

**PROJECT MANUAL AND SPECIFICATIONS
FOR
REPAIR AND PREVENTATIVE MAINTENANCE**

of
FIVE PARKING GARAGES

for the
**CITY OF ST. LOUIS
(St. Louis, MO)**

DESMAN Project No. 50-19127/8

Prepared For

**Mr. Brian Early
421 S. 10th Street, St. Louis MO**

June, 2019

Drawings & Specifications Prepared by:

DESMAN
Design Management

20 N Clark St
4th Floor
Chicago, IL 60602
312-263-8400
www.DESMAN.com

NEW YORK ☐ CHICAGO ☐ WASHINGTON, D.C. ☐ BOSTON ☐
CLEVELAND ☐ HARTFORD

TABLE OF CONTENTS

Project Number: 50-19127/8

Project Name: City of St. Louis Five Garages Repair and Preventive Maintenance

DIVISION 00 – PROCUREMENT and CONTRACT REQUIREMENTS

Section Number	Title	Number of Pages
00 01 10	Table of Contents	2
00 11 12	General Conditions.....	4
00 42 16	Proposal Form - Base Bid (PF)	16

DIVISION 01 - GENERAL REQUIREMENTS

01 10 00	Summary of Work	4
01 21 00	Allowances	2
01 22 00	Unit Prices	5
01 23 00	Alternates.....	2
01 25 00	Substitution Procedures.....	4
01 25 01	Substitution form	4
01 31 00	Project Coordination	4
01 33 00	Submittal Procedures.....	8
01 35 13	Special Procedures - Cutting & Patching	6
01 42 00	Reference Standards and Definitions	8
01 45 00	Quality Control Services.....	4
01 50 00	Temporary Facilities & Controls.....	9
01 60 00	Materials & Equipment (Product Requirements)	5
01 78 00	Project Closeout (Execution and Requirements)	6
01 78 30	Warranties and Bonds.....	3

DIVISION 2 – EXISTING CONDITIONS

02 20 00	Surface Lot Earthwork.....	7
02 41 00	Selective Demolition	5
02 25 00	Asphalt Paving.....	9

DIVISION 3 - CONCRETE

03 20 00	Concrete Reinforcement	5
03 30 00	Concrete Work	13
03 31 24.19	Concrete Repair Using High-Strength, Fast Setting Materials	3
03 37 15	Concrete Repair Using Trowel Applied Mortar.....	2

Section Number	Title	Number of Pages
DIVISION 07		
<u>THERMAL & MOISTURE PROTECTION</u>		
07 18 16	Traffic Bearing Waterproofing Membrane.....	15
07 19 00	Clear Penetrating Concrete Sealers.....	7
07 92 00	Sealants and Caulking	4
07 92 23	Pressure Epoxy Injection.....	5
07 95 00	Expansion Joint Seals	5
<u>DIVISION 09 - FINISHES</u>		
09 90 00	Painting	9
09 90 14	Pavement Marking	4
 End Section		
00 01 10 Table of Contents		

GENERAL CONDITIONS

A. OWNER

Treasurer's Office
City of St. Louis
421 S. 10th Street
St. Louis, Missouri 63102

Contact:
Mr. Brian Earley, Facilities Manager
Earleyb@stltreasurer.org
O: 314-589-6728

B. ENGINEER

DESMAN
20 North Clark Street, 4th Floor
Chicago, Illinois 60602

Contact:
Mr. Kyle Klepitch, Project Manager
kklepitch@Desman.com
O: 312-263-8400
C: 312-833-0467

C. INVITATION TO BID

1. You have been selected to bid for the "City of St. Louis Five Garages Repair and Preventive Maintenance", located in St. Louis, Missouri in accordance with this Project Manual prepared by Desman Associates dated June 18, 2019.
2. A pre-bid meeting has been scheduled on July 1, 2019 at 11:00 AM Central Daylight Time at the Kiel Parking Administrative Office, 1515 Clark Avenue, St. Louis, Missouri 63103. All contractors who are interested in bidding shall attend the pre-bid meeting. Based upon this meeting or should contractor's request for information warrant, an addenda may be issued which supersedes this bid document.
2. All questions related to the project should be directed Brian Earley and Kyle Klepitch. All questions are due by 3:00 PM Central Daylight Time on July 15th, 2019.
3. Bids are due in a sealed envelope by 3:00 PM Central Daylight Time on July 19th, 2019 and sent to the attention of Mr. Brian Earley, Facilities Manager, at the addressed listed above.

D. SCOPE OF WORK

1. The scope of this work generally consists of concrete repairs and waterproofing as described in the bid proposal form prepared by DESMAN.

E. INSTRUCTION TO BIDDERS

1. Proposal Form to be completed and signed by an authorized representative of the Bidder.
2. By executing the Bid, the undersigned bidder acknowledges that they have inspected the premises, familiarized themselves with the local conditions under which the work will be performed and correlated their observations with the requirements of the Contract Documents.

F. INSURANCE REQUIREMENTS

Contractor shall cause to be placed and kept in force **all of the following**, at its sole cost and expense:

Workers' Compensation Insurance consistent with...

- statutory limits covering all employees, so as to provide statutory benefits as required by the laws of the State of Missouri;

Employer's Liability with...

- a minimum of \$1,000,000 per each occurrence;
- a minimum of \$1,000,000 for disease, within policy limit;
- a minimum of \$1,000,000 for disease, each employee;

Commercial General Liability Insurance with...

- combined single limits of \$2,000,000 per occurrence; and
- \$4,000,000 aggregate (including contractual liability, personal injury protection, complete operations coverage);

Auto Liability with...

- a per claim minimum of \$1,000,000;

Property Insurance to...

- cover the amount equal to the replacement of costs of all such tools and equipment located on-site;

The policies shall be issued by companies of recognized financial standing authorized to issue such insurance in the State of Missouri and be on file with the Parking Administration Office, and...

- shall name the Owner as additional insured: Treasurer's Office, City of St. Louis

Send to: Earleyb@stltreasurer.org, or

Mr. Brian Earley
Treasurer's Office
City of St. Louis
421 S. 10th Street
St. Louis, Missouri 63102

F. CONTRACTOR'S DUTIES

1. Provide and pay for:
 - a. Labor, materials, and equipment
 - b. Water, heat, and other utilities required for construction.
 - c. All facilities and services necessary for proper execution and completion of work.
 - d. Certificates of Insurance to be delivered simultaneously with executed Contract.
 - e. Legally required sales, consumer and use taxes.
2. Secure and pay for, as necessary and applicable:
 - a. Permits and plan review fees
 - b. Governmental fees
 - c. License and bonds
3. All work to be performed in accordance with all local codes applicable to the City of St. Louis and the State of Missouri.
4. All work to be performed in accordance with the requirements of the latest edition of the Williams Setiger Occupational Safety and Health Act (OSHA).
5. Contractor is solely responsible for all ways and means of the work.
6. Contractor to notify Engineer immediately of any observed variance between existing conditions and the Contract Documents.

G. CONTRACTOR GUIDELINES

The Treasurer's Office, City of St. Louis, often use the services of independent contractors. Therefore, the following guidelines must be followed:

1. The Minority Business Enterprise (MBE) goal and the Women Owned Business Enterprise (WBE) goals for Letting are "Maximum Utilization of MBE and WBE." Maximum Utilization is deemed to have been met when any subcontracting or supplies equal a minimum of 25% MBE plus 5% WBE. M/WBE participation level is to be based on the base bid. The "M/WBE GUIDELINES FOR PUBLIC WORKS CONTRACTS" and "M/WBE INDEX AND SUBMISSION INSTRUCTIONS" can be found at <http://www.stlouis-mo.gov/government/departments/treasurer/documents/general-conditions.cfm>. Additionally, Executive Order Nos. 28 and 47 as issued by the Mayor of St. Louis instituting the M/WBE Guidelines and Policies at <http://www.stlouis-mo.gov/government/departments/treasurer/documents/general-conditions.cfm>.
2. The prevailing wage scale is per the "ANNUAL WAGE ORDER No. 19" as issued by the Missouri Division of Labor Standards. A copy of this standard is attached at <http://www.stlouis-mo.gov/government/departments/treasurer/documents/general-conditions.cfm>.
3. Contractor shall provide a Payment Bond and Performance and Maintenance Bond for the value of the contract.
4. Contracted work requires prior approval, phasing, and coordination by the construction administrator.
5. Contractors are required to provide a list of hazardous substances and material Safety Data Sheets (MSDS) to the management office prior to commencing work.
6. Contractor must provide a certificate of insurance to the Parking Administration Office prior to commencement of work. The certificate holder and additionally insured must be appropriately completed.
7. To prevent disruptions to parking operations, work that results in excess noise and/or odors must be coordinated with the Parking Administration Office prior to commencing work, i.e., chipping, coring, drilling, welding, staining, and etc. Additionally, a phasing plan is to be provided for approval to the Parking Administration Office prior to commencement of the work.
8. Contractors may not park in loading zones except for loading and unloading. Contractors may not park in the fire lane, handicap parking, visitor parking, driveways, or along curbs or sidewalks.

9. The Parking Administration Office and/or Treasurer's Office must authorize location of any construction dumpster. Contractors are responsible for dumpster debris in and around dumpster.
10. There is no smoking in the garage; contractors may use the designated smoking area as defined by the Parking Administration Office. Evidence of alcohol or drug use by the contractor or its employees, anywhere on the property, is subject to immediate action by management. Contractor and its employees, agents, etc., shall complete work in a professional manner.
11. Contractor is responsible for any damage to existing structure.
12. All construction materials will be neatly stored on the job site. Contractor upon completion of the work will remove excess materials and debris.
13. Contractor shall supply all equipment necessary for the job and the clean-up.

END OF SECTION

PROPOSAL FORM

Submitted by:

Date:

To: **Mr. Brian Earley**, Facilities Manager, City of St. Louis, Treasurer's Office, 421 S. 10th Street, St. Louis, MO 63102, for the

**2019 Repair and Preventive Maintenance
for the
Five Parking Garages
for the
City of St. Louis
St. Louis, Missouri**

that the construction documents dated 6/18/2019 and prepared by DESMAN, 20 North Clark Street, 4th floor, Chicago, Illinois 60602, for the construction of said project and having also received, read, and taken into account, Addenda Nos.:

and likewise having inspected the site of and the conditions affecting and governing the cost and construction of said project, the undersigned hereby proposes to furnish all material and perform all labor, as specified and described in said Specifications and as shown in the plans for the said work, for the Contract Amount of:

SUB-TOTAL FOR BASE BID WORK AT:

NINE NORTH PARKING GARAGE:	\$ _____
ARGYLE PARKING GARAGE:	\$ _____
CENTRAL DOWNTOWN PARKING GARAGE:	\$ _____
KIEL CENTER PARKING GARAGE:	\$ _____
CUPPLES STATION PARKING GARAGE:	\$ _____
TOTAL AMOUNT FOR BASE BID WORK	\$ _____

This Contract Amount is based on quantities as hereinafter listed for the restoration work and the cost of all other items required for the completion of the work. All items of material, labor, supplies, or equipment that are not specifically enumerated for payment as separate items, but which are reasonably required to complete the work as shown on the drawings or as described in the specifications, are considered as subsidiary obligations of the Contractor. No separate measurement or payment is made for them. Unit

prices shall include all charges for overhead, profit, and insurance and shall be applied to net differences in the quantities. Should any mathematical errors be discovered in the preparation of these proposals, the correct extension of the bidder's unit price times the estimated quantity of work will be the basis for computing the true bid figure.

A. NINE NORTH PARKING GARAGE

Unit Price for Base Contract (Work Installed)

1. Project Mobilization and Demobilization including multiphase and/or off-hours work scheduling to meet site constraints of the work in accordance with the scheduling requirements. This item also includes any general or special work permits, licenses, bonds, etc., if any, required to perform the repairs.

Maximum Amount (\$5,000)

LUMP SUM = \$_____

2. Partial depth removal and replacement of top surface horizontal concrete slabs outlined in Details 1&2/R-31. Work includes saw-cutting along the perimeter of squared off area, removal and disposal of materials, surface preparation, cleaning/coating/ supplementing of all exposed steel components, concrete placement, and proper curing. Assume thickness to average 2 ½ inches. This repair can be performed with either cast in place concrete (section 033000) or fast setting concrete (section 033124).

\$_____/SF x 30 SF = \$_____

PRODUCT PROPOSED = _____

3. Rout and fill with sealant concrete floor slab cracks at locations shown on the drawings according to detail 6/R-32. Work includes cleaning the crack of all dust and debris, routing the cracks to ½" by ½" V groove, prime the surfaces and fill the joint with an approved sealant material, and protect the new sealant according the manufacturer's recommendations. See specification section 079200 for approved products.

\$_____/LF x 225 LF = \$_____

PRODUCT PROPOSED = _____

4. Remove and replace existing deteriorated cove joints at locations shown on the drawings according to detail 6/R-32. Work includes removing the existing sealant, cleaning the joint of all dust and debris, prime the surfaces and fill the joint with an approved sealant material, and protect the new sealant according the manufacturer's recommendations. See specification section 079200 for approved products.

\$_____/LF x 90 LF = \$_____

PRODUCT PROPOSED = _____

5. Remove and replace existing deteriorated control joint sealants at locations shown on the drawings according to detail 6/R-32. Work includes removing the existing sealant, cleaning the joint of all dust and debris, prime the surfaces and fill the joint with an approved sealant material, and protect the new sealant according the manufacturer's recommendations. See specification section 079200 for approved products.

\$_____/LF x 600 LF = \$_____

PRODUCT PROPOSED = _____

6. Apply a new clear penetrating silane sealer, per specification Section 071900 to all structurally supported accessible levels of the garage (as shown on the drawings, Condominium parking areas are specifically excluded from this bid item) not already or designated to be protected by a waterproofing membrane system. Work includes concrete surface preparation according to the silane sealer manufacturer's requirements and placement of the material according to specifications and detail 2/R-32.

\$_____/SF x 50,000 SF = \$_____

PRODUCT PROPOSED = _____

7. Remove and replace deteriorated portions of existing joint fillers between CMU walls and cast-in-place concrete elements at locations shown on the drawings with new joint filler/sealants of construction similar to and compatible with the existing. The contractor shall submit samples of existing materials retrieved from the repair locations as well as specification data and samples of proposed new materials for Engineer's review and approval prior to start of this work. Work includes removing the existing sealant, cleaning the joint of all dust and debris, prime the surfaces and fill the joint with an approved sealant material, and protect the new sealant according the manufacturer's recommendations.

\$_____/LF x 100 LF = \$_____

8. Restripe all areas of the garage, excluding the Condominium parking areas. Layout is to match the existing striping layout. See specification section 099014 for approved concrete striping products.

LUMP SUM = \$_____

PRODUCT PROPOSED = _____

9. Miscellaneous Items and General Conditions:

Perform any miscellaneous repairs including, but not limited to the following listed, noted on the drawings or in the specifications and not otherwise enumerated in the bid

Bidder's Name

items also including traffic control and temporary signage, supervision, general conditions, dust control, off-hours work if needed, protection of newly installed materials until fully cured, performance of the work in multiple phases in each facility due to the need to minimize disruptions to on-going operations, re-stripping parking areas affected by concrete or waterproofing membrane work.

