1. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

D. Touch-Up Galvanizing:

1. Clean field welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

3.4 FIELD QUALITY CONTROL

A. The Contractor will engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.

B. Testing agency shall conduct and interpret tests and state in each report whether test specimens and Work evaluated comply with requirements, and specifically state any deviations therefrom.

1. Reports:

a. Provide daily written reports.
b. Describe areas inspected.
c. Note problems.
d. Describe compliance with Contract Documents.
e. Include tests conducted and results.

C. Architect reserves right, at any time before final acceptance, to reject material not complying with specified requirements.

D. Correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any non-compliance of original work, and as may be necessary to show compliance of corrected work.

E. Structural steel erection shall be inspected while the Work is in progress.

1. Field Bolted Connections: General

   a. The torque of 10 percent of the bolts, but not less than 2 bolts, selected at random in each connection are to be tested with an inspecting wrench calibrated with the job torque.
   b. Load indicator washers delivered for use in a specific application are to be tested at the job site to demonstrate that they do, in fact, provide a proper indication of bolt tension, and that they are properly used by the bolting crews.
   c. Bolts together with the load indicator washer plus any other washers required by Specification should be installed in all holes of the connection and the bolts tightened to approximately one-half the specified tension. Only after the initial tightening operation should the bolts be fully tensioned in a systematic manner.
   d. The use of load indicator washers are to be observed by the inspection agency at the job site and the devices and the installation procedure routinely monitored during the work in progress to assure that the specified procedure is followed.

2. Slip-critical or direct tensioning connections:

   a. Observe calibration procedures for specific fastener tightening method employed;
   b. Monitor installation of bolts to determine that plies of connected material have been drawn together;
   c. Assure that accepted tightening procedure is subsequently followed to achieve minimum fastener pretension.

3. Connections which are not slip-critical or in direct tension:

   a. Assure that plies of connected elements have been brought into snug contact (usually attained by a few impacts of an impact wrench or full effort of a man using an ordinary spud wrench);
   b. Assure that washers are used in outer plies of slotted holes or as otherwise required.

4. Visually inspect field welds for conformance with AWS criteria and the Drawings, except as follows:

   a. Full penetration welds done in the field shall be inspected by ultrasonic testing.

5. Visually inspect composite steel stud welds and perform bend tests in accordance with AWS D1.1, Section 7.8.
6. Inspect metal deck installation, fasteners, openings, etc., for conformance with approved Shop Drawings.

SECTION 06 09 00
METAL CONNECTORS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions, and Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Pre-engineered metal connectors used to support a wood or composite wood member(s) from a wood, or composite wood supporting member(s).

1.3 RELATED SECTIONS

A. Section 06100 – Rough Carpentry – Wood supported by fastenings or providing support or anchorage.

1.4 REFERENCES

A. ASTM A36 – Carbon Structural Steel
B. ASTM A167 – Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
C. ASTM A193-B7 – Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service
D. ASTM A307 – Carbon Steel Bolts and Studs
E. ASTM A1011 – Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
F. ASTM F1667 – Driven Fasteners: Nails, Spikes, and Staples
G. ASTM D1761 – Standard Test Methods for Mechanical Fasteners in Wood
H. ICBO AC13 – Acceptance Criteria for Joist Hangers and Similar Devices
I. ICBO AC95 – Acceptance Criteria to Determine Bending Yield Moment for Nails
J. ICBO AC120 – Acceptance Criteria for Wood Screws
K. AISI 1996 – Cold-Formed Steel Specification
L. 1997 NDS – National Design Specification
M. ASTM A500 – Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
N. ASTM A625 – Tin Mill Products, Black Plate, Single Reduced
O. ASTM A653 – Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
P. ASTM A706 – Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
Q. ASTM A924/A 924M – General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

1.5 STORAGE AND HANDLING

A. Deliver products to job site in manufacturer's or distributor's packaging undamaged, complete with installation instructions.
B. Protect and handle materials in accordance with manufacturer's recommendations to prevent damage or deterioration.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
   1. Simpson Strong-Tie Co., Inc. is the basis for design for this Project. Other manufacturers having compatible products may be utilized subject to their product meeting the design requirements and loadings.

2.2 MATERIALS

A. Steel:
   1. Sheet: ASTM A625, ASTM A653, ASTM A1011
   2. Fasteners: ASTM F1667, SAE C1022 (SDS Screws)

B. Stainless Steel:
   1. Sheet: ASTM A167

C. Finishes:
   1. Hot-dipped galvanized or electro-plated galvanized: , G185 (ZMAX)
   2. Zinc and dichromate for SDS screws

2.3 FABRICATION

A. Shop assembly to occur per the manufacturer's approved production drawings.
B. Fabrication tolerances per manufacturer
C. Fabrication requiring welding shall be performed in accordance with the current American Welding Society's standards.
D. The manufacturer's identification shall be stamped into the metal part and/or a label may be attached to the part with adhesive.

2.4 TESTING

A. Allowable loads published in manufacturer's catalog to be determined using the minimum load from static and/or cyclic analysis and one or more of the following test methods:
   1. Static load tests in wood assemblies
   2. Static load tests in steel jigs
   3. Static load tests of products embedded in concrete or masonry
   4. Cyclic or static load tests in wood assemblies (Anchor Tiedown System)

B. Testing to determine allowable loads shall be performed as per ICBO Acceptance Criteria 13 (AC13) and/or ASTM D1761.
C. Allowable loads for hangers are determined by a static load test resulting in not more than a 1/8" deflection of the joist relative to the header, or the lowest test ultimate load divided by 3, or the fastener allowable load as determined by the NDS, whichever is lower.
D. Testing shall be conducted under the supervision of an independent laboratory.
E. Manufacturer to provide code testing data on all products that have been code tested upon request.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Unless otherwise noted in the manufacturer's catalog, allowable loads are for Douglas Fir-Larch under continuously dry conditions. Allowable loads for other species or conditions must be adjusted according to the code. See manufacturer's catalog for additional notes and requirements.
B. Built-up lumber (multiple members) must be fastened together to act as one unit to resist the applied load.
C. Verify that the dimensions of the supporting member are sufficient to receive the specified fasteners.

3.2 INSTALLATION

A. Unless otherwise noted in the manufacturer's catalog, bolts and nails shall not be combined.
B. All nails shall be common unless otherwise noted in the manufacturer's catalog or substituted, by the engineer of record, with a reduction taken.
C. Unless otherwise noted in the manufacturer's catalog, bending steel in the field may cause fractures at the bend line. Fractured steel will not carry load and must be replaced. When bending is allowed or required in the catalog, the connector shall be allowed one cycle bend, one time only.
D. Galvanized connectors should not be placed in contact with treated wood unless the treated wood is adequately verified to be suitable for such contact. Some wood treatments may accelerate metal deterioration. See wood material supplier for specific recommendations.
E. A fastener that splits the wood will not take the design load. Evaluate splits to determine if the connection will perform as required. Dry wood may split more easily and should be evaluated as required. If wood tends to split, consider pre-boring holes with diameters not exceeding 0.75 of the nail diameter (1997 NDS 12.1.3.1).
F. Wood shrinkage shall be taken into account when designing and installing connections.
G. Built-up lumber (multiple members) must be fastened together to act as one unit to resist the applied load.
H. Top flange hangers may cause unevenness. Possible remedies should be evaluated by a professional and include using a face mount hanger, routering the beam, or cutting the subfloor to accommodate the top flange thickness.
I. Do not overload by exceeding the manufacturer's catalog allowable load values.
J. Unless otherwise noted in the manufacturer's catalog, fill all fastener holes with fastener types as specified in the manufacturer's catalog.
K. All specified fasteners must be installed according to the instructions in the manufacturer's catalog.
L. Bolt holes shall be a minimum of 1/32" and a maximum of 1/16" larger than the bolt diameter (NDS 8.1.2.1)
M. Install all specified fasteners before loading the connection.
N. Use proper safety equipment.
O. Welding shall be in accordance with the American Welding Society (AWS) standards.
P. Welding galvanized steel may produce harmful fumes, follow proper welding procedures and safety precautions.
Q. Nail tools with hole-location mechanisms may be used to install connectors, provided the correct quantity and type of nails are properly installed in the nail holes.
R. Joist shall bear completely on the connector seat, and the gap between the joist end and the header shall not exceed 1/8".
S. Installer of ATS system to cut rods to length as required.
T. Modifications to products or changes in installation procedures should only be made by a qualified designer. The performance of such modified products or an altered installation procedure is the sole responsibility of the designer.

3.3 FIELD QUALITY CONTROL

A. Determine that the proper part is being used in the correct application and has been fabricated by the approved manufacturer by observation of the stamp into the metal part and/or the adhesive label on the product denoting part and manufacturer name.
B. Before substituting another brand, confirm load capacity based on published testing data and calculations per section 2.4. The engineer/designer of record shall evaluate and give written approval for substitution prior to installation.

Table 1
Schedule of Materials

Wood Preservative Treatment	Material
Untreated Lumber – interior dry	Stainless Steel
Untreated Lumber – Interior damp	Stainless Steel
Treated Lumber	Stainless Steel

Note: Where an item is not available in stainless steel, they shall be galvanized steel ASTM A653, Class G185.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section includes:
   1. Structural wood roof and floor framing
   2. Roof sheathing
   3. Wall sheathing

1.3 RELATED WORK

A. Wood preservative treated lumber is specified in Section 06 05 73
B. Pre-engineered Metal Connectors are specified in Section 06 09 00
C. Plastic sheet air barrier is specified in Section 07 27 19

1.4 REFERENCES

A. Lumber Standards: Comply with PS 20 and with applicable rules of the respective grading and inspecting agencies for species and products indicated.
B. National Forest Products Association (NFPA): 1961 Manual for House Framing
C. Southern Forest Products Association (SFPA): Southern Forest Products Association Guide to Southern Pine Lumber Grades
D. American Institute of Timber Construction (AITC): Timber Construction Manual
E. American Wood-Preservers Association (AWPA): AWPA C22-96
F. National Evaluation Report (NES): NER-508
G. Plywood Product Standards: Comply with PS 1 (ANSI A 199.1) or, for products not manufactured under PS 1 provisions, with applicable APA Performance Standard for type of panel indicated.
H. American Plywood Association - APA Design/Construction Guide Residential and Commercial

1.5 PRODUCT HANDLING

A. Delivery and Storage: Keep materials dry at all times. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and plywood, and provide air circulation within stacks.

1.6 JOB CONDITIONS

A. Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow proper attachment of other work.

PART 2 – PRODUCTS

2.1 LUMBER

A. Factory mark each piece of lumber with type, grade, mill, and grading agency.
B. Lumber Standard: Manufacture lumber to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of National Design Specification for Wood Construction.
C. Inspection Agencies: Inspection agencies and the abbreviations used to reference them to lumber grades and species include the following:
   NLGA - National Lumber Grades Authority (Canadian).
   SPIB - Southern Pine Inspection Bureau.
   WCLIB - West Coast Lumber Inspection Bureau.
   WWPA - Western Wood Products Association.

D. Nominal sizes are indicated, except as shown by detail dimensions.
E. Provide dressed lumber, S4S, manufactured to actual sizes required by PS 20 to comply with minimum requirements indicated below:
F. Moisture Content: **Seasoned or kiln dried with 19 percent maximum moisture content** at time of dressing and shipment for sizes 2 inches or less in nominal thickness, unless otherwise indicated.
G. Framing Lumber (2" through 4" thick):
   1. For sill plate "#2 Southern Pine Treated
   2. For light framing (less than 6" wide) provide "Stud" grade lumber for stud framing and "#2 or better" grade for other light framing, Douglas Fir/Larch (WCLB or WWPA).
   3. For structural framing (6" and wider and from 2" to 4" thick), provide #2 or better, Douglas Fir/Larch (WCLB or WWPA).