LUMP SUM = \$ _____

NINE NORTH PARKING GARAGE SUB-TOTAL CONTRACT AMOUNT

\$ _____

B. ARGYLE PARKING GARAGE

Unit Price for Base Contract (Work Installed)

1. Project Mobilization and Demobilization including multiphase and/or off-hours work scheduling to meet site constraints of the work in accordance with the scheduling requirements. This item also includes any general or special work permits, licenses, bonds, etc., if any, required to perform the repairs.

Maximum Amount (\$5,000)

LUMP SUM = \$ _____

2. Partial depth removal and replacement of top surface horizontal concrete slabs outlined in Details 1&2/R-31. Work includes saw-cutting along the perimeter of squared off area, removal and disposal of materials, surface preparation, cleaning/coating/ supplementing of all exposed steel components, concrete placement, and proper curing. Assume thickness to average 2 ½ inches. This repair can be performed with either cast in place concrete (section 033000) or fast setting concrete (section 033124).

\$ _____/SF x 50 SF = \$ _____

PRODUCT PROPOSED = _____

3. Rout and fill with sealant concrete floor slab cracks at locations shown on the drawings according to detail 6/R-32. Work includes cleaning the crack of all dust and debris, routing the cracks to ½" by ½" V groove, prime the surfaces and fill the joint with an approved sealant material, and protect the new sealant according the manufacturer's recommendations. See specification section 079200 for approved products.

\$ _____/LF x 100 LF = \$ _____

PRODUCT PROPOSED = _____

4. Epoxy inject cracks at the locations shown on the drawings or as directed by the engineer according to detail 1/R-62 and specification section 079223. Excess epoxy leakage through the cracks and ports shall be ground smooth upon the completion of the work.

Bidder's Name

\$_____/LF x 50 LF = \$_____

PRODUCT PROPOSED = _____

5. Remove and replace existing deteriorated control joint sealants at locations shown on the drawings according to detail 6/R-32. Work includes removing the existing sealant, cleaning the joint of all dust and debris, prime the surfaces and fill the joint with an approved sealant material, and protect the new sealant according the manufacturer's recommendations. See specification section 079200 for approved products.

\$_____/LF x 500 LF = \$_____

PRODUCT PROPOSED = _____

6. Apply a new clear penetrating silane sealer, per specification Section 071900 to all levels of the garage not already or designated to be protected by a waterproofing membrane system. Work includes concrete surface preparation according to the silane sealer manufacturer's requirements and placement of the material according to specifications and detail 2/R-32.

\$_____/SF x 53,000 SF = \$_____

PRODUCT PROPOSED = _____

7. Recoat existing waterproofing membrane at locations shown on the drawings and according to Detail 4/R-32. Work includes cleaning and surface preparation of the existing waterproofing surface according to the manufacturer's instruction, and install a new Category B waterproofing membrane system top coat according to Section 071816 of the specifications. This item includes all necessary work to provide an acceptable surface condition to the installation contractor of a new waterproofing membrane system and all testing/inspection required by the membrane manufacturer to warrant the recoat.

\$_____/SF x 59,000 SF = \$_____

PRODUCT PROPOSED = _____

8. Provide new two way lane striping at the location shown on the drawings and according to detail 3/R-33. See specification section 099014 for approved concrete striping products.

LUMP SUM = \$_____

PRODUCT PROPOSED = _____

9. Restripe all areas of the garage, layout is to match the existing striping layout. See specification section 099014 for approved concrete striping products.

LUMP SUM = \$_____

Bidder's Name

PRODUCT PROPOSED = _____

10. Miscellaneous Items and General Conditions:

Perform any miscellaneous repairs including, but not limited to the following listed, noted on the drawings or in the specifications and not otherwise enumerated in the bid items also including traffic control and temporary signage, supervision, general conditions, dust control, off-hours work if needed, protection of newly installed materials until fully cured, performance of the work in multiple phases in each facility due to the need to minimize disruptions to on-going operations, re-stripping parking areas affected by concrete or waterproofing membrane work.

LUMP SUM = \$ _____

ARGYLE PARKING GARAGE SUB-TOTAL CONTRACT AMOUNT

\$ _____

C. CENTRAL DOWNTOWN PARKING GARAGE

Unit Price for Base Contract (Work Installed)

1. Project Mobilization and Demobilization including multiphase and/or off-hours work scheduling to meet site constraints of the work in accordance with the scheduling requirements. This item also includes any general or special work permits, licenses, bonds, etc., if any, required to perform the repairs.

Maximum Amount (\$5,000)

LUMP SUM = \$ _____

2. Partial depth removal and replacement of top surface horizontal concrete slabs outlined in Details 1&2/R-31. Work includes saw-cutting along the perimeter of squared off area, removal and disposal of materials, surface preparation, cleaning/coating/ supplementing of all exposed steel components, concrete placement, and proper curing. Assume thickness to average 2 ½ inches. This repair can be performed with either cast in place concrete (section 033000) or fast setting concrete (section 033124).

\$ _____/SF x 70 SF = \$ _____

PRODUCT PROPOSED = _____

3. Removal and replacement of deteriorated vertical/overhead concrete slabs, beams, and columns outlined in Details 3&5/R-31. Work includes , removal and disposal of materials, surface preparation, cleaning/coating/supplementing of all exposed steel components, concrete placement, and proper curing. For this work item, the Contractor can utilize trowel applied repair mortars per Specification Section 033715.

Bidder's Name

\$_____/SF x 20 SF = \$_____

PRODUCT PROPOSED = _____

4. Remove and replace existing deteriorated cove joints at locations shown on the drawings according to detail 6/R-32. Work includes removing the existing sealant, cleaning the joint of all dust and debris, prime the surfaces and fill the joint with an approved sealant material, and protect the new sealant according the manufacturer's recommendations. See specification section 079200 for approved products.

\$_____/LF x 100 LF = \$_____

PRODUCT PROPOSED = _____

5. Remove and replace existing deteriorated control joint sealants at locations shown on the drawings according to detail 6/R-32. Work includes removing the existing sealant, cleaning the joint of all dust and debris, prime the surfaces and fill the joint with an approved sealant material, and protect the new sealant according the manufacturer's recommendations. See specification section 079200 for approved products.

\$_____/LF x 500 LF = \$_____

PRODUCT PROPOSED = _____

6. Replace the Expansion Joint Seal at the location shown on the drawings with a new system in accordance with specification section 079500. Unit price includes all required joint preparation (with the exception of repairs due to delaminations) to achieve written acceptance by materials system manufacturer and complete installation. Contractor is to field verify the joint size and submit it to the engineer for approval. Refer to detail 3/R-32.

\$_____/LF x 30 LF = \$_____

PRODUCT PROPOSED = _____

7. Apply a new clear penetrating silane sealer, per specification Section 071900 to all structurally supported levels of the garage not already or designated to be protected by a waterproofing membrane system. Work includes concrete surface preparation according to the silane sealer manufacturer's requirements and placement of the material according to specifications and detail 2/R-32.

\$_____/SF x 195,000 SF = \$_____

PRODUCT PROPOSED = _____

8. Recoat existing waterproofing membrane at locations shown on the drawings and according to Detail 4/R-32. Work includes cleaning and surface preparation of the existing waterproofing surface according to the manufacturer's instruction, and install a new Category B waterproofing membrane system top coat according to Section 071816 of the

Bidder's Name

specifications. This item includes all necessary work to provide an acceptable surface condition to the installation contractor of a new waterproofing membrane system and all testing/inspection required by the membrane manufacturer to warrant the recoat.

\$ _____/SF x 25,000 SF = \$ _____

PRODUCT PROPOSED = _____

9. Installation of a new waterproofing membrane as outlined in Detail 5/R-32. Membrane installation locations include: Work includes shotblast clean the new and existing concrete surfaces, rout and caulk cracks within the area and install a Category B waterproofing membrane system according to Section 071816 of the specifications. This item includes all necessary work to provide an acceptable surface condition to the installation contractor of a new waterproofing membrane system. Membrane is to be installed over concrete repairs located within areas of existing waterproofing membrane in order to restore the membrane integrity and at locations shown on the drawings.

\$ _____/SF x 30,000 SF = \$ _____

PRODUCT PROPOSED = _____

10. Restripe all areas of the garage; layout is to match the existing striping layout. See specification section 099014 for approved concrete striping products.

LUMP SUM = \$ _____

PRODUCT PROPOSED = _____

11. Miscellaneous Items and General Conditions:

Perform any miscellaneous repairs including, but not limited to the following listed, noted on the drawings or in the specifications and not otherwise enumerated in the bid items also including traffic control and temporary signage, supervision, general conditions, dust control, off-hours work if needed, protection of newly installed materials until fully cured, performance of the work in multiple phases in each facility due to the need to minimize disruptions to on-going operations, re-striping parking areas affected by concrete or waterproofing membrane work.

LUMP SUM = \$ _____

CENTRAL DOWNTOWN PARKING GARAGE SUB-TOTAL CONTRACT AMOUNT \$ _____

D. KIEL CENTER PARKING GARAGE

Unit Price for Base Contract (Work Installed)

Bidder's Name

1. Project Mobilization and Demobilization including multiphase and/or off-hours work scheduling to meet site constraints of the work in accordance with the scheduling requirements. This item also includes any general or special work permits, licenses, bonds, etc., if any, required to perform the repairs.

Maximum Amount (\$5,000)

LUMP SUM = \$ _____

2. Partial depth removal and replacement of top surface horizontal concrete slabs outlined in Details 1&2/R-31. Work includes saw-cutting along the perimeter of squared off area, removal and disposal of materials, surface preparation, cleaning/coating/ supplementing of all exposed steel components, concrete placement, and proper curing. Assume thickness to average 2 ½ inches. This repair can be performed with cast in place concrete (section 033000).

\$ _____/SF x 1,200 SF = \$ _____

PRODUCT PROPOSED = _____

3. Removal and replacement of deteriorated vertical/overhead concrete slabs, beams, and columns outlined in Details 3&5/R-31. Work includes , removal and disposal of materials, surface preparation, cleaning/coating/supplementing of all exposed steel components, concrete placement, and proper curing. For this work item, the Contractor can utilize trowel applied repair mortars per Specification Section 033715.

\$ _____/SF x 50 SF = \$ _____

PRODUCT PROPOSED = _____

4. Rout and fill with sealant concrete floor slab cracks at locations shown on the drawings according to detail 6/R-32. Work includes cleaning the crack of all dust and debris, routing the cracks to ½" by ½" V groove, prime the surfaces and fill the joint with an approved sealant material, and protect the new sealant according the manufacturer's recommendations. See specification section 079200 for approved products.

\$ _____/LF x 1,100 LF = \$ _____

PRODUCT PROPOSED = _____

5. Remove and replace existing deteriorated control joint sealants at locations shown on the drawings according to detail 6/R-32. Work includes removing the existing sealant, cleaning the joint of all dust and debris, prime the surfaces and fill the joint with an approved sealant material, and protect the new sealant according the manufacturer's recommendations. See specification section 079200 for approved products.

\$ _____/LF x 120 LF = \$ _____

PRODUCT PROPOSED = _____

6. Apply a new clear penetrating silane sealer, per specification Section 071900 to all structurally supported levels of the garage not already or designated to be protected by a waterproofing membrane system. Work includes concrete surface preparation according to the silane sealer manufacturer's requirements and placement of the material according to specifications and detail 2/R-32.

\$_____/SF x 270,000 SF = \$_____

PRODUCT PROPOSED = _____

7. Installation of a new waterproofing membrane as outlined in Detail 5/R-32. Membrane installation locations include: Work includes shotblast clean the new and existing concrete surfaces, rout and caulk cracks within the area and install a Category B waterproofing membrane system according to Section 071816 of the specifications. This item includes all necessary work to provide an acceptable surface condition to the installation contractor of a new waterproofing membrane system. Membrane is to be installed over concrete repairs located within areas of existing waterproofing membrane in order to restore the membrane integrity and at locations shown on the drawings.

\$_____/SF x 4,000 SF = \$_____

PRODUCT PROPOSED = _____

8. Recoat existing waterproofing membrane at locations shown on the drawings and according to Detail 4/R-32. Work includes cleaning and surface preparation of the existing waterproofing surface according to the manufacturer's instruction, and install a new Category B waterproofing membrane system top coat according to Section 071816 of the specifications. This item includes all necessary work to provide an acceptable surface condition to the installation contractor of a new waterproofing membrane system and all testing/inspection required by the membrane manufacturer to warrant the recoat.

\$_____/SF x 650 SF = \$_____

PRODUCT PROPOSED = _____

9. Restripe all areas of the garage, affected by waterproofing membrane or silane sealer application, layout is to match the existing striping layout. See specification section 099014 for approved concrete striping products.

LUMP SUM = \$_____

PRODUCT PROPOSED = _____

10. Miscellaneous Items and General Conditions:

Perform any miscellaneous repairs including, but not limited to the following listed, noted on the drawings or in the specifications and not otherwise enumerated in the bid

Bidder's Name

items also including traffic control and temporary signage, supervision, general conditions, dust control, off-hours work if needed, protection of newly installed materials until fully cured, performance of the work in multiple phases in each facility due to the need to minimize disruptions to on-going operations, re-stripping parking areas affected by concrete or waterproofing membrane work.

LUMP SUM = \$ _____

KIEL CENTER PARKING GARAGE SUB-TOTAL CONTRACT AMOUNT

\$ _____

E. CUPPLES STATION PARKING GARAGE

Unit Price for Base Contract (Work Installed)

1. Project Mobilization and Demobilization including multiphase and/or off-hours work scheduling to meet site constraints of the work in accordance with the scheduling requirements. This item also includes any general or special work permits, licenses, bonds, etc., if any, required to perform the repairs.

Maximum Amount (\$5,000)

LUMP SUM = \$ _____

2. Partial depth removal and replacement of top surface horizontal concrete slabs outlined in Details 1&2/R-31. Work includes saw-cutting along the perimeter of squared off area, removal and disposal of materials, surface preparation, cleaning/coating/ supplementing of all exposed steel components, concrete placement, and proper curing. Assume thickness to average 2 ½ inches. This repair can be performed with either cast in place concrete (section 033000) or fast setting concrete (section 033124).

\$ _____/SF x 50 SF = \$ _____

PRODUCT PROPOSED = _____

3. Rout and fill with sealant concrete floor slab cracks at locations shown on the drawings according to detail 6/R-32. Work includes cleaning the crack of all dust and debris, routing the cracks to ½" by ½" V groove, prime the surfaces and fill the joint with an approved sealant material, and protect the new sealant according the manufacturer's recommendations. See specification section 079200 for approved products.

\$ _____/LF x 850 LF = \$ _____

PRODUCT PROPOSED = _____

4. Epoxy inject cracks at the locations shown on the drawings or as directed by the engineer according to detail 1/R-62 and specification section 079223. Excess epoxy leakage through the cracks and ports shall be ground smooth upon the completion of the work.

Bidder's Name

\$_____/LF x 150 LF = \$_____

PRODUCT PROPOSED = _____

5. Remove and replace existing deteriorated cove joints at locations shown on the drawings according to detail 6/R-32. Work includes removing the existing sealant, cleaning the joint of all dust and debris, prime the surfaces and fill the joint with an approved sealant material, and protect the new sealant according the manufacturer's recommendations. See specification section 079200 for approved products.