2.2 PLYWOOD

A. Wall and Roof Sheathing: APA RATED SHEATHING
   1. Exposure Durability Classification: EXTERIOR
   2. Span Rating: 32/16
   3. Type: C-D
   4. Thickness: nominal ½"

B. Attic Sub Floor: APA RATED SHEATHING
   1. Exposure Durability Classification: EXTERIOR
   2. Span Rating: 48/24
   3. Type: C-D
   4. Thickness: nominal ¾" tongue and groove

2.3 MISCELLANEOUS MATERIALS

A. Fasteners: Fasteners shall be 316 stainless steel
B. Powder Actuated Fasteners: Hilti, Rawl, or equal

PART 3 – EXECUTION

3.1 ROUGH FRAMING

A. General: Fit framing lumber and other rough carpentry, set accurately to the required lines and levels, and secure in place in a rigid manner. Do not splice framing members between bearing points. Set joists, rafters and purlins with their crown edge up. Faces of framing members which will receive gypsum wallboard shall not vary more than 1/8" from the plane of the faces of adjacent framing, bridging, or furring members. Frame members for the passage of pipes, conduits and ducts. Do not cut or bore

structural members for the passage of ducts or pipes without approval. Reinforce all members damaged by such cutting or boring by means of specially formed and approved sheet metal or bar steel shapes, or remove and provide new, as approved. Provide as necessary for the proper completion of the work all framing members not indicated or specified. Spikes, nails and bolts shall be drawn up tight. Do not use shimming on wood or metal bearings. Do not notch in middle third of joists or rafters; limit notches to 1/6-depth of joist, 1/3 at ends. Do not bore holes larger than 1/3-depth of joist or locate closer than 2" from top or bottom.

B. Wall Framing: Select studs for straightness and set plumb, true, and in alignment. In walls and partitions more than eight feet tall, provide horizontal bridging at not more than eight feet on center using nominal 2 inch material of the same width at the studs; install the bridging flat. Sizes and spacing of studs shall be as indicated. Install triple studs at corners to form corner posts. Frame corner posts to receive sheathing.
C. Nailing: Fasten all members in accordance with the IBC fastener schedule, WFCM Nailing Schedule or as specified.
D. Sills: Set sills level and square with steel. Anchor sills to the steel framing as indicated.
E. Rafters: Set accurately and form a true plane. Rafters shall be notched and have full bearing on plates.
F. Joists: Size as indicated and set accurately and in alignment. Toenail joists to all plates with not less than (3) 10d nails, frame openings in ceilings with headers and trimmers.
G. Plates: Anchor plates as indicated. Provide plates cut for the passage of pipes or ducts with a steel angle as a tie for the plate and bearing for joist.
H. Wall Sheathing: Apply horizontally and stagger vertical end joints. Abut sheathing edges over centerlines of supports. Allow 1/8" spacing at panel ends and ¼" at panel edges. Screw panels to Z furring with #8 stainless steel self drilling fasteners spaced 8" on center along edges of the panel and 12" on center over intermediate supports, unless otherwise required by drawings.
I. Attic floor panels: Position panels perpendicular to floor joists. Glue and nail in accordance with the nailing schedule.
J. Roof Sheathing: Install plywood with the grain of the outer plies or long dimension at right angles to supports. Stagger end joints and locate over the centerlines of supports. Allow 1/8" spacing at panel ends and 1/4" spacing at panel edges. Nail panels with 8 penny common or 6 penny annular ring or screw-type nails spaced 6" on center at supported edges and 12" on center at intermediate bearing.
K. Wood Grounds, Nailers, Blocking and furring: Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.
    1. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.
    2. Provide permanent furring of dressed, preservative treated, lumber not less than 1-1/2" wide and of thickness required to bring face of finish material even with existing.

L. Building Paper: On sheathing apply paper shingle fashion, horizontally beginning at the bottom of the wall. Lap edges 4", and nail with 1", zinc-coated roofing nails, spaced 12"on center and driven through plastic discs. Tape all joints.

3.2 CLEAN-UP

A. General: Keep premises in a neat, safe and orderly condition at all times during execution of the work, free from accumulation of sawdust, cut ends and debris.
B. Sweeping: At the end of each working day, more often if necessary thoroughly sweep all surfaces where refuse from this portion of the work has settled. Remove the refuse to the area of the job site designated for its storage.
C. Final Clean-Up: Upon completion of the work of this section, thoroughly broom clean all surfaces.

END OF SECTION

SECTION 06 05 73
WOOD TREATMENT

PART 1: GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Divisions 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Requirements for wood preservative treatment for dimensional lumber.

1.3 RELATED SECTIONS

A. Section 06 10 00 – Rough Carpentry

1.4 REFERENCES

A. American Wood-Preservers' Association (AWPA):
   1. Standard U1, Wood treated with preservative system
   2. Standard T1, Use Category System
   3. Standard A, Analytical
   4. Standard M, Quality Control

B. National Institute of Standards and Technology (NIST):
   1. PS 1, U.S. Product Standard for Construction and Industrial Plywood.
   2. PS 20, American Softwood Lumber Standard.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:
   1. Provide waterproof covers for preservative treated wood during shipment.

B. Storage and Protection:
   1. Store preservative treated wood off the ground and protected from the weather.

PART 2: PRODUCTS

2.1 MATERIALS

A. Lumber for preservative treatment must conform to the following specifications.
B. Lumber: In accordance with NIST PS 20 and as follows:
   1. Grade: No. 2 Dense or better
   2. Species: Southern pine.
   3. Surfacing: S4S.

C. Lumber for fire retardant treatment shall be as specified in section 06 61 00.

2.2 PRESERVATIVE TREATMENT

A. UC2 - INTERIOR/DAMP: Wood and wood based materials used for interior construction that are not in contact with ground, but may be subject to dampness. These products are continuously protected from the weather but may be exposed to occasional sources of moisture. Examples are interior beams, timbers, flooring, framing, millwork and sill plates.

2.3 SOURCE QUALITY CONTROL

A. Inspection:
1. Untreated Material:
a. Lumber: Provide lumber that has been inspected and graded by an ALSC recognized grading agency.
b. Plywood: Provide plywood that has been inspected and graded before treatment by a code-recognized inspection and testing agency.

1. Treated Material: Provide treated material that bears the Natural Select trademark and the quality mark of an ALSC-recognized agency which maintains supervision, testing, and inspection of the quality of the product. Quality marks shall be affixed to each piece and include the following:
a. Identification of the inspection agency.
b. Identification of the standard to which the material was treated.
c. Identification of the treating facility.
d. Identification of the preservative and retention.
e. Identification of the end use for which the product is suitable.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners and Anchorages: Provide size, type material and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommending nails. Provide stainless steel fasteners and anchorages or a hot-dip galvanized coating meeting ASTM A 153, ASTM Standard A653 (Class G-185)

PART 3: EXECUTION

3.1 INSTALLATION

A. Surface Treatment of Field Cuts: Treat field cuts on members that provide structural support to a permanent structure in accordance with AWPA Standard M4.

TABLE 1
SCHEDULE OF USE

Member	Treatment
Sill Plate	UC2
Ledger	UC2
Roof Blocking	UC2

END OF SECTION

SECTION 06 65 00
SIMULATED WOOD TRIM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions, and Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. This Section includes custom fabrications and trim fabricated from cellular poly vinyl chloride or FRP (Columns) including:
   1. Exterior trim
   2. Fascias
   3. Moldings
   4. Soffits and ceilings
   5. Columns

1.3 REFERENCES

A. ASTM D792 - Density and Specific Gravity of Plastics by Displacement.
B. ASTM D570 - Water Absorption of Plastics.
C. ASTM D638 - Tensile Properties of Plastics.
D. ASTM D790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
E. ASTM D1761 - Mechanical Fasteners in Wood.
F. ASTM D5420 - Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by means of a Striker Impacted by a Falling Weight.
G. ASTM D256 - Determining the Pendulum Impact Resistance of Plastics.
H. ASTM D696 - Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer.
I. ASTM D635 - Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
J. ASTM E84 - Surface Burning Characteristics of Building Materials.
K. ASTM D648 - Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
L. ASTM D3679 - Standard Specification for Rigid Poly Vinyl Chloride (PVC) Siding.

1.4 SUBMITTALS

A. General: Submit listed submittals in accordance with Condition of the Contract and Division 1 Submittal Procedures Section.
B. Product Data: Submit product data, manufacturer's catalogs, product sheet, for specified products.
C. Shop Drawings: Submit complete shop drawings of all items supplied under this section.

1.5 QUALITY ASSURANCE

A. Allowable Tolerances:
Variation in component length: -0.00 / +1.00"
Variation in component width: ± 1/16"
Variation in component thickness: ± 1/16"
Variation in component edge cut: ± 2°
Variation in Density: -0% + 10%

B. Workmanship, Finish, and Appearance: Free foam cellular PVC that is homogenous and free of voids, holes, cracks, and foreign inclusions and other defects. Edges must be square, and top and bottom surfaces shall be flat with no convex or concave deviation. Uniform surface free from cupping, warping, and twisting.

1.6 DELIVERY, STORAGE AND HANDLING

A. Trim materials should be stored on a flat and level surface on a full shipping pallet. Handle materials to prevent damage to product edges and corners. Store materials under a protective covering to prevent jobsite dirt and residue from collecting on the boards.

1.7 WARRANTY

A. Provide manufacturer's 25 year warranty against defects in manufacturing that cause the products to rot, corrode, delaminate, or excessively swell from moisture.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Material: Free foam cellular PVC material with a small-cell microstructure and density of grams/cm3
B. Performance and physical characteristic requirements:

PROPERTY UNITS VALUE ASTM METHOD PHYSICAL	
Density	g/cm3 0.55 D 792
Water Absorption %	0.15 D 570
Tensile Strength psi	2256 D 638
Tensile Modulus psi	144,000 D 638
Flexural Strength psi	3329 D 790
Flexural Modulus psi	144,219 D 790
Nail Hold lbf/in of penetration	35 D 1761
Screw Hold lbf/in of penetration	680 D 1761
Staple Hold lbf/in of penetration	180 D 1761
Gardner Impact in-lbs	103 D 5420
Charpy Impact (@23°C) ft-lbs	4.5 D 256
Coefficient of Linear Expansion in/in/°F	3.2 x 10-5 D 696
Burning Rate in/min No burn when flame removed D.	635
Flame Spread Index	25 E 84
Heat Deflection Temp 264 psi °F	150 D 648
Oil Canning (@140°F) °F	Passed D 648

2.2 ACCESSORY PRODUCTS

A. Fasteners:
   1. Cortex plug and glue system with stainless steel screws
   2. The fasteners should be long enough to penetrate the solid wood substrate a minimum of 1 1/2".
   3. Use 2 fasteners per every framing member for trim board applications. Trim boards 12" or wider, as well as sheets, will require additional fasteners.
   4. Fasteners must be installed no more than 2" from the end of the board.
   5. Fasten into a flat, solid substrate. Fastening into hollow or uneven areas must be avoided.
   6. 3/8" and 1/2" sheet product is not intended to be ripped into trim pieces. These profiles must be glued to a substrate and mechanically fastened.

B. Adhesives:
   1. Glue all joints with a cellular PVC cement, to prevent joint separation.
   2. The glue joint should be secured with a fastener and/or fastened on each side of the joint to allow adequate bonding time.
   3. Surfaces to be glued should be smooth, clean and in complete contact with each other.

C. Sealants: Use urethane, polyurethane or acrylic based sealants without silicone.

2.3 FRP COLUMNS CAPITALS AND BASES

A. Materials: One piece rotocast reinforced polymer with marble dust with a DuraStone pre-colored textured finish.
B. Column: Tapered Round Shaft, size and length as shown on drawings, with matching Tuscan base and capital

PART 3 – EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's product catalog installation instructions and product technical bulletin instructions.
B. Rabbet sides of all trim to create a J- Pocket to receive plastic siding.
C. Glue all joints in trim and plug holes.
D. Install columns covers, bases, and capitals in accordance with manufacturer's instructions. Set columns by slipping over structural column before setting steel structure. Provide coverings on columns to protect from damage from construction.

END OF SECTION

F. Testing agency shall confirm that the structure is square, plumb and level in accordance with AISC tolerances.

END OF SECTION

SECTION 07 27 19
PLASTIC SHEET AIR BARRIERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions, and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Scope of Work: Furnish and install a weather restive membrane over sheathing prior to siding installation.