\$_____/LF x 9,500 LF = \$_____

PRODUCT PROPOSED = _____

6. Remove and replace existing deteriorated control joint sealants at locations shown on the drawings according to detail 6/R-32. Work includes removing the existing sealant, cleaning the joint of all dust and debris, prime the surfaces and fill the joint with an approved sealant material, and protect the new sealant according the manufacturer's recommendations. See specification section 079200 for approved products.

\$_____/LF x 350 LF = \$_____

PRODUCT PROPOSED = _____

7. Replace the Expansion Joint Seal at the location shown on the drawings with a new system in accordance with specification section 079500. Unit price includes all required joint preparation (with the exception of repairs due to delaminations) to achieve written acceptance by materials system manufacturer and complete installation. Contractor is to field verify the joint size and submit it to the engineer for approval. Refer to detail 3/R-32.

\$_____/LF x 65 LF = \$_____

PRODUCT PROPOSED = _____

8. Installation of a new waterproofing membrane as outlined in Detail 5/R-32. Membrane installation locations include: Work includes shotblast clean the new and existing concrete surfaces, rout and caulk cracks within the area and install a Category B waterproofing membrane system according to Section 071816 of the specifications. This item includes all necessary work to provide an acceptable surface condition to the installation contractor of a new waterproofing membrane system. Membrane is to be installed over concrete repairs located within areas of existing waterproofing membrane in order to restore the membrane integrity and at locations shown on the drawings.

\$_____/SF x 38,000 SF = \$_____

PRODUCT PROPOSED = _____

9. Apply a new clear penetrating silane sealer, per specification Section 071900 to all structurally supported levels of the garage not already or designated to be protected by a waterproofing membrane system. Work includes concrete surface preparation according to the silane sealer manufacturer's requirements and placement of the material according to specifications and detail 2/R-32.

\$_____/SF x 205,000 SF = \$_____

PRODUCT PROPOSED = _____

10. Parking Lot Restoration Work (Refer to drawing R-33 for details)

- a. Demolition-Surface milling/removal of existing paving down to the existing granular subgrade. The existing asphalt paving thickness is approximately 3 inches with a surface course thickness nominally 1 ½ inches and binder course nominally 1 ½ inches. This work also includes grading, supplementing and proof rolling the existing subbase as required.

\$_____/SF x 4,500 SF = \$_____

- b. Subgrade Repairs- Upon removal of existing asphalt and proof rolling of exposed subgrade excavate weak areas of subgrade plus 12 inches of native soil. Replace excavated native soil and existing subgrade with new granular fill, grade and compact as specified.

\$_____/CU.YD x 50 CU. YD = \$_____

- c. New Hot Mix Asphalt Concrete (HMAC)- Furnish, tack place and compact the specified Standard MoDOT mix design HMAC 1 ½ inch (compacted thickness) of binder/base course 1 ½ inch (compacted thickness) of surface/wearing course

\$_____/SF x 4,500 SF = \$_____

- d. Cost to furnish, place and compact the additional thickness of specified Standard MoDOT mix design HMAC in areas of weakened subgrade not covered under bid item C at locations designated by engineer.

½ inch (compacted thickness) additional of binder/base course

\$_____/SF x 500 SF = \$_____

½ inch (compacted thickness) additional thickness of surface/wearing course

\$_____/SF x 500 SF = \$_____

- e. Seal asphalt cracks at locations shown on drawings and/or directed by Engineer in field in accordance with specification section 02 50 00.

\$_____/LF x 1,100 LF = \$_____

- f. Sealcoat the entire parking lot area in accordance with specification section 02 50 00.

Bidder's Name

\$_____/SF x 44,000 SF= \$_____

PRODUCT PROPOSED = _____

- g. Restripe all areas of the parking lot affected by sealcoating, layout is to match the existing striping layout. See Section 099014 for approved products.

LUMP SUM = \$_____

PRODUCT PROPOSED = _____

11. Restripe all areas of the garage, affected by waterproofing membrane or silane sealer application, layout is to match the existing striping layout. See specification section 099014 for approved concrete striping products.

LUMP SUM = \$_____

PRODUCT PROPOSED = _____

12. Miscellaneous Items and General Conditions:

Perform any miscellaneous repairs including, but not limited to the following listed, noted on the drawings or in the specifications and not otherwise enumerated in the bid items also including traffic control and temporary signage, supervision, general conditions, dust control, off-hours work if needed, protection of newly installed materials until fully cured, performance of the work in multiple phases in each facility due to the need to minimize disruptions to on-going operations, re-striping parking areas affected by concrete or waterproofing membrane work.

LUMP SUM = \$_____

CUPPLES STATION PARKING GARAGE SUB-TOTAL CONTRACT AMOUNT \$_____

TOTAL AMOUNT FOR BASE BID WORK \$_____

The Bidder agrees to commence work under this contract on or before a date to be specified in a written "Notice to Proceed." The Bidders proposes to complete all base bid work by no later than _____ days from and after the date of "Notice to Proceed."

GENERAL

The Bidder shall, before submitting his Proposal, carefully examine the Contract Documents. He shall inspect in detail the site of the proposed work and familiarize himself with all the local conditions affecting

The Work and the detailed requirements of construction. If his Proposal is accepted, he will be responsible for all errors in his Proposal resulting from his failure or neglect to comply with these instructions or errors in judgment arising from said inspections of the work site and examination of the Contract Documents. The Engineer and/or the Owner will, in no case, be responsible for any losses or change in Contractor's anticipated profits resulting from such failure or neglect.

If the Bidder finds any language in the Contract Documents inconsistent, vague or difficult to understand or interpret, for any reason, he shall request clarification in writing from the Engineer, no later than _____. The Engineer shall issue a written response thereto in writing to all Bidders known to the Owner no later than _____. Unless the Bidder seeks clarification in accordance with this paragraph, he will be deemed to have waived his rights, if any he had, to object to said Contract language as vague or misleading for any reason.

When the Plans and Special Conditions include information pertaining to surface observations, material testing and other preliminary investigations, such information represents only the opinion of the Engineer as to the location, character, or quantity of the materials encountered and is only included for the convenience of the Bidder. The Owner/Engineer assumes no responsibility whatever in respect to the sufficiency or accuracy of the information, and there is no guarantee, either expressed or implied, that the conditions indicated are representative of those existing throughout The Work, or that unanticipated developments may not occur. Said information shall not be considered by the parties as a basis for the Contract award amount. The successful Bidder shall coordinate construction operations through the Owner and the Engineer.

The Bidder agrees that adequate time was allowed the Bidder to inspect all work sites and, unless express written request has been made therefore, the Engineer/Owner will be presumed to have supplied the Bidder all the information and access required to adequately complete the Proposal.

The estimated quantities of work to be done and materials to be furnished under these Specifications are given in the Proposal. All quantities are to be considered as approximate and are to be used only for comparison of bids. The unit and lump sum prices to be tendered by the Bidders are to be for the scheduled quantities as they may be increased or decreased. Payments will be made to the Contractor only for the actual quantities of work performed and materials furnished in accordance with the Plans and Specifications.

The scheduled quantities of work to be done and materials to be furnished may each be increased or diminished or entirely deleted. Such changes may become necessary for the best interest of the project due to circumstances not known at the time the Contract was entered into or arising thereafter. In the event, in the sole judgment of the Engineer or its representative, such changes become necessary, the unit and lump sum prices set forth in the Proposal and embodied in the Contract shall remain valid.

Any extra work beyond the scheduled quantities requiring additional cost to the Owner shall be approved by the Owner prior to taking such action. Claims for extra work which have not been authorized in writing by the Owner and approved by the Engineer will be rejected and the Contractor shall not be entitled to payment thereof.

RIGHT TO REJECT BIDS AND SIGNING CONTRACTS

In submitting this Bid, it is understood that the right is reserved by the Owner to reject any and all bids. If written notice of acceptance of this bid is mailed, telegraphed or delivered to the undersigned within ninety (90) days after the opening thereof, or at any time thereafter before this Bid is withdrawn by written notification, the undersigned agrees to execute and deliver a Contract in the prescribed form. The work

Bidder's Name

shall be commenced by the Successful Bidder on the date specified in the notice after the Contract is executed.

IN WITNESS WHEREOF, the undersigned Bidder has caused its/his signature and seal to be affixed thereto by its duly authorized officers:

This _____ day of _____, 2019

Firm Name _____

By _____

Title _____

Telephone No. _____

Official Address _____

Attest:

Secretary

DIVISION 01
GENERAL REQUIREMENTS

**SECTION 01 10 00
SUMMARY OF WORK**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.02 INTENT OF PLANS AND SPECIFICATIONS

- A. The intent of the Plans and Specifications is to describe The Work which the Contractor undertakes to do, in full compliance with the Contract, and it is understood that the Contractor will furnish, unless otherwise provided in the Contract, all materials, machinery, equipment, tools, supplies, transportation, labor, and all other incidentals necessary to the satisfactory prosecution and completion of the Work. The Plans and Specifications are complementary, and what is called for by either is as binding as if called for by both.
- B. The Special Conditions (if applicable) shall control where in conflict with the Standard Specifications. However, such portions of the Standard Specifications not in conflict or not rendered meaningless by the Special provisions shall remain in full force and effect and be binding on the parties hereto.
- C. In the event the Contractor discovers any error or discrepancy in the Contract Documents, he shall immediately call upon the Engineer for his decision. The Engineer shall then make such corrections and interpretations as may be deemed necessary for the fulfillment of the intent of the Specifications, Special Conditions, Plans and other Contract Documents, as construed by him and his decision shall be final.

1.03 SUMMARY OF WORK

- A. General Mobilization: This work consists of all labor, materials, tools and equipment required for setting-up general plant, storage/staging areas and facilities required by State Laws and City Ordinances; and the general mobilization of equipment required for the completion of the work shown on the Contract Documents. The cost of this item shall include all permits and fees required to perform the project, unless otherwise noted in the Contract Documents, and all expenses for the de-mobilization to a 'broom clean or better' condition after the work has been completed. If a building permit is required, it will be the contractor's responsibility to get the necessary permit to perform the repair work, unless noted otherwise in the documents. This work shall also include the following items:

Reviewing existing electrical plans, if available, and existing conditions for each phase of the work to identify the likelihood of embedded conduits/wiring in the floor slabs. All existing mechanical and electrical services shall be maintained/restored by the Contractor for all work areas.

Provide effective ventilation system to safely remove all dust and hazardous fumes generated from the concrete demolition and any surface treatment applications.

Protection of overhead fire protection system to be maintained in-place, if any.

Protection of existing overhead mechanical and electrical systems, if any, to be maintained in-place.

Removal of loose overhead concrete from the structural concrete members in areas adjoining work locations within the structure prior to the start of any demolition work.

Coordinate and assist the security and property management personnel in respect to the security of commercial spaces during the repair work.

Electricity (power) and water required for the completion of the work shall be furnished by the Owner at existing fixtures or outlets. (The Owner will not provide any temporary pipes, cables, etc.) The contractor shall provide temporary lighting in the work areas, as required, during the restoration work. If the existing capacity is insufficient for the contractor's use, the contractor is responsible for supplementing existing capacity as needed.

- B. Concrete Work: Scattered concrete repairs at locations shown on the drawings
- C. Moisture Protection: Waterproofing membrane repairs and installation, silane sealer application, rout and seal cracks, and replace sealant joints at locations shown on drawings.
- D. Other Work: Other work items as shown on the drawings and listed in the proposal form.
- E. Miscellaneous Items: This work consists of items not otherwise specifically indicated or shown on the plans, but which are ancillary to the specified scope of work. This work shall also include the following:
 - 1. The contractor shall furnish, install, maintain, relocate and remove all signs, barricades, cones, warning lights, and other safety control devices and temporary signage required for the proper execution of the project. The Engineer and the Owner shall review the safety control device placement before work begins and also prior to the beginning of work on any subsequent construction stages. Any deficiencies in the location or arrangement of devices shall be corrected by the contractor before starting work.

2. The miscellaneous work shall include documentation of any non-functioning electrical/mechanical systems within work areas prior to contractor's activities. This documentation should be based on the contractor's condition survey performed immediately prior to the scheduled mobilization. The contractor shall not start the mobilization until the Owner approves the submittal.
3. The miscellaneous work shall also include cleaning and repairs to the existing drainage system in work areas of each parking structure, as required.
4. The miscellaneous work shall also include the dismantling of any existing mechanical, fire protection and electrical installations in the repair areas in order to perform the overhead repairs to the deck soffit, as required. The temporarily dismantled installations shall be reinstalled immediately after the repairs are completed.

At other locations of repair areas, the contractor shall provide adequate protection systems, as required, for the existing mechanical, plumbing and electrical installations to remain in-place.

5. The miscellaneous work shall include re-striping areas affected by waterproofing membrane installation as reasonably necessary.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

**SECTION 01 21 00
ALLOWANCES**

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY:

A In this Section materials and equipment, and in some cases, their installation are shown and specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. Additional requirements, if necessary, will be issued by Change Order.

B. Types of allowances may include the following:

- 1. Lump sum allowances.
- 2. Unit cost allowances.
- 3. Contingency allowance.

1.03 SELECTION AND PURCHASE:

A At the earliest feasible date after Contract award, advise the Architect of the date when the final selection and purchase of each product or system described by an allowance must be completed in order to avoid delay in performance of the Work.

- 1. When requested by the Architect, obtain proposals for each allowance for use in making final selections; include recommendations that are relevant to performance of the work.
- 2. Purchase products and systems as selected by the architect from the designated supplier.

1.04 SUBMITTALS:

A Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

- B. Submit invoices or delivery slips to indicate actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.05 UNUSED MATERIALS:

- A. Return unused materials to the manufacturer or supplier for credit to the Owner, after installation has been completed and accepted.
- B. Where it is not economically feasible to return unused materials for credit and when requested by the Architect, prepare unused material for the Owner's storage, and deliver to the Owner's storage space as directed. Otherwise, proper disposal of excess material is the Contractor's responsibility.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

3.01 INSPECTION:

- A Inspect products covered by an allowance promptly upon delivery for damage or defects.

3.02 PREPARATION:

- A Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related construction activities.

3.03 SCHEDULE OF ALLOWANCE:

END OF SECTION

SECTION 01 22 00
UNIT PRICES

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY:

- A This Section specifies administrative and procedural requirements for unit prices.
 - 1 A unit price is an amount proposed by Bidders and stated on the Bid Form as a price per unit of measurement for materials and/or services that will be added to or deducted from the Contract Sum by Change Order in the event the estimated quantities of Work required by the Contract Documents are increased or decreased.
 - 2 Unit prices include all necessary labor, materials, equipment and incidentals, overhead, profit and applicable taxes.
 - 3. Refer to individual Specification Sections for construction activities requiring the establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- B. Schedule: A "Unit Price Schedule" is included in the Proposal Form and at the end of this Section.
 - 1. Specification Sections referenced in the Schedule contain requirements for materials and methods described under each unit price.
 - 2. Repair Details referenced in the schedule contain requirements for the materials and drawings details described under each unit price.
 - 3. The Owner reserves the right to reject the Contractor's measurement of work-in-place that involves use of established unit prices, and to have this Work measured by an independent surveyor acceptable to the Contractor at the Owner's expense.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

3.01 UNIT PRICE SCHEDULE:

- A Unit prices for all items are as shown in the Bid Forms shall be considered an integral part of this Section.

3.02 PAYMENT FOR EXTRA WORK:

- A Extra work which results from any of the changes as specified and for which no unit price is provided in the Contract, shall not be started until receipt of a written authorization or work order from the Owner, which authorization shall state the items of work to be performed and the method of payment for each item. The Contractor shall not be entitled to payment for work performed without such authorization.
- B If it is practicable to pay for Extra Work on the unit price, or lump sum basis, a fair and equitable sum shall be fixed by agreement of the parties and shown in an Extra Work Order Agreement. Work to be performed directly by the Contractor should be submitted showing a detailed breakdown of labor and material costs to which a 15 percent markup should be added for overhead and profit.
- C Work to be performed by the subcontractor should be submitted showing a detailed breakdown of labor and materials by the subcontractor to which a five percent markup should be added by the Contractor for overhead and profit.
- D When the Owner deems it impracticable to handle any Extra Work on the unit price or lump sum basis, or if agreement of the parties cannot be reached, the work may be ordered done and paid for on a Force Account basis, as follows, unless otherwise stipulated in Owner's front end project documents:
- 1) Labor: The Contractor will be paid the actual amount of wages for all labor and foremen who are actually engaged in such work, to which cost shall be added 10 percent of the sum of such wages. A foreman shall not be used when there are less than three laborers employed, except with the written consent of the Engineer.
 - 2) Welfare and Pension Fund: The Contractor will receive the actual additional amount of contributions paid for regular and uniform health and welfare benefits, pension fund benefits or other benefits, to which 10 percent shall be added, when such amounts are required by collective bargaining agreement or other employment contract generally applicable to the class of labor employed on the Work.
 - 3) Insurance and Tax: The Contractor will receive the actual cost or increase in cost of Contractor's Public Liability and Property Damage insurance, Workmen's Compensation tax, and Social Security tax required for Force Account work. The

Contractor shall furnish satisfactory evidence of the cost or rates paid for such insurance and tax.

- 4) Materials: The Contractor will receive the actual cost for all materials, including freight charges as shown by the original paid invoices, which become an integral part of the finished work, to which shall be added 10 percent of the sum thereof.

The Contractor will be reimbursed for any materials used in the construction of such work as sheeting, falsework, form lumber, etc., which are not an integral part of the finished work. The amount of reimbursement shall be agreed upon in writing before such work is begun, and no percent shall be added. The salvage value of such materials shall be taken into consideration in the reimbursement agreed upon.

- 5) Equipment: For any machinery or special equipment (other than small tools), the use of which has been authorized by the Engineer, the Contractor will be paid as following:

- a) For his own equipment, he will be paid by the monthly rate in accordance with the latest edition of Means Construction Cost Data.
- b) For rental equipment, he will be paid for the actual invoice amount as shown by the original paid invoices.

The equipment shall be of a type and size reasonably required to complete the Extra Work. Compensation will not be allowed for transportation to or from The Work or for the time required for setting up and removing the equipment from The Work or for equipment of a type, size or condition unsuitable for The Work.

3.03 CANCELED ITEMS:

A It shall be in the sole judgment and sole discretion of the Engineer or its representatives to cancel or alter any or all portions of the Contract due to circumstances either unknown at the time of bidding or arising after the Contract was entered into. Should such actions result in elimination or non-completion of any portion of the Contract, payment shall be made as follows:

- 1) For the canceled work completed by the Contractor, payment shall be made to the Contractor for the actual number of units or items completed at the Contract unit or lump sum prices. For canceled work partially completed by the Contractor, payment shall be made to the Contractor for the partially completed units or items as specified in Payment for Extra Work.
- 2) For materials obtained by the Contractor for the unfinished (uncompleted) portions of the canceled work, that have been inspected, tested and accepted by the Engineer, and that have not been incorporated in the canceled work, payment

shall be made to the Contractor for the actual costs for all such materials, including freight charges, as shown by the original paid invoices, to which shall be added 10 percent of the sums thereof. The materials, when so paid for by the Owner, shall become the property of the Owner.

3.04 PARTIAL PAYMENTS:

- A The Engineer shall review the Contractor's pay request for materials in-place and completed, the amount of work performed, and the value thereof, at the Contract Unit Prices. From the amount so determined there shall be deducted ten percent to be retained until after the completion of the entire work to the satisfaction of the Engineer, and the balance certified to the Owner for payment. Notwithstanding the above, after 50 percent or more of the work is completed, the Engineer may certify the remaining partial payments or some of them without any further retention, provided that satisfactory progress is being made in accordance with the Contract requirements and continues to be made, and provided that the amount retained shall not be less than five percent of the total adjusted Contract Price.
- B. If stored matter is lost or damaged prior to incorporation in The Work, the materials shall be replaced or satisfactory repaired at the Contractor's expense. Where payment is made for materials in storage and not yet incorporated into The Work, the Contractor shall provide to the Owner, satisfactory evidence of insurance against loss by damage or disappearance. The Contractor shall pay and be responsible for cost of storage, if any, of said materials.

3.05 ADJUSTMENT OF UNIT PRICES BASED ON ACTUAL QUANTITIES PERFORMED:

- A. For unit price bid items, the quantities as listed in the schedule of bid items are estimates only. The Contractor will be required to complete the work specified in accordance with the Contract and at the quoted unit prices, whether quantities greater or less than the estimated amounts are involved. Should the actual quantity of a unit price pay item vary from the original estimate, the following adjustments to the unit prices shall be made:
 - 1) When the actual quantity of a unit price pay item is less than 75 percent of the original bid estimate, the Contract will be paid an amount equal to the actual quantity times the original unit price plus 10 percent of the difference between this amount and the original estimated quantity times the original unit price for that particular item.
 - 2) When the actual quantity of a unit price pay item is greater than 120 percent of the original bid estimate (based upon prior approval to exceed this quantity by the Owner and Engineer) the Contractor will be paid for the actual work performed in excess of the 120 percent of the original bid estimate at an adjusted unit price of 0.90 times the original unit price. The first 120 percent of the bid estimate quantity will be paid at the original unit price.

- B. The foregoing provisions shall be instituted only after it can be accurately determined that the actual contract sum for the project (exclusive of all change orders unrelated to the original scope of work) will be greater than or less than the original contract sum by more than 5 percent. Until such time that this determination can be made, the Contractor will be paid at his base unit price for actual quantities of work performed. No associated adjustments will be made to lump sum items within the original contract sum due to changes in the actual quantities of unit price items and the Contractor shall not be entitled to an adjusted compensation for unit price items that are deleted in their entirety from the actual scope of work performed.

3.06 SCHEDULE OF UNIT PRICES – SCHEDULE A:

END OF SECTION

**SECTION 01 23 00
ALTERNATES**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

1. Drawings and general Provision of contract, including General Conditions and Division 1 Specification Sections, apply to this Section.

1.02 REQUIREMENTS INCLUDED

1. Identification and Description of Alternate Work.

1.03 RELATED REQUIREMENTS

1. Notice to Bidders.
2. Form of Proposal.

1.04 PROCEDURES

1. Alternates will be exercised at the option of the Owner.
2. Coordinate related work and modify surrounding work as required to complete the work, including changes under each Alternate, when acceptance is designated in Agreement.
3. The work to be executed under this section shall include all labor, material, and equipment to add the following Alternates.
4. The Contractor shall request from their Subcontractors the amounts to be added for their Alternate Bids To Add affecting their section of work.

1.05 SCHEDULE

1. A "Schedule of Alternates" is included at the end of this section. Refer to related specification sections for the requirements for materials and methods necessary to achieve the work described under each Alternate.
2. Include as part of each Alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not mentioned as a part of the Alternate.

3. Award of any, all or none of the Alternates shall not affect the time proposal as established by the Lead Contractor on the Bid Form.

1.06 NOTIFICATION

1. Immediately following the award of the Contract, each Contractor shall prepare and distribute to each of his parties involved, notification of the status of each Alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 SCHEDULE OF ALTERNATES

- A. The Alternate Bids to be included in the General Contractor's work required for this project can be summarized as follows:

END OF SECTION

SECTION 01 31 00
PROJECT COORDINATION

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY:

- A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
 - 1. Coordination.
 - 2. Administrative and supervisory personnel.
 - 3. General installation provisions.
 - 4. Cleaning and protection.
- B. Requirements for the Contractor's Construction Schedule are included in Section "Submittals".

1.03 COORDINATION:

- A. Coordination: Coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.
 - 1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
 - 2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 1. Preparation of schedules.
 2. Installation and removal of temporary facilities.
 3. Delivery and processing of submittals.
 4. Progress meetings.
 5. Project Close-out activities.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
 1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other sections for disposition of salvaged materials that are designated as Owner's property.

1.04 SUBMITTALS

- A. Coordination Drawings: Prepare and submit coordination Drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.
 1. Show the interrelationship of components shown on separate Shop Drawings.
 2. Indicate required installation sequences.
 3. Comply with requirements contained in Section "Submittals."
- B. Staff Names: Within 15 days of Notice to Proceed, submit a list of the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.
 1. Post copies of the list in the Project meeting room, the temporary field office, and each temporary telephone.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.
- G. Install each component during weather conditions and project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
- I. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Consultant for final decision.

3.02 CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessively high or low temperatures.
3. Air contamination or pollution.
4. Water or ice.
5. Solvents.
6. Chemicals.
7. Puncture.
8. Abrasion.
9. Heavy traffic.
10. Soiling, staining and corrosion.
11. Bacteria.
12. Combustion.
13. Electrical current.
14. Unusual wear or other misuse.
15. Contact between incompatible materials.
16. Destructive testing.
17. Misalignment.
18. Excessive weathering.
19. Unprotected storage.
20. Improper shipping or handling.
21. Theft.
22. Vandalism.

END OF SECTION

SECTION 01 33 00
SUBMITTALS

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including;
 - 1. Contractor's construction schedule.
 - 2. Submittal schedule.
 - 3. Daily construction reports.
 - 4. Shop Drawings.
 - 5. Product Data.
 - 6. Samples.
- B. Administrative Submittals: Refer to other Division-1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
 - 1. Permits.
 - 2. Applications for payment.
 - 3. Performance and payment bonds.
 - 4. Insurance certificates.
 - 5. List of Subcontractors.
- C. The Schedule of Values submittal is included in Section "Applications for Payment."
- D. Inspection and test reports are included in Section "Quality Control Services."

1.03 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

- a. The Consultant reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
3. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for re-submittals.
 - a. Allow two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Consultant will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
 - b. If an intermediate submittal is necessary, process the same as the initial submittal.
 - c. Allow two weeks for reprocessing each submittal.
 - d. No extension of Contract Time will be authorized because of failure to transmit submittals to the Consultant sufficiently in advance of the Work to permit processing.
- B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
 1. Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
 2. Include the following information on the label for processing and recording action taken.
 - a. Project name.
 - b. Date.
 - c. Name and address of Consultant.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Number and title of appropriate Specification Section.
 - i. Drawing number and detail references, as appropriate.
- C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Consultant using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.
 1. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements,

including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

2. Transmittal Form: Use AIA Document G 810.

1.04 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by requirements for phased completion to permit Work by separate Contractors and partial occupancy by the Owner prior to Substantial Completion.
- B. Work Stages: Indicate important stages of construction for each major portion of the Work, including testing and installation.
- C. Distribution: Following response to the initial submittal, print and distribute copies to the Consultant, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.
 1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

1.05 SUBMITTAL SCHEDULE

- A. After development and acceptance of the Contractor's construction schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for establishment of the Contractor's construction schedule.
 1. Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.
 2. Prepare the schedule in chronological order; include submittals required during the first 90 days of construction. Provide the following information:
 - a. Scheduled date for the first submittal.
 - b. Related Section number.
 - c. Submittal category.
 - d. Name of subcontractor.
 - e. Description of the part of the Work covered.
 - f. Scheduled date for re-submittal.
 - g. Scheduled date the Consultant's final release or approval.
- B. Distribution: Following response to initial submittal, print and distribute copies to the Consultant's, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.
 1. When revisions are made, distribute to the same parties and post in the same

locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

- C. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.06 DAILY CONSTRUCTION REPORTS

- A. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Consultant at weekly intervals:
 - 1. List of subcontractors at the site.
 - 2. Approximate count of personnel at the site.
 - 3. High and low temperatures, general weather conditions.
 - 4. Accidents and unusual events.
 - 5. Meetings and significant decisions.
 - 6. Stoppages, delays, shortages, losses.
 - 7. Meter readings and similar recordings.
 - 8. Emergency procedures.
 - 9. Orders and requests of governing authorities.
 - 10. Change Orders received, implemented.
 - 11. Services connected, disconnected.
 - 12. Equipment or system tests and start-ups.
 - 13. Partial Completions, occupancies.
 - 14. Substantial Completions authorized.

1.07 SHOP DRAWINGS

- A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.
- B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
 - 1. Dimensions.
 - 2. Identification of products and materials included.
 - 3. Compliance with specified standards.
 - 4. Notation of coordination requirements.
 - 5. Notation of dimensions established by field measurement.
 - 6. Sheet Size: Except for templates, patterns and similar full- size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 36" x 48".
 - 7. Initial Submittal: Submit one correctable translucent reproducible print and one blue- or black-line print for the Consultant's review; the reproducible print will be

- returned.
8. Initial Submittal: Submit 2 blue- or black-line prints for the Consultant's review; one will be returned.
 9. Final Submittal: Submit 3 blue- or black-line prints; submit 5 prints where required for maintenance manuals. 2 prints will be retained; the remainder will be returned.
 10. Final Submittal: Submit 3 blue- or black-line prints and 2 additional prints where required for maintenance manuals, plus the number of prints needed by the Consultant for distribution. 2 prints will be retained; the remainder returned.
 - a. One of the prints returned shall be marked-up and maintained as a "Record Document."
 11. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.
- C. Coordination drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended.
1. Preparation of coordination Drawings is specified in section "Project Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.
 2. Submit coordination Drawings for integration of different construction elements. Show sequences and relationships of separate components to avoid conflicts in use of space.

1.08 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."
1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
 - a. Manufacturer's printed recommendations.
 - b. Compliance with recognized trade association standards.
 - c. Compliance with recognized testing agency standards.
 - d. Application of testing agency labels and seals.
 - e. Notation of dimensions verified by field measurement.
 - f. Notation of coordination requirements.

2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
3. Preliminary Submittal: Submit a preliminary single-copy of Product Data where selection of options is required.
4. Submittals: Submit 2 copies of each required submittal; submit 4 copies where required for maintenance manuals. The Consultant will retain one, and will return the other marked with action taken and corrections or modifications required.
 - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
5. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
 - a. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.
 - b. Do not permit use of unmarked copies of Product Data in connection with construction.

1.09 SAMPLES

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
 1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Consultant's Sample. Include the following:
 - a. Generic description of the Sample.
 - b. Sample source.
 - c. Product name or name of manufacturer.
 - d. Compliance with recognized standards.
 - e. Availability and delivery time.
 2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
 - a. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not

less than 3), that show approximate limits of the variations.

- b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
 - c. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
- 3. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
 - a. Preliminary submittals will be reviewed and returned with the Consultant's mark indicating selection and other action.
- 4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; one will be returned marked with the action taken.
- 5. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.
 - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
 - b. Sample sets may be used to obtain final acceptance of the construction associated with each set.
- B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.
 - 1. Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.
 - a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.10 ARCHITECT'S ACTION

- A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Consultant will review each submittal, mark to indicate action taken, and return promptly.