1.3 RELATED SECTIONS

A. To include and/or coordinate with related work specified elsewhere:

Section 07 92 00 - Joint Sealers

1.4 REFERENCES

American Association of Textile Chemists & Colorists (**AATCC**)
AATCC-127 Water Resistance: Hydrostatic Pressure Test
American Society for Testing & Materials (**ASTM**)
ASTM D1117 Methods of Testing Non-woven Fabrics
ASTM D374 Standard Test Method for Thickness of Solid Electrical Insulation
ASTM D882 Standard Test Method for Tensile Properties of Thin Plastic Sheeting
ASTM E84a Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials

PART 2 – PRODUCTS

2.1 MATERIALS

A. Building Paper: "Commercial Wrap" 100 percent flash spun-bond high density polyethylene fibers bonded by heat and pressure into sheet.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Attach membrane to sheathing with large head plastic washers with roofing nails.
B. Beginning at the corner of the building, leave approximately 6" – 12' (152-305mm) of material extended beyond the corner edge to overlap later. Hold the roll vertically and unroll for a short distance. Make sure that the roll is plumb and the bottom edge runs along the line of the curb.
C. Continue to unroll a few feet at a time being careful to follow the line of the curb. Secure the material at approximately every 12" – 18" (305-457 mm).
D. Tape all horizontal seams and repair or tape any damaged areas. Tape any vertical breaks or overlaps.

END OF SECTION

SECTION 07 31 13
ASPHALT SHINGLE ROOF

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions, and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. The work under this Section includes the supply and installation of roof shingles, underlayments, and accessories for new addition.

1.3 RELATED WORK

A. The following related work is specified in other sections:
   1. Sheet Metal Flashing and Trim: Section 07 62 00
   2. Sealants: Section 07 92 00

1.4 SUBMITTALS

A. Product Data: Submit technical product data, installation instructions and recommendations from shingle manufacturer, including data that materials comply with requirements.
B. Samples: Submit full range of samples for color and texture selection.
C. Maintenance Stock: 2% of each type/color/texture shingle used in the work.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide all primary roofing products, including shingles, underlayment, leak barrier, and ventilation, by a single manufacturer.
B. Installer Qualifications: Installer must be approved by the roofing manufacturer for installation of all roofing products to be installed under this section.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver materials in manufacturer's unopened, labeled containers.
B. Storage: Store materials to avoid water damage, and store rolled goods on end. Comply with manufacturer's recommendations for job-site storage and protection.

1.7 JOB CONDITIONS

A. Substrate: Proceed with shingle work only after substrate construction and penetrating work have been completed.
B. Weather Conditions: Proceed with shingle work only when weather conditions are in compliance with manufacturer's recommendations and when substrate is completely dry.

1.8 WARRANTY

A. Provide to the Owner manufacturer's warranty. Contractor must be trained and certified by the manufacturer for the product to be installed.

B. Material defects: Warranty shall provide 100% coverage for materials and labor for the first 20 years, then prorated thereafter.
C. Workmanship (installation) Errors: Warranty shall provide 100% coverage for workmanship errors for the first 20 years.
D. Installer must register and pay for the warranty.

1.9 MANUFACTURER'S SERVICES

A. Contractor shall schedule a start-up, at least one interim inspection and final inspection with manufacturer.

1.10 REFERENCES

A. ASTM - Listed Standards
B. SMACNA - Architectural Sheet Metal Manual
C. Revere Copper and Brass Incorporated - Copper and Common Sense
D. NARCA – Roofing and Waterproofing Manual
E. NRCA - Steep Roofing Manual
F. ARMA - Residential Asphalt Roofing Manual.
G. UL 790 - Tests for Fire Resistance of Roof Covering Materials
H. UL 997 - Wind Resistance of Prepared Roof Covering Materials
I. ASTM B 370 - Standard Specification for Copper Sheet and Strip for Building Construction
J. ASTM D 2218 – Impact Resistance of Prepared Roof Covering Materials
K. ASTM D 3018 - Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules
L. ASTM D 3161 - Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method)
M. ASTM D 3462 – Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules
N. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free
O. ASTM D 7158 - Standard Test Method for Wind-Resistance of Sealed Asphalt Shingles (Uplift Force/Uplift Resistance Method)

PART 2 – PRODUCTS

2.1 MATERIALS

A. Shingles: Super-heavyweight, granule surfaced, self sealing asphalt shingle with a strong fiberglass reinforced core and stain guard protection, which prevents pronounced discoloration from blue-green algae through formulation/unique blends of granules. Architectural laminate styling providing a wood shake appearance with a 5" or 5 5/8" exposure. UL 790 Class A rated with UL 997 Wind Resistance Label; ASTM D 7158, Class H; ASTM D 3161, Type 1; ASTM D 3018, Type 1; ASTM D 3462; CSA 123.5-98; Dade County Approved, Florida Building Code Approved, Texas Dept of Insurance Approved, ICC Report Approval. Equal to Timberline® Prestique® Lifetime High Definition Shingles, by GAF-Elk.
B. Ridge Shingles: High profile self sealing hip and ridge cap shingle matching the color of selected roof shingle.
C. Starter Shingle: Self sealing starter shingle designed for premium roof shingles.
D. Leak Barrier: Ice and Water Barrier (Eave Ice Dam Protection): ASTM D1970 Self-Adhering Polymer Modified Bituminous Sheet Materials consisting of rubberized asphalt bonded to skid resistant sheet polyethylene, 58 mil (1.5 mm) total thickness, with strippable treated release paper.
E. Underlayment: Asphalt-saturated roofing felt and No. 15 unperforated organic felt, complying with ASTM D 226 Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing, 36" wide, approximate weight 18 lbs./square.
F. Nails: Series 316 stainless steel, minimum 3/8" diameter head, and of sufficient length to penetrate minimum 3/4" into solid decking or to penetrate through plywood sheathing a minimum of 1/8".
G. Coil Nails: Type 316 Stainless Steel.

H. Plastic Cement: General purpose asphalt roofing cement meeting the requirements of ASTM D 4586, Type I or II

PART 3 – EXECUTION

3.1 INSPECTION

A. Installer of shingles must examine substrate and conditions under which shingling work is to be performed and must notify Contractor in writing of unsatisfactory conditions. Do not proceed with shingling work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 PREPARATION OF SUBSTRATE

A. Cleaning: Clean substrate of any projections and substances detrimental to shingling work. Cover knotholes or other minor voids in substrate with sheet metal flashing secured with roofing nails.
B. Coordination with Other Trades: Coordinate installation of shingles with flashing and other adjoining work to ensure proper sequencing. Do not install shingle roofing until all vent stacks and other penetrations through roofing have been installed and are securely fastened against movement.

3.3 INSTALLATION

A. General: Comply with instructions and recommendations of shingle manufacturer, except to extent more stringent requirements are indicated.
B. Flashing: Install metal flashing and vent flashing as shown and in accordance with details and recommendations of the NRCA Steep Roofing Manual.
C. Eave Metal:
    1. Install eave metal flashing before protective underlayment.
    2. Place eave metal flashings tight with fascia and roof sheathing. Weather lap joints 2 inches secure flange with nails spaced 4 inches on center.

D. Eave Ice and Water Barrier:
    1. Place eave edge metal flashings tight with fascia boards. Weather lap joints 6 inches and seal with roof cement. Secure flange with nails spaced 4 inches on center.
    2. Apply Ice and Water Barrier in accordance with the manufacturer's recommendations over eave flashing.
    3. Extend Ice and Water Barrier protection membrane minimum 2 feet up slope beyond the interior face of the exterior wall.
    4. Install a 36" wide sheet of Ice and Water Barrier along rake.

E. Protective Underlayment: Place one ply of 36" wide underlayment horizontally over entire roof over area not protected by eave protection, with horizontal edges weather lapped a minimum of 19 inches over itself and eave protection and have ends lapped a minimum of 12 inches over itself. Stagger end laps of each consecutive layer. Nail in place. Lap felt 6" from both sides over hips and ridges. Secure underlayment to deck with sufficient fasteners to hold in place until shingles are applied.
F. Vertical walls: Install Ice and Water Barrier protection membrane extending at least 6 inches (150 mm) up the wall and 12 inches (305 mm) on to the roof surface. Lap the membrane over the roof deck underlayment.
G. Asphalt Shingles:
    1. Install starter shingles at eaves and along rake. Extend shingles 3/8" beyond roof edge. Install shingles in accordance with manufacturer's recommended pattern and weather exposure utilizing (6) fasteners per shingle. Use horizontal and vertical chalk lines to ensure straight coursing.

Comply with installation details and recommendations of shingle manufacturer and NRCA Steep Roofing Manual.

2. Seal rake edge shingles to underlayment and drip edge with a four inch wide strip of roofing cement.
3. Install Ridge shingles per manufacturer's instructions using Hip and Ridge Cap Shingles.
4. Surface caulk all exposed roofing nails with silicone sealant.
5. Install shingles in valley following manufacturer's installation requirements and as specified herein:
    a. Extend starters and first course across valley a minimum of 12" beyond centerline.
    b. Do not nail shingles within 6" of valley centerline. Double nail shingle ends in valley.
    c. Mark a taper cut when valley is fully shingled. Start at 2" width at peak and taper toward eaves at 1/8" per foot.
    d. Seal shingles after they have been cut with plastic roofing cement.
6. Hand seal shingles following with roofing cement when installed between November 15 and March 15.

3.4 EXTRA STOCK

A. Provide minimum of 2% of installed quantity of each type/color/texture shingle used in the work. Provide in unopened clearly labeled bundles or containers.

END OF SECTION

SECTION 07 46 33
VINYL AND POLYMER SIDING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions, and other Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Vinyl Siding and Polymer shake and shingle siding
B. Accessories and trim

1.3 RELATED SECTIONS

A. Section 06 10 00 – Framing and Sheathing
B. Section 07 27 19 – Air Barrier
C. Section 07 92 00 – Joint Sealers

1.4 REFERENCES

A. ASTM D 635 – Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
B. ASTM D 638 – Standard Test Method for Tensile Properties of Plastics
C. ASTM D 648 – Test Method for Deflection Temperature of Plastics under Flexural Load
D. ASTM D 696 – Standard Test method for Coefficient of Linear Thermal Expansion of Plastics between -30 Degrees C and 30 Degrees C
E. ASTM D 790 – Standard Test Methods for Flexural Properties of Un-reinforced and Reinforced Plastics and Electrical Insulating Materials
F. ASTM D 1435 – Standard Practice Method for Outdoor Weathering of Plastics
G. ASTM D 1929 – Standard Test Method for Ignition Properties of Plastics
H. ASTM D 2843 – Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics
I. ASTM D 3679 – Standard Specifications for Rigid Poly (Vinyl Chloride) (PVC) Siding
J. ASTM D 4101 – Standard Specification for Propylene Plastic Injection and Extrusion Materials
K. ASTM D 4216 – Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Related Plastic Building Product Compounds
L. ASTM D 4226 – Standard Test Method for Impact Resistance of PVC Building Products
M. ASTM D 4477 – Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Soffit
N. ASTM D 5206 – Standard Windload Resistance Test
O. ASTM E 84 –Standard Test method for Surface Burning Characteristics of Building Materials
P. ASTM E 119 – Standard Test Methods for Fire Tests on Building Construction and Materials

1.5 PERFORMANCE REQUIREMENTS

A. PVC Fire Resistance: Provide vinyl siding products that meet or exceed the following ratings:
   1. Flame spread index 20, fuel contribution o, smoke development rating 360, per ASTM E 84.
   2. Self-ignition temperature: 824 degrees F (440 degrees C) per ASTM D 1929.
   3. Fire endurance classification of 1 hour, per ASTM E 119 as wall assembly.

B. Cedar Impressions Shake and Shingle Siding: TPO Fire Resistance: Provide thermoplastic polyolefin siding products that meet or exceed the following ratings:
   1. Minimum self-ignition temperature of 650 degrees F (343 degrees C), per ASTM D1929.
   2. Smoke density rating of 40, per ASTM D 2843.

1.6 SUBMITTALS

A. Submit under provisions of Section 01300
B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations
   2. Storage and handling requirements and recommendations
   3. Installation methods
C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Provide installer with not less than three years of experience with products specified or has obtained Master Craftsman credentials from siding manufacturer.