1. Compliance with specified characteristics is the Contractor's responsibility.
- B. Action Stamp: The Consultant will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:
1. Final Unrestricted Release: Where submittals are marked "Accepted," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
 2. Final-But-Restricted Release: When submittals are marked "Accepted as Noted," that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
 3. Returned for Re-submittal: When submittal is marked "Not Accepted, Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
 - a. Do not permit submittals marked "Not Accepted, Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.
 4. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Action Not Required."

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION

**SECTION 01 35 13
CUTTING AND PATCHING**

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY:

- A. This Section specifies administrative and procedural requirements for cutting and patching.
- B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - 1. Requirements of this Section apply to existing plumbing and electrical installations.
- C. Demolition of selected portions of the building for repair is included in Section "Selective Demolition."

1.03 SUBMITTALS:

- A. Cutting and Patching Proposal: Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:
 - 1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
 - 2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
 - 3. List products to be used and firms or entities that will perform Work.
 - 4. Indicate dates when cutting and patching is to be performed.
 - 5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.

6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.
7. Approval by the Consultant to proceed with cutting and patching does not waive the Consultant's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

1.04 QUALITY ASSURANCE:

- A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
 1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:
 - a. Foundation construction.
 - b. Bearing and retaining walls.
 - c. Structural concrete.
 - d. Structural steel.
 - e. Lintels.
 - f. Timber and primary wood framing
 - g. Structural decking.
 - h. Stair systems.
 - i. Miscellaneous structural metals.
 - j. Exterior curtain wall construction.
 - k. Equipment supports.
 - l. Piping, ductwork, vessels and equipment.
- B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.
 1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
 - a. Shoring, bracing, and sheeting.
 - b. Primary operational systems and equipment.
 - c. Air or smoke barriers.
 - d. Water, moisture, or vapor barriers.
 - e. Membranes and flashings.
 - f. Fire protection systems.
 - g. Noise and vibration control elements and systems.
 - h. Control systems.
 - i. Communication systems.
 - j. Conveying systems.

- k. Electrical wiring systems.
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Consultant's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.
- 1. If possible retain the original installer or fabricator to cut and patch the following categories of exposed Work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:
 - a. Processed concrete finishes.
 - b. Stonework and stone masonry.
 - c. Ornamental metal.
 - d. Matched veneer woodwork.
 - e. Preformed metal panels.
 - f. Window wall system.
 - g. Stucco and ornamental plaster
 - h. Acoustical ceilings.
 - i. Terrazzo.
 - j. Finished wood flooring.
 - k. Fluid-applied flooring.
 - l. Carpeting.
 - m. Aggregate wall coating.
 - n. Wall covering.
 - o. Swimming pool finishes.
 - p. HVAC enclosures, cabinets, or covers.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

3.01 INSPECTION:

- A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

1. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.02 PREPARATION:

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.03 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
 1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.
 1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
 3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.

4. Comply with requirements of applicable Sections of Division-2 where cutting and patching requires excavating and backfilling.
 5. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.
 - a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken containing the patch, after the patched area has received primer and second coat.
 4. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.04 CLEANING

- A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION

SECTION 01 42 00

REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.01 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.

1.02 DEFINITIONS:

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. Indicated: The term "indicated" refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.
- C. Directed: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Consultant," "requested by the Consultant," and similar phrases.
- D. Approve: The term "approved," where used in conjunction with the Consultant's action on the Contractor's submittals, applications, and requests, is limited to the Consultant's duties and responsibilities as stated in the Conditions of the Contract.
- E. Regulation: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. Furnish: The term "furnish" is used to mean "supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations."
- G. Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."
- H. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."
- I. Installer: An "Installer" is the Contractor or an entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term "experienced," when used with the term "Installer," means having a minimum of five previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.
2. Trades: Use of titles such as "carpentry" is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades persons of the corresponding generic name.
3. Assignment of Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in the operations to be performed. The specialists must be engaged for those activities, and assignments are requirements over which the Contractor has no choice or option. Nevertheless, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.
 - a. This requirement shall not be interpreted to conflict with enforcement of building codes and similar regulations governing the Work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.
- J. Project Site is the space available to the Contractor for performance of construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.
- K. Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.03 SPECIFICATION FORMAT AND CONTENT EXPLANATION:

- A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16-Division format and MASTER FORMAT numbering system.
- B. Specification Content: This Specification uses certain conventions in the use of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
 1. Abbreviated Language: Language used in Specifications and other Contract Documents is the abbreviated type. Words and meanings shall be interpreted as appropriate. Words that are implied, but not stated shall be interpolated as the sense required. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and the context of the Contract Documents so indicates.

2. Imperative and streamlined language is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text, for clarity, subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.
 - a. The words "shall be" shall be included by inference wherever a colon (:) is used within a sentence or phrase.

1.04 INDUSTRY STANDARDS

- A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with the standard in effect as of the date of the Contract Documents.
- C. Conflicting Requirements: Where compliance with two or more standards is specified, and the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different, but apparently equal, and uncertainties to the Consultant for a decision before proceeding.
 1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for the context of the requirements. Refer uncertainties to the Consultant for a decision before proceeding.
- D. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with the Contract Documents.
 1. Where copies of standards are needed for performance of a required construction activity, the Contractor shall obtain copies directly from the publication source.
- E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction, or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

- F. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in Contract Documents, are defined to mean the associated names. Names and addresses are subject to change and are believed to be, but are not assured to be, accurate and up to date as of date of Contract Documents.

AA Aluminum Association
900 19th St., NW, Suite 300
Washington, DC 20006 (202) 862-5100

AASHTO American Association of State Highway
and Transportation Officials
444 North Capitol St., Suite 225
Washington, DC 20001 (202) 624-5800

ACI American Concrete Institute
P.O. Box 19150
Detroit, MI 48219 (313) 532-2600

ACIL American Council of Independent Laboratories
1725 K St., NW
Washington, DC 20006 (202) 887-5872

AI Asphalt Institute
P.O. Box 14052
Lexington, KY 40512-4052 (606) 288-4960

AIA American Institute of Architects
1735 New York Ave., NW
Washington, DC 20006 (202) 626-7300

AISC American Institute of Steel Construction
One East Wacker Drive Suite 700
Chicago, IL 60601 (312) 670-2400

APA American Plywood Assoc.
P.O. Box 11700
Tacoma, WA 98411 (206) 565-6600

ARMA Asphalt Roofing Manufacturers Assoc.
6288 Montrose Rd.
Rockville, MD 20852 (301) 231-9050

ASC Adhesive and Sealant Council
1627 K Street, NW, Suite 1000
Washington, DC 20006 (202) 452-1500

ASPE American Society of Plumbing Engineers

3617 Thousand Oaks Blvd., Suite 210
Westlake, CA 91362 (805) 495-7120

ASTM American Society for Testing and Materials
1916 Race St.
Philadelphia, PA 19103 (215) 299-5400

AWS American Welding Society
550 LeJeune Road, NW
P.O. Box 351040
Miami, FL 33135 (305) 443-9353

BANC Brick Association of North Carolina
P.O. Box 13290
Greensboro, NC 27415-3290 (919) 273-5566

BHMA Builders' Hardware Manufacturers Assoc.
355 Lexington Ave., 17th Floor
New York, NY 10017 (212) 661-4261

BIA Brick Institute of America
11490 Commerce Park Drive, Suite 300
Reston, VA 22091 (703) 620-0010

CRSI Concrete Reinforcing Steel Institute
933 Plum Grove Rd.
Schaumburg, IL 60173 (847) 517-1200

EJMA Expansion Joint Manufacturers Assoc.
25 N. Broadway
Tarrytown, NY 10591 (914) 332-0040

HPMA Hardwood Plywood Manufacturers Assoc.
1825 Michael Farraday Drive
P.O. Box 2789
Reston, VA 22090 (703) 435-2900

IEEE Institute of Electrical and
Electronic Engineers
345 E. 47th St.
New York, NY 10017 (212) 705-7900

NAPA National Asphalt Pavement Assoc.
Calvert Building, Suite 620
6811 Kenilworth Ave.
Riverdale, MD 20737 (301) 779-4880

NCMA National Concrete Masonry Assoc.

P.O. Box 781
Herndon, VA 22070 (703) 435-4900

NEC National Electric Code (from NFPA)

NECA National Electrical Contractors Assoc.
7315 Wisconsin Ave.
Bethesda, MD 20814 (301) 657-3110

NFPA National Fire Protection Assoc.
One Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101 (617) 770-3000

NPCA National Paint and Coatings Assoc.
1500 Rhode Island Ave., NW
Washington, DC 20005 (202) 462-6272

NRCA National Roofing Contractors Assoc.
One O'Hare Centre
6250 River Road, Suite 8030
Rosemont, IL 60018 (708) 318-6722

PCA Portland Cement Assoc.
5420 Old Orchard Road
Skokie, IL 60077 (847) 966-6200

PCI Prestressed Concrete Institute
175 W. Jackson Blvd.
Chicago, IL 60604 (312) 786-0300

PDI Plumbing and Drainage Institute
c/o Sol Baker
1106 W. 77th St., South Dr.
Indianapolis, IN 46260 (317) 251-6970

RMA Rubber Manufacturers Assoc.
1400 K St., NW
Washington DC 20005 (202) 682-4800

SSPC Steel Structures Painting Council
4400 Fifth Ave.
Pittsburgh, PA 15213 (412) 268-3327

WRI Wire Reinforcement Institute
1760 Reston Parkway, Suite 403
Reston, VA 22090 (703) 790-9790

- G. Federal Government Agencies: Names and titles of federal government standard or Specification producing agencies are often abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard or Specification producing agencies of the federal government. Names and addresses are subject to change but are believed to be, but are not assured to be, accurate and up to date as of the date of the Contract Documents.

CE Corps of Engineers
(U.S. Department of the Army)
Chief of Engineers - Referral
Washington, DC 20314 (202) 272-0660

CFR Code of Federal Regulations
Available from the Government Printing Office
N. Capitol St. between G and H St. NW
Washington, DC 20402 (202) 783-3238
(Material is usually first published
in the "Federal Register")

CPSC Consumer Product Safety Commission
5401 Westbard Ave.
Bethesda, MD 20816 (800) 638-2772

CS Commercial Standard
(U.S. Department of Commerce)
Government Printing Office
Washington, DC 20402 (202) 377-2000

DOC Department of Commerce
14th St. and Constitution Ave., NW
Washington, DC 20230 (202) 377-2000

DOT Department of Transportation
400 Seventh St., SW
Washington, DC 20590 (202) 366-4000

EPA Environmental Protection Agency
401 M St., SW
Washington, DC 20460 (202) 382-2090

FAA Federal Aviation Administration
(U.S. Department of Transportation)
800 Independence Ave., SW
Washington, DC 20590 (202) 366-4000

NIST National Institute of Standards and Technology
(U.S. Department of Commerce)
Gaithersburg, MD 20899 (301) 975-2000

OSHA Occupational Safety and Health Administration
(U.S. Department of Labor)
Government Printing Office
Washington, DC 20402

(202) 523-6091

PS Product Standard of NBS
(U.S. Department of Commerce)
Government Printing Office
Washington, DC 20402

(202) 783-3238

1.05 GOVERNING REGULATIONS/AUTHORITIES:

- A. The Consultant has contacted authorities having jurisdiction where necessary to obtain information necessary for preparation of Contract Documents. Contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.
- B. Copies of Regulations: Obtain copies of the applicable regulations and retain at the Project Site, available for reference by parties who have a reasonable need for such reference.

1.06 SUBMITTALS:

- A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION

SECTION 01 45 00
QUALITY CONTROL SERVICES

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements for quality control services.
- B. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include contract enforcement activities performed by the Consultant.
- C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.
- D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.
 - 1. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.
 - 2. Inspections, test and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.
 - 3. Requirements for the Contractor to provide quality control services required by the Consultant, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.03 RESPONSIBILITIES

- A. Contractor Responsibilities: The Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification Sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity; these services include those specified to be performed by an independent agency and not by the Contractor. Costs for these services shall be included in the Contract Sum.

1. The Contractor shall employ and pay an independent agency, to perform specified quality control services.
 2. The Owner will engage and pay for the services of an independent agency to perform inspections and tests specified as the Owner's responsibilities.
 - a. Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the Work, and if the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless otherwise agreed in writing with the Owner.
 3. Retesting: The Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.
 - a. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.
 4. Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:
 - a. Providing access to the Work and furnishing labor and facilities necessary to facilitate inspections and tests.
 - b. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
 - c. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
 - d. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
 - e. Security and protection of samples and test equipment at the Project site.
- B. Owner Responsibilities: The Owner will provide inspections, tests and similar quality control services specified to be performed by independent agencies and not by the Contractor, except where they are specifically indicated as the Contractor's responsibility or are provided by another identified entity.
1. The Owner will employ and pay for the services of an independent agency, testing

laboratory or other qualified firm to perform services which are the Owner's responsibility from the allowance set aside for testing in the contract sum.

- C. Duties of the Testing Agency: The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the Consultant and Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.
 - 1. The agency shall notify the Consultant and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.
 - 3. The agency shall not perform any duties of the Contractor.
- D. Coordination: The Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition, the Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
 - 1. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.
 - 2. The contractor shall schedule pre-installation coordination meetings for key elements in this project:
 - a. Pre-Concrete Coordination meeting, including owner, engineer, concrete supplier, testing agency, and other specialty contractors/manufacturers such as the membrane manufacturer and installer.
 - b. Pre-Membrane installation coordination meeting, meeting, including owner, engineer, membrane, sealant, sealer, suppliers and manufacturer representative, and other specialty contractors/manufacturers such as the concrete contractor.

1.04 SUBMITTALS:

- A. The independent testing agency shall submit a certified written report of each inspection, test or similar service, to the Consultant, in duplicate, unless the Contractor is responsible for the service. If the Contractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the Contractor, in duplicate.
 - 1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
 - 2. Report Data: Written reports of each inspection, test or similar service shall

include, but not be limited to:

- a. Date of issue.
- b. Project title and number.
- c. Name, address and telephone number of testing agency.
- d. Dates and locations of samples and tests or inspections.
- e. Names of individuals making the inspection or test.
- f. Designation of the Work and test method.
- g. Identification of product and Specification Section.
- h. Complete inspection or test data.
- i. Test results and an interpretations of test results.
- j. Ambient conditions at the time of sample-taking and testing.
- k. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.
- l. Name and signature of laboratory inspector.
- m. Recommendations on retesting.

1.05 QUALITY ASSURANCE

- A. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 REPAIR AND PROTECTION

- A. General: Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for "Cutting and Patching."
- B. Protect construction exposed by or for quality control service activities and protect repaired construction.
- C. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

- A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.
- B. Temporary utilities may include but are not limited to:
 - 1. Water service and distribution subject to the scope of work.
 - 2. Temporary electric power and light subject to the scope of work.
 - 3. Telephone service if full-time project representation is required.
- C. Temporary construction and support facilities may include but are not limited to:
 - 1. Temporary heat.
 - 2. Field offices and storage sheds.
 - 3. Sanitary facilities, including drinking water.
 - 4. Temporary enclosures, including noise abatement to meet local ordinances.
 - 5. Temporary Project identification signs and bulletin boards.
 - 6. Waste disposal services.
 - 7. Rodent and pest control.
 - 8. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities may include but are not limited to:
 - 1. Temporary fire protection.
 - 2. Barricades, warning signs, lights.
 - 3. Sidewalk bridge or enclosure fence for the site.
 - 4. Environmental protection.

1.03 SUBMITTALS

- A. Temporary Utilities: Submit reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.
- B. Implementation and Termination Schedule: Submit a schedule indicating implementation and termination of each temporary utility within 15 days of the date established for commencement of the Work.

1.04 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to:
1. Building Code requirements.
 2. Health and safety regulations.
 3. Utility company regulations.
 4. Police, Fire Department and Rescue Squad rules.
 5. Environmental protection regulations.
- B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."
1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.
 2. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.05 PROJECT CONDITIONS

- A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of the permanent service.
- B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Provide new materials; if acceptable to the Architect, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.
- B. Lumber and Plywood:

1. For job-built temporary offices, shops and sheds within the construction area, provide UL labeled, fire treated lumber and plywood for framing, sheathing and siding.
 2. For signs and directory boards, provide exterior type, Grade B-B High Density Concrete Form Overlay Plywood conforming to PS-1, of sizes and thickness indicated.
 3. For fences and vision barriers, provide exterior type, minimum 3/8" thick plywood.
 4. For safety barriers, sidewalk bridges and similar uses, provide minimum 5/8" thick exterior plywood.
- C. Paint: Comply with requirements of Division-9 Section "Painting."
1. For job-built temporary offices, shops, sheds, fences and other exposed lumber and plywood, provide exterior grade acrylic-latex emulsion over exterior primer.
 2. For sign panels and applying graphics, provide exterior grade alkyd gloss enamel over exterior primer.
 3. For interior walls of temporary offices, provide two coats interior latex flat wall paint.
- D. Tarpaulins: Provide waterproof, fire-resistant, UL labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride fire retardant tarpaulins.
- E. Water: Provide potable water approved by local health authorities.
- F. Open-Mesh Fencing: Provide 11-gage, galvanized 2-inch, chain link fabric fencing 6-feet high with galvanized barbed wire top strand and galvanized steel pipe posts, 1-1/2" I.D. for line posts and 2-1/2" I.D. for corner posts.

2.02 EQUIPMENT

- A. General: Provide new equipment; if acceptable to the Consultant, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.
- B. Water Hoses: Provide 3/4" heavy-duty, abrasion-resistant, flexible rubber hoses 100 ft. long, with pressure rating greater than the maximum pressure of the water distribution system; provide adjustable shut-off nozzles at hose discharge.
- C. Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools

and equipment.

- D. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.
- E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.
- G. Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows and serviceable finishes. Provide heated and air- conditioned units on foundations adequate for normal loading.
- H. Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.
- I. First Aid Supplies: Comply with governing regulations.
- J. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.
 - 1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

- A. General: Engage the appropriate local utility company to install temporary service or

connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

1. Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.
 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
 3. Obtain easements to bring temporary utilities to the site, where the Owner's easements cannot be used for that purpose.
 4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Consultant, and will not be accepted as a basis of claims for a Change Order.
- B. Temporary Water Service: The contractor shall make arrangements with the Building Management for temporary water from existing sources at the facility. The Contractor shall be responsible for all hoses, connections, etc., required from the point of water source at the facility.
- C. Temporary Electric Power Service: The Contractor shall make all arrangements for and shall install and pay for the temporary electric service. The Contractor shall furnish, install and maintain all temporary and power facilities required by the work. Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload protected disconnects, automatic ground-fault interrupters and main distribution switch gear.
1. Power Distribution System: Install wiring overhead, and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, AC 20 ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.
- D. Temporary Lighting:
1. Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction operations and traffic conditions.
- E. Temporary Telephones: Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period. Install telephone on a separate line for each temporary office and first aid station. Where an office has more than two occupants, install a telephone for each additional occupant or pair of occupants.
1. At each telephone, post a list of important telephone numbers.

- F. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off the site in a lawful manner.
1. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.
 2. Connect temporary sewers to the municipal system as directed by the sewer department officials.
 3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.
- G. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

3.03 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

- A. Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities for easy access at locations approved by the Owner.
1. Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.
- B. Provide incombustible construction for offices, shops and sheds located within the construction area, or within 30 feet of building lines. Comply with requirements of NFPA 241.
- C. Temporary Heat: Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
- D. Heating Facilities: Except where use of the permanent system is authorized, provide vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.
1. Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.

- E. Field Offices: Provide insulated, weathertight temporary offices of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly for use for small progress meetings. Furnish and equip offices as follows:
1. Furnish with a desk and chairs, a 4-drawer file cabinet, plan table and plan rack and a 6-shelf bookcase.
 2. Equip with a water cooler and private toilet complete with water closet, lavatory and mirror-medicine cabinet unit.
- F. Storage and Fabrication Sheds: Install storage and fabrication sheds, sized, furnished and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on the site as approved by the Owner.
- G. Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
1. Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.
- H. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.
- I. Drinking Water Facilities: Within temporary office, provide containerized tap-dispenser bottled-water type drinking water units, including paper supply.
- J. Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.
1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
 2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.
 3. Where temporary wood or plywood enclosure exceeds 100 square feet in area, use UL-labeled fire-retardant treated material for framing and main sheathing.
- K. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during

normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

3.04 PROTECTION FACILITIES INSTALLATION

A. Temporary Fire Protection:

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.
4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

B. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.

C. Security Enclosure and Lockup:

1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

D. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.05 OPERATION, TERMINATION AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of

temporary facilities to essential and intended uses to minimize waste and abuse.

- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on a 24-hour day basis where required to achieve indicated results and to avoid possibility of damage.
 2. Protection: Prevent water filled piping from freezing.
- C. Termination and Removal: Unless the Owner requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of the Contractor.
 2. Where the area is intended for landscape development, remove soil and aggregate fill that does not comply with requirements for fill or subsoil in the area. Remove materials contaminated with substances which might impair growth of plant materials or lawns. Repair or replace street paving, curbs and sidewalks at the temporary entrances, as required by the governing authority.
 3. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:
 - a. Replace air filters and clean inside of ductwork and housings.
 - b. Replace significantly worn parts and parts that have been subject to unusual operating conditions.

END OF SECTION

SECTION 01 60 00
MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
- B. The Contractor's Construction Schedule and the Schedule of Submittals are included under Section "Submittals."
- C. Standards: Refer to Section "Reference Standards and Definitions" for applicability of industry standards to products specified.
- D. Administrative procedures for handling requests for substitutions made after award of the Contract are included under Section "Product Substitutions."

1.03 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms such are self-explanatory and have well recognized meanings in the construction industry.
 - 1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. Note that some product specifications require job specific purchase of the materials versus use from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - a. "Named Products" are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
 - 2. "Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
 - 3. "Equipment" is a product with operational parts, whether motorized or manually

operated, that requires service connections such as wiring or piping.

1.04 SUBMITTALS

- A. Product List Schedule: Prepare a schedule showing products specified in a tabular form acceptable to the Consultant. Include generic names of products required. Include the manufacturer's name and proprietary product names for each item listed.
1. Coordinate the product list schedule with the Contractor's Construction Schedule and the Schedule of Submittals.
 2. Form: Prepare the product listing schedule with information on each item tabulated under the following column headings:
 - a. Related Specification Section number.
 - b. Generic name used in Contract Documents.
 - c. Proprietary name, model number and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date, or time span of delivery period.
 3. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of an initial product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.
 - a. At the Contractor's option, the initial submittal may be limited to product selections and designations that must be established early in the Contract period.
 4. Completed Schedule: Within 60 days after date of commencement of the Work, submit 3 copies of the completed product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.
 5. Engineer's Action: The Consultant will respond in writing to the Contractor within 2 weeks of receipt of the completed product list schedule. No response within this time period constitutes no objection to listed manufacturers or products, but does not constitute a waiver of the requirement that products comply with Contract Documents. The Engineer's response will include the following:
 - a. A list of unacceptable product selections, containing a brief explanation of reasons for this action.

1.05 QUALITY ASSURANCE

- A. Source Limitations: To the fullest extent possible, provide products of the same kind, from

a single source.

1. When specified products are available only from sources that do not or cannot produce a quantity adequate to complete project requirements in a timely manner, consult with the Consultant for a determination of the most important product qualities before proceeding. Qualities may include attributes relating to visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources that produce products that possess these qualities, to the fullest extent possible.
- B. Compatibility of Options: When the Contractor is given the option of selecting between two or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.
 1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.
 3. Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
 4. Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected.
 5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
 6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
 7. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 - PRODUCTS

2.01 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, unused at the time of installation.
1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
 2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- B. Product Selection Procedures: Product selection is governed by the Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include the following:
1. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated. No substitutions will be permitted.
 2. Semi-proprietary Specification Requirements: Where two or more products or manufacturers are named, provide one of the products indicated. No substitutions will be permitted.
 - a. Where products or manufacturers are specified by name, accompanied by the term "or equal," or "or approved equal" comply with the Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
 3. Non-Proprietary Specifications: When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
 4. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
 5. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the

application indicated. General overall performance of a product is implied where the product is specified for a specific application.

- a. Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.
6. Compliance with Standards, Codes and Regulations: Where the Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes or regulations specified.
7. Visual Matching: Where Specifications require matching an established Sample, the Consultant's decision will be final on whether a proposed product matches satisfactorily.
 - a. Where no product available within the specified category matches satisfactorily and also complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category, or for noncompliance with specified requirements.
8. Visual Selection: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Consultant will select the color, pattern and texture from the product line selected.
9. Allowances: Refer to individual Specification Sections and "Allowance" provisions in Division-1 for allowances that control product selection, and for procedures required for processing such selections.

PART 3 - EXECUTION

3.01 INSTALLATION OF PRODUCTS:

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
 1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION

SECTION 01 78 00
PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY:

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - 1. Inspection procedures.
 - 2. Project record document submittal.
 - 3. Operating and maintenance manual submittal.
 - 4. Submittal of warranties.
 - 5. Final cleaning/site demobilization of left over materials and equipment.
 - 6. Re-installation of any existing building features temporarily removed for access to work areas.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections.

1.03 SUBSTANTIAL COMPLETION:

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
 - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - a. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - 2. Advise Owner of pending insurance change-over requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance agreements, final

certifications and similar documents.

4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
 5. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.
 6. Deliver tools, spare parts, extra stock, and similar items.
 7. Make final change-over of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of change-over in security provisions.
 8. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
 9. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
- B. Inspection Procedures: On receipt of a request for inspection, the Consultant will either proceed with inspection or advise the Contractor of unfilled requirements. The Consultant will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
1. The Consultant will repeat inspection when requested and assured that the Work has been substantially completed.
 2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.04 **FINAL ACCEPTANCE:**

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.

3. Submit a certified copy of the Consultant's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Consultant.
 4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when the Owner took possession of and responsibility for corresponding elements of the Work.
 5. Submit consent of surety to final payment.
 6. Submit a final liquidated damages settlement statement.
 7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Re-inspection Procedure: The Consultant will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Consultant.
1. Upon completion of re-inspection, the Consultant will prepare a certificate of final acceptance, or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 2. If necessary, re-inspection will be repeated.

1.05 **RECORD DOCUMENT SUBMITTALS:**

- A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Consultant's reference during normal working hours.
- B. Record Drawings: Maintain a clean, undamaged set of blue or black line white prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
 1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
 3. Note related Change Order numbers where applicable.
 4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.
- C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.
1. Upon completion of the Work, submit record Specifications to the Consultant for the Owner's records.
- D. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.
1. Upon completion of mark-up, submit complete set of record Product Data to the Consultant for the Owner's records.
- E. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Consultant and the Owner's personnel to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the Owner for record purposes. Comply with delivery to the Owner's Sample storage area.
- F. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Consultant for the Owner's records.

- G. Maintenance Manuals: Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:
1. Emergency instructions.
 2. Spare parts list.
 3. Copies of warranties.
 4. Wiring diagrams.
 5. Recommended "turn around" cycles.
 6. Inspection procedures.
 7. Shop Drawings and Product Data.
 8. Fixture lamping schedule.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 **CLOSEOUT PROCEDURES**:

- A. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:
1. Maintenance manuals.
 2. Record documents.
 3. Spare parts and materials.
 4. Tools.
 5. Lubricants.
 6. Fuels.
 7. Identification systems.
 8. Control sequences.
 9. Hazards.
 10. Cleaning.
 11. Warranties and bonds.
 12. Maintenance agreements and similar continuing commitments.
- B. As part of instruction for operating equipment, demonstrate the following procedures:
1. Start-up.
 2. Shutdown.
 3. Emergency operations.
 4. Noise and vibration adjustments.

5. Safety procedures.
6. Economy and efficiency adjustments.
7. Effective energy utilization.

3.02 **FINAL CLEANING:**

- A. General: General cleaning during construction is required by the General Conditions and included in Section "Temporary Facilities".
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
 1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
 - a. Remove labels that are not permanent labels.
 - b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 - c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
 - d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 - e. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.
- C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

1. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION

SECTION 01 78 36
WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY:

- A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.
 - 1. Refer to the General and/or Special Conditions for terms of the Contractor's special warranty of workmanship and materials.
 - 2. General closeout requirements are included in Section "Project Closeout."
 - 3. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, may be included in the individual Sections.
 - 4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
- B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.03 DEFINITIONS

- A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.04 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

- B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.
- D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - 1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
- E. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.05 SUBMITTALS

- A. Submit written warranties to the Consultant prior to the date certified for Substantial Completion. If the Consultant's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Consultant.
 - 1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Consultant within fifteen days of completion of that designated portion of the Work.
- B. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Consultant for approval prior to final execution.
- C. Forms for special warranties are included at the end of this Section. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor, or the Contractor and subcontractor, supplier or manufacturer. Submit a draft to the Owner through the Consultant for approval prior to final execution.

1. Refer to individual Sections for specific content requirements, and particular requirements for submittal of special warranties. In general, the warranty for all work will be five (5) years.
- D. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- E. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.
 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.
 2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS, the Project title or name, and the name of the Contractor.
 3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 SCHEDULE OF WARRANTIES

- A. Schedule: Provide a five (5) year labor and material (manufacturers) warranty on products and installations specified in Division 3, 5, 7 and 9.

END OF SECTION

DIVISION 02

EXISTING CONDITIONS

SECTION 02 20 00

EARTHWORK

PART 1 - GENERAL

1.01 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.

1.02 DESCRIPTION

- A. Provide all materials, equipment and labor required for the complete performance of the work in this Section including but not limited to the following:
 - 1. Excavating all types of materials to limits indicated or required, including soil, boulders, rock, shale, abandoned utilities, and pavements as required for subgrade repairs/reinforcement in areas of parking lot determined by proof rolling or other methods in the field.
 - 2. Preparing and protecting subgrades for pavements as indicated on the Drawings and as specified herein.
 - 3. Using all or a portion of the excavated material on the project site, and disposing of surplus or unsuitable excavated material at appropriate off-site locations.
 - 5. Providing specified materials from off-site sources as required and specified herein.
 - 6. Backfilling and compaction operations associated with the placement of Granular Subbase materials.
 - 7. Grading, shaping and compacting subgrades, upon which pavement, surfacing, base, subbase or structures are to be placed.

1.03 CLASSES OF EXCAVATION

- A. Unclassified Excavation: Removal of materials for new below-grade construction, utility relocation and construction, and other indicated site improvements regardless of the nature of the material encountered, the water content thereof, and the type of equipment required for excavating; and the proper disposal of excavated material not required or not suitable for use as specified backfill materials.