1.8 DELIVERY, STORAGE AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.9 PRODUCT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

A. Provide manufacturer's standard lifetime limited warranty on siding products.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Polymer Shakes and Shingles Siding (Cedar Impressions): Thermoplastic Polyolefin (TPO): Provide siding materials made of modified polypropylene copolymer with cell classification of PP300A11220F00W2020103, as defined by ASTM D 4101, meeting or exceeding the following properties.
   1. Tensile strength: 3,500 psi (24,133 kPa), per ASTM D 638
   2. Tensile modulus: 180,000 psi (1,241,100 kPa), per ASTM D 638
   3. Flexural modulus: 180,000 psi (1,241,100 kPa), per ASTM D 790
   4. Coefficient of linear thermal expansion: .000053 in/in/degree F, per ASTM D 696
   5. Deflection temperature at 264 psi (1820 kPa): 160 degrees F (71 degrees C)

2.2 Polymer Shakes and Shingle Siding

A. Cedar Impressions D7 Straight Edge Perfection Shingles:
   1. Design: Double 7 inch (178 mm) shingle; cedar grain finish
   2. Lock: Molded Perimeter Lock

3. Width: 14 inch (356 mm)
4. Length: 4 feet (1.22m) plus or minus .025 inch (6mm)
5. Average Thickness: 0.100 inch (2.54 mm)
6. Panel Projection: ¾ inch (19mm)
7. Panel Exposure: 7 inch (178mm) plus or minus .062 inch (1.57 mm)
8. Maximum Warp (per 2 panels): 0.250 inch (6mm)
9. Panel Thermometer: Monitors panel temperature to help ensure accurate installation
10. Color: As selected by Architect from manufacturer's standards

2.3 VINYL CARPENTRY ACCESSORIES

A. Accessories:
   1. Undersill trim
   2. 2 ½ inch (64 mm) Metal Starter Strip

2.4 FASTENERS

A. Provide 316 stainless steel nails as recommended by manufacturer of siding products.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Examine, clean, and repair as necessary any substrate conditions which would be detrimental to proper installation.
B. Do not begin installation until unacceptable conditions have been corrected.

3.3 INSTALLATION

A. Install products in accordance with the latest printed instructions of the manufacturer. Installer should have current Master Craftsman credentials.
B. Install products with all components true and plumb.
C. Nail horizontal panels by placing nail in center of slot. Nail vertical panels by placing first nail at top of top slot and remaining nails in center of slots. Drive nails straight, leaving 1/16 inch (1.6mm) space between nail head and flange of panel.
D. Allow apace between both ends of siding panels and trim for thermal movement. Overlap horizontal panel ends one-half the width of factory pre-cut notches.
E. Stagger lap joints in horizontal siding in uniform pattern as successive courses of siding are installed.
F. Install J-channel and flashing to accommodate successive courses of vertical siding. Install wood shims at building corners to bring cut edges of vertical siding out to correct plane.

3.4 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion

3.5 CLEANING

A. At completion of work, remove debris caused by siding installation from project site.

END OF SECTION

SECTION 07 61 13
COPPER STANDING SEAM ROOF

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Standing-seam copper roofing on Cupola.
B. Related Requirements:
   1. Section 07 62 00 – Copper Flashing and Trim: Flashing and other trim not part of roofing.
   2. Division 07 92 00 Section "Joint Sealants" for field-applied panel sealants.
   3. Wood framing and decking is specified in a Division 06 Section.

1.3 PERFORMANCE REQUIREMENTS

A. Installation Requirements: Fabricator is responsible for installing system, including anchorage to substrate and necessary modifications to meet specified and drawn requirements and maintain visual design concepts in accordance with Contract Documents and following installation methods as stipulated in the "Copper in Architecture" handbook published by the Copper Development Association Inc. (CDA)
   1. Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
   2. Make modifications only to meet field conditions and to ensure fitting of system components.
   3. Obtain Architect's approval of modifications.
   4. Provide concealed fastening wherever possible.
   5. Attachment considerations: Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening and fracturing connection between units and building structure or between components themselves.
   6. Obtain Architect's approval for connections to building elements at locations other than indicated in Drawings.
   7. Accommodate building structure deflections in system connections to structure.

B. Performance Requirements:
   1. System shall accommodate movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects when subjected to seasonal temperature changes and live loads.
   2. Design system to be capable of withstanding wind pressure set forth on the drawings.

C. Interface With Adjacent Systems:
   1. Integrate design and connections with adjacent construction.
   2. Accommodate allowable tolerances and deflections for structural members in installation.

1.4 SUBMITTALS

A. Product data including metal manufacturer's specifications, installation instructions, and general recommendations for roofing applications. Include certification or other data substantiating that materials comply with requirements.

B. Shop drawings showing manner of forming, joining, and securing copper roofing, and pattern of seams. Show expansion joint details and waterproof connections to adjoining work and at obstructions and penetrations.

1.5 QUALITY ASSURANCE

A. Fabricator's Qualifications: Company specializing in copper sheet metal roofing work with three years experience in similar size and type of installations.
B. Installer: A firm with 3 years of successful experience with installation of copper roofing of type and scope equivalent to Work of this Section.
C. Industry Standard: Except as otherwise shown or specified, comply with applicable recommendations and details of the "Copper in Architecture" handbook published by the Copper Development Association Inc. (CDA). Conform to dimensions and profiles shown.
D. Wind Uplift: Provide roof assemblies meeting wind uplift ratings as required by code.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading: Protect finish panel faces.
B. Acceptance at Site: Examine each panel and accessory as delivered and confirm that finish is undamaged. Do not accept or install damaged panels.
C. Storage and Protection:
   1. Stack pre-formed material to prevent twisting, bending, and abrasions.
   2. Provide ventilation.
   3. Prevent contact with materials which may cause discoloration or staining.

1.7 WARRANTY

A. Warrant installed system and components to be free from defects in material and workmanship for period of 2 years from final acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide materials by one of the following:
   1. Hussey Copper, Ltd.
   2. Luvata, Inc.
   3. PMX Industries Inc.
   4. Revere Copper Products, Inc.

2.2 MATERIALS

A. Copper Roofing Sheets: Cold-rolled copper sheet complying with ASTM B 370 temper H00, unless otherwise indicated, and as follows: Weight: 20 oz. per sq. ft. (0.0270-inch thick) (0.69-mm) unless otherwise indicated.
B. Miscellaneous Materials: Provide materials and types of fasteners, solder, protective coatings, separators, sealants and accessory items as recommended by copper sheet manufacturer for copper roofing work, except as otherwise indicated.
C. Accessories: Except as indicated as work of another specification Section, provide components required for a complete roof system, including trim, finial, copings, fascias, ridge closures, cleats, seam covers, battens, flashings, sealants, gaskets, and closure strips. Match materials and finishes of roof.
   1. Sealing Tape: Pressure-sensitive 100 percent solids polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

2. Joint Sealant: One-part, copper compatible elastomeric polyurethane, polysulfide, butyl or silicone rubber sealant as tested by sealant manufacturer for copper substrates. Refer to Division 07.
3. Cleats:
    a. Concealed type as indicated in the "Copper in Architecture " handbook published by the Copper Development Association Inc. (CDA) for standing seam roof spaced on 12-inch (300-mm) centers.
    b. Fabricate cleats to allow thermal movement of copper roof panels while preventing copper panel distortion due to wind uplift forces.

4. Trim, Closure Pieces, and Accessories:
    a. Same material, thickness and finish as adjacent copper roof panels, brake formed to required profiles.
    b. Comply with standards conforming to recognized industry standard sheet metal practice.

D. Bituminous Coating: SSPC-Paint 12, Cold-Applied Asphalt Mastic (Extra Thick Film), nominally free of sulfur, compounded for 15-mil dry film thickness per coat.
E. High Temperature Grade Water Barrier Underlayment: Cold applied, self-adhering membrane composed of a high density, cross laminated polyethylene film coated on one side with a layer of butyl rubber or high temperature asphalt adhesive. Provide primer when recommended by water barrier manufacturer.
    1. Minimum Thickness: 3 0 mil.
    2. Tensile Strength: ASTM D 412 (Die C Modified); 250 psi.
    3. Membrane Elongation: ASTM D412 (Die C Modified); 250%.
    4. Permeance (Max): ASTM E96; 0.05 Perms.
    5. Acceptable Products:
        a. Blueskin PE 200 HT, Henry.
        b. Ultra, W.R. Grace Company.
        c. CCW MiraDRI WIP 300 High Temperature, Carlisle Coatings and Waterproofing.

F. Nails for Wood Substrates: Copper or hardware bronze, 0.109-inch minimum not less than 7/8-inch (22-mm) long barbed with large head.
G. Screws & Bolts: Copper, bronze, brass, or passivated stainless steel (300 Series) of sufficient size and length to sustain imposed stresses.
H. Cleats: 16 or 20 oz ounce cold rolled copper, as required to sustain loads 2-inch (50 mm) wide x 3-inch (75-mm) long.
I. Solder: ASTM B32; Provide 50-50 tin/lead or lead free alternative of similar or greater strength solder. Killed acid flux.
J. Flux: Muriatic acid neutralized with zinc or approved brand of soldering flux.
K. Rivets:
    1. Pop Rivets: 1/8-inch (3-mm) to 3/16-inch (4.5-mm) diameter, with solid brass mandrels.
    2. Provide solid copper rivet (tinner's rivets) where structural integrity of seam is required.

2.3 FABRICATION

A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of the "Copper in Architecture" handbook published by the Copper Development Association (CDA) and other recognized industry practices. Fabricate for waterproof and weather-resistant performance with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrate. Comply with material manufacturer's instructions and recommendations for forming material. Form exposed copper work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.
    1. Fabricate to allow for adjustments in field for proper anchoring and joining.
    2. Form sections true to shape, accurate in size, square, free from distortion and defects.

3. Cleats: Fabricate cleats and starter strips of same material as sheet, interlockable with sheet in accordance with CDA recommendations.
4. Tin edges of copper sheets and cleats at soldered joints for flat lock and soldered system.

B. Standing Seam Panels:
   a. Fabricate pans to interlock standing seam with center to center seam spacing as indicated on Drawings.
   b. Fabricate interlocking seams to heights and patterns indicated.
   c. Form overlapping and interlocking transverse joints.

C. Seams: Fabricate nonmoving seams in copper sheet with flat-lock seams. Tin edges and cleats to be soldered, form seams, and solder.

D. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used, or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch (25-mm) deep, filled with mastic sealant (concealed within joints).

E. Sealant Joints: Where movable, non-expansion-type joints are indicated or required for proper performance of work, form copper to provide for proper installation of elastomeric sealant, in compliance with the "Copper in Architecture" handbook published by the Copper Development Association Inc. (CDA) .

F. Separations: Provide for separation of copper from noncompatible metal or corrosive substrate by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

G. Solder:
   1. Solder and seal non-moving copper joints on slopes up to 3:12, except those indicated or required to be expansive type joints.
   2. After soldering, remove flux. Wipe and wash solder joints clean.

2.4 FINISHES

A. Natural weathering mill finished copper. No applied finish.

PART 3 – EXECUTION

3.1 EXAMINATION

A. General: Examine conditions and proceed with work when substrates are ready.
B. Confirm that substrate system is even, smooth, sound, clean, dry, and free from defects.
C. Verify roof openings, pipes, sleeves, ducts, and vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.

3.2 PREPARATION

A. Clean surfaces to receive copper roofing. Substrate to be smooth and free of defects. Drive all projecting nails or other fasteners flush with substrate.
B. Water Barrier Underlayment:
   1. Install high temperature grade water barrier on clean, dry roof substrate.
   2. Remove dust, dirt, and loose fasteners.
   3. Remove protrusions from the deck area.
   4. Verify substrate has no voids, damaged, or unsupported areas.
   5. Repair voids or unacceptable areas before installing membrane.
   6. Prime substrates with manufacturer's approved primer if required for proper installation of membrane over substrate.
   7. Install membrane in strict accordance with manufacturer's printed application procedures, precautions, and limitations.