1.04 QUALITY ASSURANCE

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing codes and authorities having jurisdiction.
- B. Testing and Inspection Service: The Owner will employ a testing service to perform soil testing and inspection for quality control during earthwork operations as herein specified.
- C. Quality Control Testing during Construction: The following tests will be performed to demonstrate conformance to compaction and other requirements.
 - 1. Field density tests in accordance with ASTM D1557, Modified Proctor Method. In each compacted fill layer, one field density test for every 2000 sq. ft., but not less than two (2) field density tests, for every 100 cubic yards.

1.05 SUBMITTALS

- A. Test Reports-Excavating and Grading: The Contractor shall submit the following reports:
 - 1. Test reports on soil material.
 - 2. Field density test reports.
 - 3. One optimum moisture-density relationship curve for each type of soil to be used for fill or backfill.

1.06 JOB CONDITIONS

- A. Existing Utilities: Prior to start of work, contact local utility companies to locate and mark out existing underground utilities in the area of work.
 - 1. Utilities designated to remain in place or which serve adjacent structures are to be protected and maintained at all times during construction. Active utility lines damaged in the course of construction operations shall be repaired or replaced immediately at no cost to the Owner.
 - 2. Should uncharted piping or other utilities be encountered during excavation, consult the Architect and the utility owner immediately. Cooperate with the Architect and the utility owners in keeping services and facilities in operation.

PART 2 - PRODUCTS

2.01 DEFINITIONS

- A. Suitable Soil Materials are defined as those complying with ASTM D2487 soil classification Groups GW, GP, GM, SM, SW and SP or other material approved by the Owner's representative or representative of authority having jurisdiction and as specified herein.
- B. Unsuitable Soil Materials are defined as those complying with ASTM D2487 soil classification groups

GC, SC, ML, MH, CL, CH, OL, OH, and PT. Any material containing vegetable or organic matter, muck, weeds, peat, organic silt, topsoil, or sod, rubbish, garbage or other material that may decay or is otherwise not satisfactory for use in construction is designated as an unsuitable material, and shall not be used. Certain man made deposits of industrial waste, sludge, landfill or debris may also be determined to be unsuitable materials.

2.02 EARTH MATERIALS

- A. Stabilized Granular Subbase Material: Suitable off-site natural or artificially graded granular material free of organic material, loam, trash, snow, ice, frozen soil and other objectionable material and well-graded within the following limits:

<u>Sieve Size</u>	<u>Percent Finer by Weight</u>
2 in.	100
¾ in.	35-65
No. 40	15-40
No. 200	10-15

1. Provide stabilized granular subbase fill under sidewalks, concrete slabs and asphalt concrete pavement to the thickness shown on the drawings.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the site and all work prepared by others and report to the Engineer in writing any conditions detrimental to the proper and timely completion of work until unsatisfactory conditions have been corrected in an acceptable manner.

3.02 GENERAL REQUIREMENTS

- A. Use of Materials Found on the Site:

1. All unsuitable material, and suitable material not required for the proper completion of the Contract, will become the property of the Contractor and shall be removed and properly disposed of away from the jobsite at no additional cost to the Owner.
2. Do not excavate or remove any material from the site or right-of-way, which is not within the excavation, as indicated in the Drawings, without written authorization from the Architect.

- B. Stockpiling of Material: Establish material stockpiles on site only at locations, which will not interfere with the progress of the work. Off-site stockpiling and rehandling, if required shall be the responsibility of the Contractor, at no additional expense to the Owner. Such off-site stockpiling shall require written permission from the Architect.

C. Unfavorable Weather:

1. Fill materials shall not be placed on snow, ice, frozen subgrades or uncompacted frozen soil.
2. Fill materials shall not be frozen when placed or be allowed to freeze prior to compaction. At the end of each day's work during freezing weather, the last lift of fill, after compaction, shall be rolled by a smooth-wheeled roller to eliminate ridges of uncompacted soil. The Contractor shall suspend backfilling operations when air temperatures are below 32 degrees F.
3. Wet Weather: If fill material placement, spreading, rolling or compaction operations are interrupted by heavy rain or other unfavorable conditions, do not resume such operation until ascertaining that the moisture content and density of the previously placed soil are as required by these specifications.

D. Maintenance of Excavations and Slopes:

1. Stability of excavations and job safety are the sole responsibility of the Contractor.

3.03 SUBSURFACE OBSTRUCTIONS

- A. All buried structures shall be removed in confined excavations as general excavation proceeds. Do not excavate for buried structure removal below subgrade elevations unless otherwise directed by the Architect.

3.04 EXCAVATION

A. General Requirements:

1. Conduct unclassified excavation and grading using appropriate methods and equipment in sufficient quantity and sizes to perform the work as specified and as shown on the Drawings.
2. Adhere to specified restrictions for excavation and removal of buried structures.
3. Carry out excavation in such a manner that damage to adjacent roads, structures and utilities is prevented.
4. Control the inflow of water into excavations by acceptable construction de-watering methods and procedures. Control the inflow of water to prevent loss of materials from outside the limits of excavation.
5. Prevent disturbance to all soil subgrades.
6. Remove unsuitable and excess suitable excavated material from the excavation and site promptly. Do not stockpile excavated material immediately outside the site limits.
7. Exercise care to preserve the material below and beyond the lines of all excavations. Where

excavation is carried below indicated grade, backfill to the indicated grade as specified herein.

8. Excavation for the convenience of the Contractor shall conform to limits acceptable to the Engineer and shall be at no additional expense to the Owner.

B. Unauthorized Excavations:

1. Unauthorized excavation consists of removal of materials beyond required subgrade elevations or dimensions without specific direction of the Engineer.

Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at the Contractor's expense.

2. Backfill and compact unauthorized excavations with granular fill as specified for authorized excavations unless otherwise directed by the Engineer.

C. Additional Excavations:

1. When excavation has reached required subgrade elevations, notify the Engineer who will observe the excavation and grading conditions.
2. If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material with granular fill as specified, and as directed by the Architect. Removal of unsuitable materials and their replacement as directed by the Architect will be paid on the basis of contract conditions relative to changes in the work.
3. If unsuitable materials are encountered at subgrade elevations due to the Contractor's operations (such as soil disturbance caused by improper dewatering procedures or excavation procedures), then the additional excavation and replacement shall be conducted at the Contractor's expense.

3.05 SUBGRADE PREPARATION AND PROTECTION

A. General:

1. Complete the excavations to the required subgrade elevations allowing for subbase material, bedding layers, plus any additional depth required to accommodate particular requirements.
2. All subgrades must be observed and accepted by the Engineer prior to proof-rolling or placement of Stabilized Granular Subbase material or any structure over subgrades.
3. Remove any additional materials below subgrade elevations, which are unsuitable where directed by the Engineer.
4. Proof-roll the exposed sub grade with a minimum 10-ton vibratory roller for a minimum of four (4) passes or as required to achieve the proper compaction of subgrade material.

5. Backfill all holes or voids encountered outside of minimum excavation limits with compacted granular fill in layers not exceeding nine (9) inches measured before compaction and compact to 95 percent of maximum dry density (ASTM D1557) using appropriate compaction equipment.

3.06 PLACEMENT AND COMPACTION OF MATERIALS

A. General:

1. Backfills of the various types specified shall be placed and compacted within the limits and to the thickness indicated on the Drawings and as specified:
2. All backfill material shall be placed "in-the-dry" on subgrades. The Contractor shall remove water from within excavated areas on subgrade surfaces as required to perform the work, and in such a manner as to preserve the undisturbed state of the approved subgrade material.
3. Placement of all specified fill and backfill materials shall be systematically conducted in the specified uniform layer thicknesses. Measurement of backfill layer or lift thickness shall be conducted in all cases prior to compaction.
4. Compaction of backfill materials shall be conducted with a minimum of four (4) complete coverages with acceptable compaction equipment and to at least the minimum specified density, which is expressed as a percentage of maximum dry density as determined by ASTM D1557.

B. Compaction Equipment:

1. Compaction in open areas shall be conducted with heavy equipment such as vibratory rollers weighing at least 15,000 lbs., or by other acceptable equipment.
2. Compaction in confined areas (against walls, footings, piers and in trenches) shall be conducted with acceptable equipment such as hand-guided vibratory compactors or tampers.

C. Control of Moisture: The amount of moisture in any one layer of backfill material shall be as uniform as practicable throughout.

1. The upper limit of water content in materials shall be that which will permit handling and placing and will permit proper compaction with the Contractor's equipment. In no case shall the water content during compaction exceed a value of two (2) percentage points on the wet side of optimum water content as determined by ASTM D1557.
2. The lower limit of water content shall not be less than two (2) percentage points below optimum water content. Material, which is too wet, shall be spread and permitted to dry, assisted by mechanical agitation, if necessary, until the water content is reduced to a value within the specified limits. Each layer of material, which is too dry, shall be sprinkled with water, and the water worked into the material by mechanical methods until a uniform

distribution of moisture is obtained. Water applied to a layer of material shall be accurately controlled in amount so that free water will not appear on the surface during or subsequent to compaction.

D. Backfill and Fill:

1. Place in layers not to exceed eight (8) inches when utilizing heavy compaction equipment and in four (4") layers when utilizing light hand operated compaction equipment.
2. Compact each layer of fill to the maximum dry density, percentage of ASTM D1557 indicated below or as directed by the Engineer.
 - a. Paved areas - 95 percent

E. Stabilized Granular Sub base:

1. Place in layers not to exceed six (6) inches when utilizing heavy compaction equipment and four (4) inches when utilizing light hand operated compaction equipment.
2. Compact to at least 95 percent of maximum dry density.
3. Place a minimum six (6) inch compacted thickness below pavement.

3.07 GRADING AND COMPACTING

- A. Fine Grading and Compacting: Shape the subgrade to a fine surface conforming to the indicated cross section, and compact fill material to the maximum dry density specified. Cut down all high spots, fill depressions and recompact until the surface is smooth and satisfactorily compacted.
- B. Grading and Finishing: In areas designated for grading and finishing, rake or machine-grade the areas to remove stones over two inches and other unsatisfactory material; fill depressions and finish the surface within the indicated tolerances.

END OF SECTION

**SECTION 02 41 00
SELECTIVE DEMOLITION**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. DESCRIPTION

1. Furnish labor, materials, equipment and transportation necessary to do all concrete demolition, as shown on drawings and as specified herein, including but not necessarily limited to the following:
 - a. Removal of existing deteriorated concrete as noted on plans or directed by the Engineer.
 - b. Removal of existing vertical and overhead concrete where directed by the Engineer.
 - c. Dust and water control.
 - d. Removal and disposal of all debris.
 - e. Disconnecting and relocating/reinstalling any existing utility lines on the site which interfere with the repairs.
 - f. Protection of all existing electrical systems, mechanical equipment, light fixtures, overhead piping, fire protection system etc. scheduled to remain.
2. Contractor shall provide barricades with warning lights, enclose the construction area and take all precautions necessary to ensure public and employee safety.
3. All work shall be done in accordance with the requirements of all local and state agencies.

B. QUALITY ASSURANCE

1. Demolition Contractor's Qualifications: Minimum of 5 years experience on comparable projects.
2. Comply with all pertinent codes and regulations which apply to this type of work and with requirements of insurance carriers providing coverage for this work. Dispose of debris in a legal manner off site daily. Do not allow to accumulate on site.

C. JOB CONDITIONS

1. Dust and Water Control: Contractor shall contain particular debris generated by his work activities from polluting the atmosphere or waterways.

2. On-site burning shall not be permitted.
3. Use all means necessary to protect existing facilities, utilities, and appurtenances within the project areas.

1.03 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Schedule indicating proposed sequence of operations for selective demolition work to Owner's Representative for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
 1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
 2. Coordinate with Owner's continuing use of portions of existing building and/or with Owner's partial occupancy of completed new addition.
- C. Photographs of existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with Owner's Representative prior to start of work.

1.04 JOB CONDITIONS

- A. Occupancy: Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities that will affect Owner's normal operations.
- B. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.
 1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur prior to start of selective demolition work.
- C. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.
 1. Storage or sale of removed items on site will not be permitted.
- D. Protections: Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work.
 1. Provide protective measures as required to provide free and safe passage of

Owner's personnel and general public to occupied portions of the project.

2. Erect temporary covered passageways as required by authorities having jurisdiction.
3. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain.
4. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
5. Protect floors with suitable coverings when necessary.
6. Construct temporary insulated dust resistant partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dust resistant doors and security locks.
7. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
8. Remove protections at completion of work.

E. Damages: Promptly repair damages caused to adjacent facilities by demolition work.

F. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

1. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

G. Flame Cutting: Do not use cutting torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire suppression devices during flame-cutting operations.

H. Utility Services: Maintain existing utilities in service and protect them against damage during demolition operations.

1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
2. Maintain fire protection services during selective demolition operations.

- I. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.
1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Use appropriate materials and proper equipment to complete the work of this Section. Provide all necessary barricades, warning devices, enclosures, etc. as required to comply with governing safety regulations.

PART 3 - EXECUTION

3.01 PREPARATION

- A. General: Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
1. Cease operations and notify Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
2. Cover and protect equipment, and fixtures from soilage or damage when demolition work is performed in areas where such items have not been removed.
3. Erect and maintain dust resistant partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.
 - a. Where selective demolition occurs immediately adjacent to occupied portions of the building, construct dust resistant partitions of minimum 4-inch studs and ½-inch fire-retardant plywood on demolition side.
 - b. Provide weatherproof closures for exterior openings resulting from demolition work.
4. Locate, identify, stub off, and disconnect utility services that are not indicated to remain.
 - a. Provide bypass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shutdown of service is necessary during changeover.

3.02 DEMOLITION

A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.

1. Demolish concrete in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.
2. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
3. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.

B. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Consultant written, accurate detail. Pending receipt of directive from Owner's Representative, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.03 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove from building site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose off site.

1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
2. Burning of removed materials is not permitted on project site.

3.04 CLEANUP AND REPAIR

A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean.

1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION

SECTION 02 50 00

ASPHALT PAVING

PART 1 - GENERAL

1.01 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.

1.02 DESCRIPTION

- A. The extent of asphalt paving repairs and/or replacement is shown on the Drawings. Furnish all labor, tools, materials, equipment and supplies and perform all operations as shown on the drawings and specified herein:
 - 1. Repair existing asphalt, to include, as needed: surface preparation, saw cutting, asphalt removal, gravel base installation, prime coat installation, and binder and/or surface course patching.
 - 2. Grind/mill any areas shown on the drawings, including proper removal of all ground/milled materials from site
 - 3. Sealcoat asphalt areas, to include, as needed: surface preparation, asphalt repair, crack cleaning, crack filling, and sealcoating.
 - 4. Existing Base Course: One and half inches bituminous concrete consisting of a mixture of coarse and fine aggregates and bituminous material applied over a primed subbase course.
 - 5. Existing Surface Course: One and half inches bituminous concrete consisting of a mixture of coarse and fine aggregates and bituminous material constructed on the primed base course to the lines and grades replicating the existing and/or as required for proper drainage slopes.
- B. Related Work specified elsewhere:
 - 1. Section 02 20 00 - Earthwork
 - 2. Section 09 90 14 - Pavement Marking

1.03 QUALITY ASSURANCE

- A. Codes and Standards: Comply with requirements of the following codes, specifications and standards, except as herein modified:
 - 1. American Associations of State Highway and Transportation Officials (AASHTO).