8. Start application at low points and lap membrane shingle fashion to prevent water penetration.
9. Membrane Underlayment: Apply horizontally, lapping preceding layer not less than 4-inches (100 mm). End lap membrane not less than 6-inches (150-mm) .
    a. Maximize adhesion to substrate by brooming or rolling membrane in place after placement.
    b. Center membrane at valleys, hips, and ridges.

3.3 INSTALLATION

A. Manufacturer's Recommendations: Except as otherwise shown or specified, comply with recommendations and instructions of manufacturer of copper being fabricated and installed.
B. General:
    1. Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating, by applying rubberized asphalt or butyl underlayment to each metal surface, or by other permanent separation as recommended by manufacturers of dissimilar metals.
    2. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of copper roofing to profiles, patterns, and drainage arrangements shown and as required for permanently leak proof construction. Provide for thermal expansion and contraction of the work, as indicated. Seal joints as shown and as required for leak proof construction. Shop-fabricate materials to greatest extent possible.
    3. Sealant-Type Joints: Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to conceal sealant completely. When ambient temperature is moderate at time of installation, 40 degrees to 70 degrees F (4 degrees to 21 degrees C), set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher or lower ambient temperatures. Do not install sealant-type joints at temperatures below 40 degrees F (4 degrees C). Comply with requirements of Division 07 "Joint Sealant" Sections for handling and installing sealants.
    4. Fabricate and install work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks considering temper and reflectivity of metal. Provide uniform, neat seams with minimum exposure of solder, and sealant. Except as otherwise shown, fold back sheet metal to form a hem on concealed side of exposed edges.
    5. Conceal fasteners and expansion provisions where possible in exposed work, and locate so as to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
    6. Tin uncoated copper surfaces and cleats at edges of sheets to be soldered, for a width of 1-1/2 inch (38 mm), using solder recommended for copper work.

C. Standing Seam Roofing:
    1. Fold lower end of each pan under 3/4 inch (19 mm). Slit fold 1-inch (25-mm) away from corner to form tab where pan turns up to make standing seam. Fold upper end of each pan over 2-nches (50 mm). Hook fold on lower end of upper pan into fold on upper end of underlying pan.
    2. Apply pans beginning at eaves. Loose lock pans to valley flashing and edge strips at eaves and gable rakes.
    3. Finish standing seams one inch (25-mm) 1 ½-inch (38mm)] high. Bend up one side edge 1 ½-inch (38-mm) [2-inch (50-mm)] and other 1-3/4 inch (44 mm) [2-1/4 (66mm)]. Make first fold ¼-inch (6-mm) wide single fold and second fold ½-inch (13-mm) wide, providing locked portion of standing seam with 5 plies in thickness. Fold lower ends of seams at eaves over at 45 degree angle. Terminate standing seams at ridge and hips by turning down in tapered fold.
    4. Form valleys of sheets not exceeding 10 '-0" (3000-mm) in length. Lap joints 8-nches (200 mm) in direction of drainage. Extend valley sheet minimum 6-inches (150-mm) under roofing sheets. At valley, double fold valley and roofing sheets and secure with cleats spaced 12-inch (300-mm) centers.

3.4 CLEANING

A. Remove protective film (if any) from exposed surfaces of copper roofing promptly upon installation. Strip with care to avoid damage to finishes.
B. Upon completion of each area of soldering, carefully remove flux and other residue from surfaces. Neutralize acid flux by washing with baking soda solution, and then flushing clear water rinse. Use special care to neutralize and clean crevices.
C. Clean exposed metal surfaces of substances that would interfere with uniform oxidation and weathering.

3.5 PROTECTION

A. Provide final protection in a manner acceptable to installer that ensures that copper roofing is without damage or deterioration at time of Substantial Completion

END OF SECTION

SECTION 07 62 00
FLASHING AND SHEET METAL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. The work under this Section includes the supply and installation of all metal flashing.

1.3 REQUIRED WORK NOT FURNISHED UNDER THIS SECTION

The following work is required for a complete installation and is specified in other Sections:

A. Section 07 31 13: Asphalt Shingles
B. Section 07 92 00: Sealants.

1.4 SUBMITTALS

A. Prior to commencing construction, submit proof that the installing contractor is authorized by the materials manufacturer and qualifies to receive required systems warranty.
B. Prior to starting any work, the contractor shall submit copies of manufacturer's literature for each required product. This information shall include product description and applicable quality standards, and conform to the requirements of this specification.
C. Physical samples of products to be used must be made available, if requested.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Furnish sheet metal items in 8 to 10-foot lengths. Single pieces less than 8 feet long may be used to connect to factory-fabricated inside and outside corners, and at ends of runs. Provide accessories and other items essential to complete the sheet metal installation. These accessories shall be made of the same materials as the items to which they are applied. Fabricate sheet metal items of the materials specified below and to the gage, thickness, or weight shown in Table I at the end of this Section.
B. Copper Flashings: Shall be copper QQ-c576. Light cold rolled or B370 cold rolled weight as noted.
C. Soldering Flux: ASTM B284, Rosin or 0-F506 where necessary.
D. Solder: ASTM B32
E. Nails, screws bolts expansion shields and other fastening shall be of the same material as sheet metal to be secured or shall be durable and compatible material which are regularly recommended for extended use by the manufacturer of the sheet metal. Nails shall be # 10 gauge (.1019 inch diameter) or larger, needle point of length enough to penetrate wood one inch. Rivets shall be 1/8" in diameter.

2.2 FABRICATED UNITS

A. Eave and rake flashing: Eave flashings shall be constructed as detailed of 20-ounce coated copper.
B. Step flashing: Stepped flashing shall be separate pieces of 7" x 10" 20 ounce copper bent in half 7" x 5" on each side.

C. Cupola Louvers: Aluminum 4" deep, 99% weather resistance, channel frame fixed blade louver with 1 1/2" perimeter flange and integral sill flashing. Fish shall be a 3 coat Kynar 500/Hylar 5000 resin coating, color to match trim.

PART 3 – EXECUTION

3.1 JOINTING

A. Expansion and Contraction: Provide expansion and contraction joints at not more than 32-foot intervals for aluminum and at not more than 40-foot intervals for other metals. Where the distance between the last expansion joint and the end of the continuous run is more than half the required interval, an additional joint shall be provided. Space joints evenly. Join extruded aluminum gravel stops and fascias by expansion and contraction joints spaced not more than 12 feet apart.
B. Soldering:

1. Where soldering is specified, it shall apply to copper, terne-coated stainless steel, zinc-coated steel, and stainless steel items.
2. Edges: Pre-tin edges of sheet metals before soldering. Slowly solder with well-heated soldering items so as to thoroughly heat the seams and completely sweat the solder through the full width of the seam. Scrape or wire-brush the edges of lead-coated material to be soldered to produce a bright surface. Flux brush the seams in before soldering. Treat with soldering acid flux, the edges of stainless steel to be pre-tinned. Solder immediately after application of the flux. Upon completion of soldering, the acid flux residue shall be thoroughly cleaned from the sheet metal with a solution of washing soda in water and rinsed with clean water.

C. Lock seam Joints: Fabricate sheet metal with either single or double lock seam flat-lock seams.
D. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with industry standards.

3.2 FLASHING INSTALLATION

A. Requirements: Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections, which might affect the application. For installation of items not shown in detail or not covered by specifications, conform to the applicable requirements of SMACNA ASMM, Architectural Sheet Metal Manual. Provide sheet metal flashings in the angles formed where roof decks abut walls, curbs, ventilators, pipes or other vertical surfaces and wherever indicated and necessary to make the work watertight. Join sheet metal items together as shown in Table II.
B. Workmanship: Make lines, arises, and angles sharp and true. Free exposed surfaces from visible wave, warp and buckle, and tool marks. Fold back exposed edges neatly to form a 1/2-inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.
C. Nailing: Confine nailing of sheet metal generally to sheet metal having a maximum width of 18 inches. Confine nailing or flashing to one edge only. Space nails evenly not over 3 inches on centers and approximately 1/2-inch from edge unless otherwise specified or indicated. Face nailing will not be permitted. Where sheet metal is applied to other than wood surfaces, include in shop drawings, the locations for sleepers and nailing strips required to secure the work.
D. Bolts, Rivets, and Screws: Install bolts, rivets, and screws where indicated or required. Provide compatible washers where required to protect surface of sheet metal and to provide a water-tight connection.
F. Eave Flashing: Eave flashings shall be constructed as detailed of 20-ounce coated copper. Nail drip edge along bottom edge of cave.
G. Cleaning: Clean exposed sheet metal work at completion of installation. Remove grease

and oil films, handling marks, contamination from steel wool, fittings and drilling debris, and scrub clean. Free the exposed metal surfaces of dents, creases, waves, scratch marks, and solder or weld marks.

H. Repairs to Finish: Scratches, abrasions, and minor surface defects of finish may be repaired in accordance with the manufacturer's printed instructions and as approved. Repair damaged surfaces caused by scratches, blemishes, and variations of color and surface texture. Replace items which cannot be repaired.

I. Stepped flashing: Nail each piece to the roof at top edge with two roofing nails. Apply shingles on top of metal set in black mastic cement. Allow for possible roof movement by not nailing flashing to wall. When step flashing vertical masonry surfaces extend flashing up vertical surface 5" and cap with counter flashing.

TABLE I
SHEET METAL WEIGHTS THICKNESS AND GAUGES

FLASHING	MATERIAL	THICKNESS AND GAUGES
Step Flashing	Copper	20 oz.
Edge Flashing	Copper	20 oz.
Head Flashing	Copper	20 oz.
Interior Gutter Trough	Aluminum	.040"
Pan Flashing	Copper	20 oz.

TABLE II

SHEET METAL JOINTS

Metal flashing:	Lap Seam Sealant Joint

END OF SECTION

SECTION 07 92 00
JOINT SEALERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Installation of sealants and backing rods at sealant joints in the building façade.

B. Scope: Provide all materials, labor, equipment, and appliances required to complete work of this Section, including, but not necessarily limited to, the following:
   1. Cleaning and priming of joints as required by Manufacturers installation instructions.
   2. Installation of joint sealants at exterior intersections with metal frames.

1.3 REFERENCES

A. ASTM C 321 - Standard Test Method for Bond Strength of Chemical-Resistant Mortars.
B. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.
C. FS (Federal Specification) TT-S-00227E (COM-NBS) - Interim Federal Specification for Sealing Compound: Elastomeric Type, Multi-Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures.
D. FS (Federal Specification) TT-S-00230C - Interim Federal Specification for Sealing Compound: Elastomeric Type, Single Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures.
E. FS (Federal Specification) TT-S-001543 (COM-NBS) - Interim Federal Specification for Sealing Compound: Silicone Rubber Base (for Caulking, Sealing, and Glazing in Buildings and Other Structures.

1.4 QUALITY ASSURANCE

A. Performance: Except as otherwise indicated, joint sealers are required to establish and maintain airtight and waterproof continuous seals on a permanent basis, within recognized limitations of wear and aging as indicated for each application. Failures of installed sealers to comply with this requirement will be recognized as failures of materials and workmanship.
B. Applicator Qualifications: Contractor and job foreman must have a minimum of five (5) years experience installing sealant.
C. Pre-Installation Compatibility and Adhesion Tests: Contractor shall be responsible for verifying with sealant manufacturer that all sealants to be used are compatible with and will satisfactorily adhere to all substrates. Tests shall be conducted in the field and witnessed by the Contracting Officer.
D. Adhesion Test: During installation, in the presence of, and when and where directed by the Contracting Officer conduct pull test on each joint type. Test is to be performed by slicing across the joint and then cutting both sides of the joint two inches, separating the sealant from the adjoining material. The sealant shall then be pulled in the direction of the joint. The sealant should break rather than separate from the adjoining material.

1.5 SUBMITTALS

A. Submit under provisions of Division 1.
B. Manufacturer's Technical Data, Guides, and Application Procedures

C. Submit samples illustrating colors.
D. Submit laboratory tests or data validating product compliance with performance criteria specified.
E. Submit a copy of the Manufacturer's warranty.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets for each product.
B. Store products in a location protected from freezing, damage, construction activity, precipitation, and direct sunlight in strict accordance with manufacturer's recommendations.
C. Condition products to approximately 60 to 70 degrees F (16 to 21 degrees C) for use in accordance with manufacturer's recommendations.
D. Handle all products with appropriate precautions and care as stated on Material Safety Data Sheet.

1.7 PROJECT CONDITIONS

A. Do not use products under conditions of precipitation or freezing weather. Use appropriate measures for protection and supplementary heating to ensure proper curing conditions in accordance with manufacturer's recommendations if application during inclement weather occurs.
B. Ensure substrate is dry.
C. Protect adjacent work from contamination or damage.

1.8 WARRANTY

A. Provide manufacturer's twenty-year limited warranty against failure of structural adhesion, staining, and weatherseal.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Single Source: All materials, including joint sealers, cleaners, and primers shall be of a single source manufacturer.
B. Acceptable Manufacturers:
    1. Dow Corning
    2. Sika
    3. Tremco
    4. Approved Equal

2.2 MATERIALS

A. One-part, low modulus, elastomeric sealant: *DOW CORNING* 790 Silicone Building Sealant, *SIKA* Sikasil WS 290 or *TREMCO* Spectrem 1, Conforming to ASTM C920, Type S, Grade 25, Use NT, M, G, A, and O.

2.3 ACCESSORIES

A. Primer: As required by sealant manufacturer.
B. Joint Cleaner: Non-corrosive and non-staining type recommended by sealant manufacturer and compatible with joint forming materials.
C. Backer Rod: Open or closed-cell polyethylene rod designed for use with cold-applied joint sealants for on-grade or below-grade applications.
    1. Comply with ASTM C 1330.

2. Size required for joint design.

D. Bond Breaker: Pressure-sensitive tape polyethylene or Teflon recommended by sealant manufacturer.
E. Masking Tape: Pressure-sensitive paper tape.

2.4 COLOR

A. Sealant Colors: Selected by Contracting Officer from manufacturer's master color system.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Inspect all areas involved in work to establish extent of work, access, and need for protection of surrounding construction and public spaces.
B. Conduct pre-application inspection of site verification with an authorized manufacturer's representative.
C. The drawings generally indicate locations of joint sealers. The contractor shall examine the building prior to bidding to determine the quantity and location of all sealant joints. The contractor shall be responsible for the preparation and replacement of joint sealers in ALL joints whether shown on the drawings or not.

3.2 PREPARATION

A. Remove loose materials and foreign matter which impair adhesion of joint filler.
B. Clean joints by grinding, sandblasting, or wire brushing to expose a sound surface free of contamination and laitance.
C. Ensure structurally sound surfaces, dry, clean, free of dirt, moisture, loose particles, oil, grease, asphalt, tar, paint, wax, rust, waterproofing, curing and parting compounds, membrane materials, and other foreign matter.
D. Prime the bond line using Prime Coat where required by the sealant manufacturer installation instructions or as required for proper adhesion, allowing a minimum of one hour drying and cure time before installing sealant. Primer should be within shelf life and poured from containers onto rags, or into applicator bottles that can be poured onto rags. If brushes are used, primer should be poured a small amount at a time into another open container to avoid contaminating primer and to minimize primer being exposed too long. Pour out no more than can be applied in 30 minutes. If primer becomes cloudy or contaminated, discard. Prime no more substrate than can be sealed in one day or shift.
E. Where the possibility of joint filler staining of adjacent areas or materials exists, mask joints prior to application.
    1. Do not remove masking tape before joints have been tooled and initial cure of joint filler has taken place.
    2. Work stained due to failure of proper masking precautions will not be accepted.

3.3 INSTALLATION

A. Solvent clean aluminum and any other non-porous surfaces with recommended solvent using the "Two Cloth Cleaning Method".
B. Apply primer according to manufacturer's instructions.
C. Back-Up Material:
    1. Install backer rod using blunt or rounded tools to assure uniform depth (+/- 1/8") without puncturing or twisting. Closed cell rod shall be a minimum 20% oversized. Open cell rod shall be a minimum 50% oversized. Install bond breaker tape in shallow joints.
    2. Install polyethylene joint filler in joints wider than 1/4 inch (6 mm) to back-up material per manufacturer's recommendations.

D. Bond Breaker: Install bond-breaker strip in joint to be sealed on top of back-up material to prevent adhesion of sealant to back-up material; install per manufacturer's recommendations.
E. Sealant:
    1. Mask or protect adjacent areas that are not to receive sealant.
    2. Apply sealant in joints using a pressure gun with nozzle cut to appropriate size. Deposit sealant in a uniform and continuous bead with no gaps or air pockets.
    3. Tool joints to require configuration with a blunt instrument as soon as possible after installation, but before sealant begins to skin over. Remove all masking materials immediately after tooling.
    4. Apply materials only within manufacturer's specified application life period. Discard sealant after application life is expired or if prescribed application period has elapsed.

F. Joints shall have a minimum width to depth ratio of 2:1. Finished joint cross section shall have an hourglass shape.

3.4 CLEANING

A. Remove uncured sealant and joint filler with Reducer 990, xylene, toluene, or MEK. Remove cured sealant and joint filler by razor, scraping, or mechanically.
B. Remove all debris related to application of sealants from job site in accordance with all applicable regulations for hazardous waste disposal.

3.5 SCHEDULE OF JOINT SEALERS

A. General-Purpose Exterior Applications:
    1. Sealant: Silicone.
    2. Applications:
        a. Joints and recesses between adjacent constructions and frames, sills, and sub-sills of louvers, and trim.
        b Around penetrations in exterior walls.
        c. Top edges of surface mounted counterflashing.
        d. Where necessary to prevent infiltration of water or air into or through exterior building envelope.

END OF SECTION

SECTION 08 31 00
ACCESS DOORS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions, and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the supply and installation of access door, as specified herein and delineated on the drawings.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's specifications for fabrication and installation, including data substantiating that products comply with all requirements.

PART 2 – PRODUCTS

2.1 ACCESS DOOR

A. Size: 36" wide x 48" high ceiling access door.
B. Material: Type 316 stainless steel door, hinges, and hardware.
C. Door: Diamond plate reinforced for live load of 150 pounds/sq.ft.
D. Frame: Type 316 Stainless steel angle frame with an integral 1" anchor flange.
E. Hinge: Stainless Steel butt hinges with tamperproof stainless steel bolts and nuts.
F. Opening Device: Torsion springs assist hold door in closed or full open position.
G. Latch: Removable latch handle and cylinder dead bolt.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General: Install door and frame in accordance with final, approved shop drawings, and manufacturer's installation instructions.
B. Coordinate rough opening with floor framing.

END OF SECTION

Attachment No. 3

Stormwater Pumping Station Specifications - Keystone Engineering Group, Inc. (Electrical)

SECTION 260519

CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Insulated Wire Corp.; a Leviton Company.
2. General Cable Corporation.
3. Southwire Company.
4. Approved equal.

B. Copper Conductors: Comply with NEMA WC 70.

C. Conductor Insulation: Comply with NEMA WC 70 for Types THW, THHN-THWN, XHHW and SO.

D. Multiconductor Cable: Comply with NEMA WC 70 for armored cable, Type AC and Type SO with ground wire.

2.2 CONNECTORS AND SPLICES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. O-Z/Gedney; EGS Electrical Group LLC.
2. 3M; Electrical Products Division.
3. Tyco Electronics Corp.
4. Approved equal.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper, stranded.

B. Branch Circuits, in conduit: Copper, stranded.

C. Branch Circuits, cable: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Type THW, THHN-THWN, or XHHW single conductors in raceway, except branch circuits concealed in office area ceilings, walls and partitions may be armored cable, type AC.

B. Type XHHW for power wiring to motors on variable frequency drives.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

B. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

C. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

D. Identify and color-code conductors and cables according to Division 26 Section "Electrical Identification."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

C. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION

SECTION 260526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes methods and materials for grounding systems and equipment.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Plans showing dimensioned as-built locations of grounding features specified in Part 3 "Field Quality Control" Article, including the following:

1. Ground rods.
2. Bonding to water pipes.
3. Bonding to foundation reinforcing steel.
4. Grounding arrangements and connections for separately derived systems.

C. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 by a qualified testing agency and marked for intended use.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.

2.2 CONNECTORS

A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.

B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.

1. Bury at least 24 inches below grade.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors.
3. Connections to Structural Steel: Welded connectors.
4. Connection to Foundation Reinforcing Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Signal and Communication Equipment: For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
2. For grounding electrode system, install a sufficient number of ground rods to obtain desired ground resistance, spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

    a. At service entrance, provide a minimum of three ground rods buried in ground roughly 10 feet apart from each other forming an triangle and connecting them with copper conductors.

C. Bonding to Concrete Foundation Reinforcing Steel: Use exothermic-welded connectors to bond to 20 ft or more of 1/ 2 in. foundation and/or footing reinforcing steel at each buildings and structure. Where 20 ft of reinforcing steel is not available, imbed 20 ft or more of bare copper not smaller than 4 AWG.

D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

E. Grounding and Bonding for Piping:

1. Install insulated copper grounding conductors, in conduit, from building's main service equipment or electrical grounding bus to metal piping entrances to building. Connect grounding conductors to metal water pipes using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of

the lug bolts of the flange. Bond metal grounding conductor conduit or sleeve to conductor at each end.

2. Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

3. Prepare dimensioned drawings locating each ground rod and ground rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

B. Report measured ground resistances that exceed 10 ohms and include recommendations to reduce ground resistance.

END OF SECTION

SECTION 260533

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. EPDM: Ethylene-propylene-diene terpolymer rubber.

C. FMC: Flexible metal conduit.

D. LFMC: Liquidtight flexible metal conduit.

E. LFNC: Liquidtight flexible nonmetallic conduit.

F. NBR: Acrylonitrile-butadiene rubber.

G. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.

1. For manholes and boxes for underground wiring, including the following:

a. Duct entry provisions, including locations and duct sizes.
b. Frame and cover design.
c. Grounding details.
d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
e. Joint details.

C. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Structural members in the paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.

D. Source quality-control test reports.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Allied Tube & Conduit; a Tyco International Ltd. Co.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. O-Z Gedney; a unit of General Signal.
4. Robroy Industries, Inc
5. Wheatland Tube Company.
6. Approved equal.

B. Rigid Steel Conduit: ANSI C80.1.

C. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

1. Comply with NEMA RN 1.
2. Coating Thickness: 0.040 inch, minimum.

D. LFMC: Flexible steel conduit with PVC jacket.

E. EMT: ANSI C80.3.

F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

1. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.
2. Fittings for EMT: Steel, compression type

G. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 NONMETALLIC CONDUIT

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AFC Cable Systems, Inc.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. CANTEX Inc.
4. Condux International, Inc.
5. Electri-Flex Co.
6. Carlon Electrical Products.
7. Manhattan/CDT/Cole-Flex.
8. RACO; a Hubbell Company.
9. Thomas & Betts Corporation.

B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.

C. Fittings for RNC: NEMA TC 3; match to conduit type and material.

2.3 METAL WIREWAYS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cooper B-Line, Inc.
2. Hoffman.
3. Square D; Schneider Electric.
4. Approved equal.

B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, unless otherwise indicated.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Hinged type.

E. Finish: Manufacturer's standard enamel finish.

2.4 BOXES, ENCLOSURES, AND CABINETS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. EGS/Appleton Electric.
3. Hoffman.
4. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
5. O-Z/Gedney; a unit of General Signal.
6. RACO; a Hubbell Company.
7. Robroy Industries, Inc.; Enclosure Division.
8. Thomas & Betts Corporation..
9. Approved equal.

B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

E. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

F. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

G. Cabinets:

1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.

5. Accessory feet where required for freestanding equipment.

2.5 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. Description: Comply with SCTE 77.

1. Color of Frame and Cover: Gray.
2. Configuration: Units shall be designed for flush burial and have open bottom, unless otherwise indicated.
3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
5. Cover Legend: Molded lettering, as indicated for each service.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel or fiberglass or a combination of the two.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Hubbell Power Systems Quazite or a comparable product by one of the following:

a. Armorcast Products Company.
b. Carson Industries LLC.
c. CDR Systems Corporation.
d. Approved equal.

C. Source Quality Control For Underground Enclosures

1. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

a. Tests of materials shall be performed by a independent testing agency.
b. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
c. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: Rigid steel conduit, PVC coated.
2. Underground Conduit, Direct Buried: Rigid steel conduit, PVC coated,.
3. Underground, Concrete Encased: Rigid Nonmetallic Conduit
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 4.

B. Comply with the following indoor applications, unless otherwise indicated:

1. Exposed, Dry Location: Rigid Steel Conduit.
2. Damp or Wet Locations: Rigid Steel Conduit, PVC Coated.
   a. All Hazardous Locations and General Purpose Locations with open channels, open tanks, or process areas subject to washdown shall be considered a Damp or Wet Location.
   b. All areas within vaults, pits or otherwise below grade shall be considered a Damp or Wet Location.
3. Office areas, Concealed in Ceilings and Interior Walls and Partitions: EMT.
4. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, in damp or wet locations.
5. Embedded in concrete floors and walls, and below concrete floors and slabs: RNC.
   a. Use PVC coated steel conduit where conduits pass through, stub-up or leave concrete floors and walls.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.

3.2 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Support raceways as specified in Division 16 Section "Electrical Supports and Seismic Restraints."

E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

G. Conceal conduit within finished walls, ceilings, and floors, unless otherwise indicated.

H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.

I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

L. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:

1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

M. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where otherwise required by NFPA 70.

N. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations not subject to severe physical damage.

O. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.

P. Set metal floor boxes level and flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 2 Section "Earthwork" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Division 2 Section "Earthwork."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 2 Section "Earthwork."
4. Install manufactured PVC coated rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
    b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

3.4 INSTALLATION OF UNDERGROUND MANHOLES AND BOXES

A. Install manholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Install manholes with bottom below the frost line.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.

F. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

B. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

C. Rectangular Sleeve Minimum Metal Thickness:

1. For sleeve cross-section rectangle perimeter less than 50 inches and no side greater than 16 inches, thickness shall be 0.052 inch.
2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than, 16 inches, thickness shall be 0.138 inch.

D. Cut sleeves to length for mounting flush with both surfaces of walls.

E. Extend sleeves installed in floors 2 inches above finished floor level.

F. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway unless sleeve seal is to be installed.

G. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.

H. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.

I. Roof-Penetration Sleeves: Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.

J. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

K. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between raceway and sleeve for installing mechanical sleeve seals.

3.6 SLEEVE-SEAL INSTALLATION

A. Install to seal underground, exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway material and size. Position raceway in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.7 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 260544

SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Sleeves for raceways and cables.
2. Sleeve seals.

1.3 DEFINITIONS

A. ATS: Acceptance Testing Specifications.

B. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 QUALITY ASSURANCE

A. Test Equipment Suitability and Calibration: Comply with NETA ATS, "Suitability of Test Equipment" and "Test Instrument Calibration."

1.6 COORDINATION

A. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Molded PVC sleeves: With nailing flange for attaching to wooden forms.

2.3 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Available Manufacturers:

   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Metraflex Co.
   d. Pipeline Seal and Insulator, Inc.
   e. Approved equal.

2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
3. Pressure Plates: Plastic. Include two for each sealing element.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION

3.1 SLEEVE-SEAL INSTALLATION

A. Install to seal underground, exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.2 FIELD QUALITY CONTROL

A. Inspect installed sleeve and sleeve-seal installations and associated firestopping for damage and faulty work.

END OF SECTION

SECTION 260553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Identification for raceway.
2. Identification for conductors and communication and control cable.
3. Underground-line warning tape.
4. Warning labels and signs.
5. Instruction signs.
6. Equipment identification labels.
7. Miscellaneous identification products.

1.3 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. Wire and cable labeling scheme.

1. Submit table detailing wire scheme for each control circuit installed under this Contract.
2. Table shall include each terminating end point with terminal number, signal type, conduit number, and a unique wire identification number.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and ANSI C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.145.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring

diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

PART 2 - PRODUCTS

2.1 RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Color for Printed Legend:

1. Power Circuits: Black letters on an orange field.
2. Legend: Indicate system or service and voltage, if applicable.

C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

2.2 CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

C. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and polyester or nylon tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.3 UNDERGROUND-LINE WARNING TAPE

A. Description: Permanent, bright-colored, continuous-printed, polyethylene tape.

1. Not less than 6 inches wide by 4 mils thick.
2. Compounded for permanent direct-burial service.
3. Embedded continuous metallic strip or core.
4. Printed legend shall indicate type of underground line.

2.4 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.

C. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.5 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. in. and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.6 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

PART 3 - EXECUTION

3.1 APPLICATION

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A: Identify with orange self-adhesive vinyl label.

B. Power-Circuit Conductor Identification: For conductors No. 1/0 AWG and larger in vaults, pull and junction boxes, manholes, and handholes use color-coding conductor tape and marker tape. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.

C. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use marker tape. Identify each ungrounded conductor according to source and circuit number.

D. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and Operation and Maintenance Manual.

E. Control Circuit Point to Point Identification and Labeling:

1. Wire label to contain unique wire number and shall identifying each terminating end point.
2. Wire Label shall be applied at each end of each circuit, and shall include:

a. Each terminating end point with terminal number.
b. Signal type (DI, DO, AI or AO)
c. Conduit number
d. A unique wire identification number.

F. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable..

G. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply self-adhesive warning labels. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.

1. Equipment with Multiple Power or Control Sources: Apply to door or cover of equipment including, but not limited to, the following:

a. Power transfer switches.
b. Controls with external control power connections.

2. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.

H. Instruction Signs:

1. Operating Instructions: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
2. Emergency Operating Instructions: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.

I. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where 2 lines of text are required, use labels 2 inches high.
b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

2. Equipment to Be Labeled:

a. Panelboards, electrical cabinets, and enclosures.
b. Transformers.
c. Disconnect switches.
d. Enclosed circuit breakers.
e. Motor starters.
f. Push-button stations.
g. Power transfer equipment.
h. Power-generating units.
i. Voice and data cable terminal equipment.
j. Monitoring and control equipment.

3.2 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach nonadhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

F. System Identification Color Banding for Raceways and Cables: Each color band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

G. Color-Coding for Phase Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.

1. Color shall be factory applied or, for sizes larger than No. 10 AWG if authorities having jurisdiction permit, field applied.
2. Colors for 208/120-V Circuits:

    a. Phase A: Black.
    b. Phase B: Red.
    c. Phase C: Blue.

3. Colors for 480/277-V Circuits:

    a. Phase A: Brown.
    b. Phase B: Orange.
    c. Phase C: Yellow.

4. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

H. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trenchexceeds 16 inches overall.

END OF SECTION

SECTION 262816

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Nonfusible switches.
2. Molded-case circuit breakers (MCCBs).
3. Enclosures.

1.3 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

C. Field quality-control reports.

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

D. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NFPA 70.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
2. Altitude: Not exceeding 6600 feet.

1.6 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.

3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.
5. Approved equal.

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.2 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.
5. Approved equal.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

D. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application.

2.3 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Damp or Wet Locations: NEMA 250, Type 4X
3. Hazardous Locations: UL Listed for Area of Classification
4. Outdoor: NEMA 250, Type 4X.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Comply with NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Division 16 Section "Electrical Identification."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

    a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
    b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.
    c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges.

END OF SECTION

SECTION 263524

PUMP CONTROL PANEL

PART 1 - GENERAL

1. SUMMARY

A. The Pump Control Panel shall be provided by the Pump Provider for a complete and coordinated system.

B. This Section includes the design, supply and installation of all hardware and software products required to provide a complete and fully functional pump control system as shown on the Contract Drawings and/or herein specified.

C. Design the Pump Control Panel and field wiring interfaces required to implement the control equipment.

1. All control panels shall be designed and manufactured in accordance with UL 508A, Standard for Industrial Control Panels, and NFPA 79, Electrical Standard for Industrial Machinery.
2. All components shall be UL recognized.

D. Furnish, Install and Test:

1. Pump Control Panel, Programmable Logic Controller, enclosures and appurtenant equipment.

2. Software products, interface cables and related products.

3. Data communications equipment, materials and software required to interface the new pump control equipment with a cellular network.

4. Relays, intrinsically safe relays, signal splitters or other devices required to condition input and output field signals for the control equipment.

E. Connect and test all input and output field wiring to and from the control equipment.

F. Provide all manufacturer's services required for installation, startup, calibration, inspection, and training.

2. SYSTEM DESCRIPTION

A. Pump Control Panel and appurtances shall be placed in service in each pumping station as indicated in other specification sections and shown on the drawings.

1. One (1) Pump Control Panel that includes soft starts, TVSS, PLC system, cellular autodialer, circuit breakers, pump protection relays and accessories for a complete and operational system.

B. Provide an extended manufacturer's warranty on all products and equipment to remain in effect for not less than one year after the successful completion of the reliability acceptance tests.

3. SUBMITTALS

A. Submit one binder of catalog cutsheets for equipment common to multiple locations, and submit a separate binder of panel drawings, data and field wiring diagrams for each of the separate locations.

B. Submit the following information involving proposed hardware for the control system:

1. A detailed written description of the control system outlining the purpose and capabilities of each component.

2. Catalog information, shop drawings, and descriptive literature for each component of the control system.

3. Shop drawings and catalog cuts for all panels and enclosures.

C. Submit complete detailed shop drawings, working drawings and descriptive literature for control panel equipment, cabinets, and components. As a minimum the shop drawings and working drawings shall include the following:

1. Bill of Materials

2. Power load calculations verifying capacity of power supplies to carry the panel load.

a. Provide a minimum of 20% spare capacity on DC power supplies.

3. Heat rise calculation of each enclosure.

4. Front panel, back panel and panel schematic wiring diagrams.

a. Submit detailed drawings showing proposed arrangement of equipment within each enclosure, proposed locations of all equipment and enclosures, and proposed arrangement of all conduits and conductors that will enter each enclosure.

4. DELIVERY, STORAGE, AND HANDLING

A. Materials and equipment shall be boxed, crated or otherwise completely enclosed and protected during shipment, handling, and storage. Such boxes, crates or protection shall be clearly labeled with manufacturer's name, brand or model designation, and type or grade. Complete packing lists and bills of materials shall be included with each shipment. Each item of equipment shall be tagged or marked with the same identification number or mark as shown on the packing lists and bills of materials.

B. Store and handle all equipment in accordance with the manufacturer's recommendations.

PART 2 - PRODUCTS

1. PUMP CONTROLLER

A. The Pump Controller shall be capable of the following:

1. The Controller shall control up to five pumps to perform liquid level control.

2. The device must be capable of controlling any mix of constant speed and variable speed pumps

3. The device must be capable of controlling any mix of constant speed and variable speed pumps

4. The controller shall not require an external power supply or any external I/O modules to be a fully functioning unit. Analog inputs (4-20mA) with zero and span adjustments shall be provided for the wet-well level inputs.

5. Relay outputs shall be provided as standard for high and low level alarms and for the control of up to four pumps. Up to four isolated analog outputs (4-20mA) shall be available as an option, for VFD speed control when needed. Up to four isolated analog inputs (4-20mA) inputs shall also be available as an option, for use when needed as telemetry inputs.

6. The controller shall have a minimum of 18 discrete inputs. The inputs shall be transient protected and be programmable for the following functions

a. Pump disable with HOA in OFF, or pump fault

b. External Alternator Selector Switch

c. All pump disable – for connection to Phase Monitor

d. Limit number of pumps, called to run, while on emergency power

e. Alternation by External Time Clock

f. Freeze wet well level during a bubbler tube purge

g. Call pump last – for connection to VFD/Bypass logic

h. Pump disable upon low level – for connection to low level float switch

i. Float switch backup

7. Troubleshooting features shall include a fault indicator on the front of the unit and retrievable fault codes.

8. The controller shall remember which pump was in the lead position during a power outage.

9. Pump disable discrete inputs shall cause the alternator to skip over disabled pumps.

10. The controller shall have a level offset parameter to enable the transducer or conductance level probe to be placed off the bottom of the wetwell, while maintaining an accurate representation of the wetwell depth.

11. The controller shall be able to perform float back-up using from 2 to 7 floats.

12. The controller shall be powered off of a 120VAC DIN-Rail Mounted Uninterruptable Power Supply to allow controller to continue running in the event of power loss.

13. The control shall have an Ethernet port with the following Protocols

    a. Modbus TCP

    b. Modbus RTU

B. Control Operation:

1. There are two submersible transducers in the wet well, two floats, and one transducer to monitor bay water level. Each transducer will be monitored by a precision digital meter with relays. If one of the wet well transducers goes below 4mA, then the second transducer will take over the wet well level monitoring and an alarm will be sent out through the cellular autodialer. If the second transducer should fall below 4mA, an alarm will be sent out through the cellular autodialer

and the two floats will act as an emergency backup. The bay transducer will monitor the Bay water level and will stop all pumping if the level in the Bay is above the selected flood level.

2. There will be one PLC System: The PLC will control all of the sump pumps and stormwater pumps. There will be five (5) stormwater pumps at the L. Street, Island Avenue, Eighth Avenue, 22nd Avenue and Eisenhower Avenue pump stations. The controls at each location shall be arranged such that no more than four (4) stormwater pumps can run at the same time. One level signal will be sent to the PLC. If one transducer fails, the level will switch to the second transducer.

3. Float Backup:

   a. If the controller does not start the pumps and the level rises to activate the Float Switch FR2 (on level), FR2 will energize a relay and start TD timing. The relay contact will latch coil and TD coil on until the level recedes to close Float FR1. FR2 relay will start Pump 1 if H-O-A:1 is in Auto. TD will start Pump 2 if H-O-A:2 is in Auto. TD will flash the alarm light or send remote contact of High-High Level alarm.

   b. If the levels in the well drops to activate the Low Level Float, both pumps will stop. Both pumps will stop for either the floats or the controller if the low level float is activated.

2. EQUIPMENT ENCLOSURES

A. Floor Mounted Enclosures

1. The two (2) enclosures shall be a NEMA 4X rated enclosure with two (2) doors manufactured from 304 stainless steel by Hoffman or equal.

2. The enclosures shall be a minimum depth of 24" sized to adequately house all the components.

3. The door gasket shall be foamed in place rubber composition and shall assure a positive weatherproof seal.

4. The door shall open a minimum of 180 degrees.

5. Devices mounted on the external surface of the enclosure shall maintain the NEMA rating of the enclosure.

6. A polished aluminum dead front shall be mounted on a continuous aircraft type hinge, shall contain cutouts for mounted equipment, and shall provide protection of personnel from live internal wiring.

7. Cutouts for breaker handles shall be provided to allow operation of breakers without entering the compartment.

8. The back plate shall be manufactured of 12 gauge sheet steel and be finished with a primer coat and two (2) coats of baked on white enamel.

9. All hardware mounted to the sub panel shall be accomplished with machine thread tapped holes.

10. Sheet metal screws are not acceptable.

11. All devices shall be permanently identified with engraved legends.

12. All hardware mounted to the sub panel shall be accomplished with machine thread tapped holes.

13. All devices shall be permanently identified with engraved legends.

3. MISCELLANEOUS EQUIPMENT

A. INCOMING POWER

1. Terminals

a. Properly sized power terminals shall be supplied in its own section for the bottom feed incoming power supply.

b. These terminals, rated at 65KAIC will tie into the horizontal bus bar.

B. SURGE PROTECTION

1. SPD supplied in NEMA 1 enclosure with a circuit breaker disconnect for installation in the Pump Control Center.

2. Minimum surge current capability (single pulsated) per phase shall be 160kA. L-N 80k, L-G 80k, N-G120k.

3. AC sinewave Tracking Filter with EMI/RFI Filtering up to -50dB from 100kHz to 100MHz.

4. Replaceable fused modules for each phase.

5. LED's to indicate loss of protection.

6. One set of NO/NC dry contacts shall be provided for alarm.

7. 5 year warranty that includes unlimited replacement modules.

C. ALARM SYSTEM

1. 120VAC Alarm Light

a. The alarm light shall be a weatherproof-shatterproof red light fixture with a 40 watt bulb to indicate alarm conditions.

b. The alarm light shall be turned on by the alarm level.

2. Alarm Horn

a. The alarm horn shall be mounted on the exterior of the cabinet.

b. The alarm horn shall provide a signal of not less than 90db at 10 feet.

c. An alarm silence switch shall deactivate the alarm horn, however, the alarm light will flash until the alarm condition ceases to exist.

d. At that time the alarm reset function will reset for normal operation.

3. Cellular Autodialer

a. Cellular Transceiver

1) GSM dual Band 850/1900 Digital Transceiver, 15 month factory warranty.

b. Frequency Ranges

1) GSM 850 - Transmit 824-849 MHz, Receive 869-894 MHz

2) GSM 1900 - Transmit 1850-1910 MHz, Receive 1930-1990 MHz

c. Operating Voltages

1) 6.0 VDC

d. Transceiver Battery Backup

1) One (1) 6 Volt 4AH, sealed lead acid battery

a) Externam battery operation equals 8 hour active use, 14 hours standby

e. Antenna

1) Flexible right angle, 2.0 dBi gain dual band dipole antenna, connected with a standard TNC connector

f. Telephone Connection

1) One standard RJ11C connector provided for standard telephone set or autodialer.

g. Environment

1) Operating Temperature Range: -10 degrees C to +50 degrees C

2) Storage Temperature Range: -40 degrees C to +60 degrees C

3) Humidity Range: 5% to 95% (excludes batteries)

h. Enclosure Specifications

1) Molded fiberglass with silicone gaskets NEMA 4X, CSA Type 3, 4 and 5; UL Approved

i. Channels – 16 Channel Autodialer

1) Main Wet Well Transducer Fail
2) Back-Up Wet Well Transducer Fail
3) High-High Level Alarm
4) High Bay Level Alarm
5) Storm Water Pump Common Fault
6) Sump Pump Common Fault
7) Loss of Phase Alarm
8) Panel Intrusion
9) Channels 9-16: Spare

4. Cellular Autodialer shall be 555BCELL-AC-G850/1900 – Cellularm GSM 850/1900

D. MOTOR BREAKERS

1. Heavy Duty 18 KAIC Breakers

a. Motor breakers shall be thermal magnetic rated at 18KAIC minimum, Square D HGL frame.

b. Breakers shall be indicating type, providing on-off-tripped in positions of the handle.

c. They shall be quick make-quick break on manual and automatic operation and have inverse time characteristics

E. BRANCH CIRCUIT BREAKERS

1. Branch Rated Circuit Breakers to be provided for the following equipment in the Control Panel:

   a. Convenience Receptacle
   b. Panel Light
   c. Building Light
   d. Autodialer
   e. Two (2) Spare Breakers

2. Branch Circuit Breakers to be Allen Bradley 1489 Series, or equal.

F. MOTOR STARTERS

1. Soft Starters

   a. The soft start (Schneider Electric - ATS22 Series or equal) shall be designed to operate in an ambient temperature 0°C to 50°C with shorting contactor.

   b. For ambient temperatures between 50°C and 60°C, derate the current by 2% per C above 40°C.

   c. Storage temperature range shall be -25°C to 70°C.

   d. Maximum relative humidity shall be 95% at 50°C, non-condensing.

   e. The soft start shall have an operating voltage range of 208 VAC - 15% to 575 VAC + 10 %, 50/60 Hz.

   f. The starter shall be preset to the following for operation without adjustment in most applications

g. The starter shall be preset to the following for operation without adjustment in most applications

h. Current limitation to 300% of the motor full load current rating

i. Class 10 overload protection

j. A digital keypad shall be utilized configure the operating parameters as required.

k. Output relays shall provide the following status indications:

1) One form A (N.O.) for indication of fault or control of an isolation contactor

2) One form A (N.O.) for indication that torque ramp is complete and current is below 130% motor FLA (End of start) One form A (N.O.) that is programmable.

l. The soft start shall provide phase loss, phase reversal, underload, stall, and jam protection.

m. The integral protective features shall be active even if an external shorting contactor is used to bypass the SCRs during steady state operation.

n. The SCR's shall have a minimum P.I.V. rating or 1800Vac Lower rated SCR's with protection by MOV's are not acceptable.

G. PUMP PROTECTION

1. Phase Monitor

a. A line voltage rated, adjustable phase monitor shall be installed to sense low voltage, loss of power, reversed phasing and loss of a phase.

b. Control circuit shall de-energize upon sensing any of the faults and shall automatically restore service upon return to normal power.

2. Pump Protection Relays

a. One plug in solid state Mini-Cas 120 unit shall be supplied for each pump to monitor the pump for over-temp and leakage.

b. The unit shall have an 11pin, round base to mate with a standard 11 pin socket.

c. The unit shall also be flanged in order to allow deadfront door mounting.

d. The unit shall be powered by 24VAC, 24VDC, or 120VAC. LED indication shall be provided for power on, over-temp, and leakage conditions.

e. An over-temp reset push-button shall be provided to allow reset of the unit.

f. The sensor input circuitry is to contain both hardware and software filters to provide noise immunity, as well as sensor input short circuit protection.

g. The Mini-Cas 120 unit shall be model 14-407129, as supplied by Flygt Corporation.

H. PANEL INTRUSTION SWITCH

1. Magnetic Reed Switch to detect intrusion on Control Panel Doors

2. The intrusion switch shall be Sensaphone Magnetic Reed Switch P/N: FGD-00006 or approved equal.

I. SURGE PROTECTED OUTLET

1. Duplex Outlet with Surge Suppression
2. 20Amps
3. Hubbell, 20A, HBL5360ISA or approved equal.

J. PANEL LIGHT WITH AUTOMATIC SWITCH

1. Light to be installed on the inside of Control Panel.

2. Light shall be LED low power light kit.

3. Operating Voltage: 120VAC

4. Operating Temperature: -22 to +140°F

5. 5-Watt Power Consumption

6. Switch included to turn light on when Panel door is opened.

7. Panel Light shall be Panelite by Hoffman Enclosure, or approved equal.

K. SELECTOR SWITCHES, PUSHBUTTONS, CONTROLS

1. NEMA 4 oil-tight Hand-Off-Automatic pump switches.

2. NEMA 4 oil-tight Push-To-Test pilot run, failure and level indicators.

3. Elapse time meters for each pump.

4. Alternation w/ automatic and manual selectors.

5. Phase Monitor 12-pin two double pole, double throw contacts plug-in w/ time delay.

6. Wire numbers through-out the Pump Control Center.

7. All alarms will be provided with dry contacts for remote monitoring.

8. All components shall have identification tags.

PART 3 – EXECUTION

1. INSTALLATION

A. Install Pump Control Panel in accordance with the configuration shown on the Contract Drawings and in accordance with manufacturer's standards.

B. All materials required for installation of pumps shall be on site before starting the work required.

C. Inspect material for defects in workmanship and material. Repair equipment which is defective at no cost to Owner.

D. The Contractor shall furnish and install all material and hardware required to supply a complete and functional installation.

2. FIELD TESTING

A. Test the hardware and software using simulated inputs and outputs prior to installation.

1. The Contractor shall retain the services of the Pump Control Panel provider to provide detailed test plans and procedures to demonstrate and document that all equipment has been properly installed and configured for a full functional system which meets all contract requirements.

B. Test the complete installed system by demonstrating that all signals are properly received and sent and that the control system operates as intended.

3. CLEANING AND TOUCH-UP PAINTING

A. The premises shall be kept free from accumulation of waste material and rubbish. Upon completion of work, the Contractor shall remove materials, scraps, and debris from the site. Scratches, scrapes, or ships in interior or exterior surfaces of devices shall be touched up with finishes matching as nearly as possible the type and color of the original finish.

B. All material, equipment, and workmanship shall be subject to inspection by the Engineer or his representatives. In the event the Engineer finds the materials or workmanship not in accordance with these Contract Documents, the work or materials shall be removed and replaced, or corrected, by and at the expense of the Contractor.

4. TRAINING

A. Provide all on-site and off-site training as specified in these contract specifications.

END OF SECTION 17100

BORING LOGS FOR THIS CONTRACT ARE NOT REPRINTED HERE DUE TO SIZE.