2. American Society for Testing and Materials (ASTM).
 3. Missouri Standard Specifications for Highway Construction hereinafter referred to the "Standard Specifications".
- B. Testing and Inspection: Owner will engage testing and inspection services for quality control during the asphalt concrete paving operations.
1. Allow designated testing laboratory to inspect and evaluate the construction and materials at any time during the progress of the work.
 2. Tests will be performed to verify density, thickness and surface smoothness.
 - a. Four (4) inch diameter pavement cores will be taken to determine density and thickness of asphalt concrete courses as required.
 - b. Contractor to fill core holes resulting from test specimens with hot asphalt concrete.

1.04 SUBMITTALS

- A. Materials List: Submit listing identifying the types and sources of materials proposed for this work. If requested by Engineer, provide samples of aggregates, asphalt binder or both to Testing Laboratory.
- B. Name of proposed subcontractor, if applicable.
- C. State Department of Transportation certified mix design for the producer, aggregate source and asphalt cement proposed for the project.
1. Asphalt prime and tack coat material certificate of conformance to MoDOT requirements.
 2. Asphalt cement certificate of conformance to MoDOT requirements.
 3. Job-mix certification-Submit plant mix certification that mix equals or exceeds MoDOT Specification.
- D. Delivery Tickets: Submit delivery tickets for each load of asphalt with the following information:
- a. Supplier
 - b. Mix Type
 - c. Quantity
 - d. Deliver date and time of shipment
 - e. Placement Time

1.04 JOB CONDITIONS

- A. Weather Limitations: Do not place asphalt when the base or ambient temperature is less than

40 degrees F. Also, do not place when the base surface is wet or frozen. Place bitumen mixture when temperature is not more than 15 F degrees below bitumen supplier's bill of landing and not more than maximum specified temperature.

- B. Grade Control: Establish and maintain the required lines and grades, including crown and cross-slope, for each course during construction operations.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Granular Subbase: Existing stabilized granular subbase shall be treated per requirements of Section 02 20 00 Earthwork for undercutting, grading and compaction as deemed required in the field.
- B. Base Course: Materials shall conform to MoDOT Article 403 Superpave SP 125 E Type C.
- C. Surface Courses: Materials shall conform to MoDOT Article 403 Superpave SP 125 E Type C.
- D. Prime Coat: Asphalt emulsion prime coat complying with MoDOT Specifications.
- E. Tack Coat: emulsified asphalt, or cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application complying with MoDOT Specifications.
- F. Sealcoating materials shall be asphalt-based sealants, installed per manufacturer's directions. Coal tar sealing agents are prohibited for use on the project.

PART 3 - EXECUTION

3.01 ASPHALT PAVEMENT REMOVAL

- A. Method of existing asphalt binder and surface courses removal shall not cause damage to the underlying existing aggregate base or adjacent concrete curbs, gutters and pavements.
- B. Existing Pavement: Saw cut existing pavement to full depth in straight lines, where new pavement abuts existing.
- C. Pavement milling shall consist of stripping pavement material by a cold milling process for the purpose of removing the entire existing asphalt surface prior to resurfacing. This milling shall provide a surface which is free of gouges, ridges, continuous grooves and shall have a uniform surface texture. Milling shall be done in a longitudinal direction. The roadway is to be milled from curb face to curb face, and all asphalt is to be removed to the aggregate base. All asphalt "scabs" must be removed, so that only the aggregate base remains.
- D. Material Recovery: Complete recovery of milled material shall be accomplished immediately following the milling operation. The milled surface shall be clear of all loose material, dust and dirt. The recovered milled material shall be the property of the contractor, and hauled off-site accordingly. All asphalt material must be taken to an approved asphalt-recycling facility, and documentation of delivery (load tickets) must be provided.

- E. Butt Joints: At the project limits, all butt joints must be sawcut to a depth of two (2) inches. The contractor shall install and maintain a temporary **cold patch ramp** at all butt joints (“upstream” and “downstream”), until just prior to paving operations.

3.02 SURFACE PREPARATION

- A. Subgrade: The subgrade shall be re-checked, and if necessary, supplemented, reshaped, rolled, and uniformly compacted to conform to the cross section and grade of the new pavement. All boulders, organic material, soft clay, spongy materials, and other deleterious materials encountered during this operation shall be removed and replaced with an approved material prior to placing the aggregate sub-base.
 - 1. Apply the aggregate base course where required. Deliver at the required gradation and place to the required thickness with a spreading and finishing machine. The thickness of each lift shall not exceed a maximum of a 4 inch compacted layer, except the top lift shall be a nominal 2 inch compacted layer. If the Contractor elects to substitute an approved vibrating roller for one of the required rollers to compact the mix, the compacted lift thickness on the lower lifts may be increased to 6 inches provided the required density is obtained. The surface of each layer shall be clean and dry before succeeding layers are placed.
 - 2. Immediately after the aggregate base course is placed, it shall be given an initial rolling with a vibratory roller. After the initial rolling, the base course shall be given a final or finish rolling with a tandem roller. If initial rolling causes undue displacement of the base course, the Contractor shall adjust the time of the rolling. Compact base to achieve 95% of maximum density as determined in accordance with ASTM D698.
 - 3. Gravel base shall be graded to conform to the slopes of the asphalt pavement to provide a uniform subgrade prior to the placement of asphalt. A smooth surface not deviating more than 1/4 inch when tested with a 10 foot straightedge placed parallel to the centerline of the pavement shall remain after grading. Correct deviations exceeding 1/4 inches in 10 feet.
 - 4. The base course shall be constructed to the nominal thickness of 8 inches (minimum). Thickness measurements shall be taken at either cored points or at the base edge.
- B. Priming:
 - 1. Apply prime coat to clean and dry gravel base and edge surfaces at a rate of 0.3 gallons per square yard. The airing period shall be a minimum of twenty-four hours.
 - 2. Apply prime coat to clean and dry asphalt at a rate of 0.135 gallons per square yard. The airing period shall be a minimum of twenty-four hours.

3.03 PREPARING THE MIX

- A. Aggregate Storage: Keep each component of the various-sized combined aggregates in separate stockpiles. Maintain stockpiles so that aggregate size will not be intermixed and to prevent segregation.
- B. Asphalt Cement Preparation: Heat the asphalt cement at the mixing plant to a viscosity, which can readily be pumped and distributed throughout the asphalt concrete mixture. Add asphalt cement binder to aggregate at a temperature between 275 degrees F. and 375 degrees F.
- C. Aggregate Preparation: Dry aggregates and deliver to the mixer at a temperature between 250 degrees F. and 375 degrees F. Maintain the temperature between these limits according to the penetration grade viscosity characteristics of the asphalt cement, ambient temperature, and workability of the mixture, while the asphalt cement is being added.
- D. Mixing: Accurately weigh or measure dried aggregates and weigh or meter asphalt cement to comply with the job-mix formula requirements. Do not heat asphalt cement above 300 degrees F. at the time of introduction into the mixer.
 - 1. Mix aggregate and asphalt cement to achieve 90-95 percent of coated particles for base mixture and 85-90 percent of coated particles for surface mixture.

3.04 PLACING THE MIX

- A. General: Place the asphalt concrete mixture on the prepared surface, spread and strike-off using an acceptable bituminous paver. Spread mixture at a temperature within 25 degrees F. of the temperature specified in the approved mix formula, inaccessible and small areas may be placed by hand. Place each course in the required amounts so that when compacted, they will conform to the indicated grade, cross-section, and thickness.
- B. Paver Placing: Unless otherwise directed, begin placing along the centerline of areas to be paved on a crowned section, and at the high side of sections with a one-way slope, and in the directions of traffic flow.
 - 1. Place in strips not less than 10 feet wide, unless otherwise acceptable to the Engineer. After the first strip has been placed and rolled, place all succeeding strips and extend rolling to overlap previous strips. Complete all base courses for section before placing any surface course materials. Place mixture in as continuous an operation as possible.
- C. Hand Placing: Spread, tamp and finish the mixture using hand tools in areas where the use of machine spreading is not practical. Place mixture at a rate that will ensure proper handling and compaction before mixture becomes cooler than acceptable working temperature.
- D. Joints: Carefully make joints between old and new pavements, or between successive days' work, to ensure a continuous bond between adjoining work. Construct joints to have the same texture, density and smoothness as other sections of the asphalt concrete course.
 - 1. Clean contact surfaces of sand, dirt, or other objectionable material and apply tack coat at a rate of 0.05 to 0.15 gallons per square yard.

- E. Offset transverse joints in succeeding courses not less than 24 inches. When the edges of

longitudinal joints are irregular, honeycombed, or inadequately compacted, cut back all unsatisfactory sections to expose an even, vertical surface for the full course thickness.

- F. Offset longitudinal joints in succeeding courses not less than 6 inches. When the edges of longitudinal joints are irregular, honey-combed, or inadequately compacted, cut back all unsatisfactory sections to expose an even, vertical surface for the full course thickness.

3.05 COMPACTING MIX

- A. General: Begin rolling operations as soon as the mixture will bear the weight of the roller without excessive displacement. Do not suddenly change the line or direction of rolling.
 - 1. Compact the mixture with hot hand tamper or vibrating plate compactors in all areas inaccessible to rollers.
 - 2. Do not permit heavy equipment, including rollers, to stand on the finished surface before it has thoroughly cooled or set.
- B. Procedure: Start rolling longitudinally at the extreme lower side of sections and proceed toward the center of the pavement. Roll to slightly different lengths on alternate runs of the rollers. Do not roll center of sections first under any circumstances.
- C. Breakdown Rolling: Accomplish the breakdown or initial rolling immediately following the rolling of transverse and longitudinal joints and the outside edge. Operate rollers as close as possible to paver without causing displacement.
- D. Second Rolling: Follow the breakdown rolling as soon as possible while the mixture is hot and in condition for proper compaction. Continue the second rolling for at least 3 complete coverages or until the mixture has been thoroughly compacted.
- E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until all roller marks are eliminated and the course has attained the required density.
- F. The surface courses shall be compacted to a density of not less than 93% of the maximum possible density of a voidless mixture composed of the same materials in like proportions. If, during construction, the results of density tests show that the compacted surface course has a density less than 93%, an additional roller will be required. Contractor will furnish selected roller at no additional cost to the Owner.
- G. Patching:
 - 1. Remove defective areas for the full depth of the course.
 - 2. Cut sides perpendicular and parallel to direction of traffic flow, and with edges vertical.
 - 3. Apply a tack coat before placing new asphalt concrete mixture.

4. Compact by rolling to the required surface density and thickness.
- H. Protection: After final rolling, do not permit vehicular traffic on the asphalt concrete pavement until it has cooled and hardened.

3.06 EXISTING ASPHALT SURFACE PREPARATION

1. The existing pavement surface shall be sound, clean, and free of oil and structural defects prior to sealcoating.
2. All vegetation shall be removed from all surfaces to be sealed.
3. All surfaces to be sealed shall be thoroughly cleaned to remove all foreign debris using a mechanically powered forced air sweeper and steel bristle hand brooms.
4. Muddy areas shall be scraped thoroughly, scrub-washed and pressure rinsed with clear, fresh water.
5. Oil spots shall be scraped, scrubbed and lightly burned with a torch, if necessary, to remove visible excess oil. Coat old oil patches with a Neyra or approved equal primer to achieve adequate adhesion and prevent bleeding.
6. Treat any old or badly oxidized asphalt pavement that has lost its binder through erosion with a prime coat of penetrating primer at a rate of .0075 to .0300 gal. per square yard or a diluted sealer coat (one part sealer to three parts water) at a rate of .04 to .06 gal. per square yard.

3.07 CRACK FILLING

1. Any existing cracks over ¼" width shall be thoroughly cleaned out with air or water pressure and tooling and filled with a flexible crack filler. Approximate locations of cracks to be repaired are shown on the drawing.
2. Any existing cracks that have been previously filled and have deteriorated shall have old fill material removed and be refilled with a flexible crack filler.
3. Any existing cracks that have been previously filled and have settled shall be cleaned and additional flexible crack filler added.

3.08 SEALCOATING

1. Apply a primer coat of sealer (5 to 6 pounds of sand per gallon of undiluted sealer) over entire surface.
2. Fog spray pavement with fresh, clean water, if necessary to achieve workability and ease of spreading. No voids or pinholes shall be permitted.
3. Allow prime coat of sealer to thoroughly dry prior to applying second coat.

4. Apply second coat of sealer to entire surface.
5. Apply sealer at a minimum application rate of .10 gal. per square yard per coat.
6. Do not allow surface runoff containing sealer to enter storm sewer drain system.
7. Any machine used for applying sealcoat shall have adequate agitation to keep material in proper suspension at all times. It shall be equipped with a water fog bar so that the pavement is dampened (but without puddles) when sealcoat is applied if temperatures are above 85 deg. F or in hot, bright sun.
8. Any spray distributor used for application of the sealcoat shall be self-propelled, equipped with pneumatic tires, have full sweep agitator blades and be capable of applying the required coat weight of sand-reinforced sealcoat evenly over the entire width of the application bar to provide a smooth, uniformly coated surface.

3.09 PAVEMENT MARKING

- A. Paint markings in accordance with drawings and as specified in Section 09 90 14.

3.10 MINIMUM QUALITY REQUIREMENTS

- A. General: In addition to other specified conditions, comply with the following minimum quality requirements. Provide final surfaces of uniform texture, conforming to the required grades and cross-sections.
- B. Thickness: In-place compacted thicknesses will not be acceptable if exceeding the following allowable variation from thickness shown on the drawings.
 1. Base Course: 3/8 inch, plus or minus.
 2. Surface Course: 1/4 inch, plus or minus.
- C. Surface Smoothness: Test the finished surface of each asphalt concrete course for smoothness, using a 10' straightedge applied parallel with and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness:
 1. Base Course Surface: 1/2 inch.
 2. Wearing Course Surface: 3/16 inch.
 3. Check surfaced areas at intervals as directed by the Engineer.

END OF SECTION

DIVISION 03

CONCRETE

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 DESCRIPTION

- A. Furnish, fabricate and install reinforcement and associated items required or indicated on the drawings for cast-in-place concrete, including, but not necessarily limited to, conventional and epoxy-coated bars, welded wire fabric, ties, and supports.

1.03 WORK SPECIFIED ELSEWHERE

- A. Furnishing and placement of inserts, anchorages, and other embedded items as specified in other sections.

1.04 QUALITY ASSURANCE

- A. Unless otherwise shown or specified, fabrication and placement of all concrete reinforcement and related items shall conform to the following codes and standards:
 - 1. American Concrete Institute, ACI 318, "Building Code Requirement for Reinforced Concrete."
 - 2. American Concrete Institute, ACI 315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures."
 - 3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."

1.05 SUBMITTALS

- A. Shop Drawings: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with the ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures." Show bar schedule, stirrup spacing, diagrams of bent bars, arrangements and assemblies, for the fabrication and placement of concrete reinforcement.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver reinforcement to the Project Site bundled, tagged, and marked. Use

metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

Protection: Use all means necessary to protect concrete reinforcement before, during, and after installation and to protect the materials and installed work of all trades. Take all necessary precautions to maintain identification of fabricated bars after bundles are broken.

Storage: Store concrete reinforcement materials at the site to prevent damage and accumulation of dirt or excessive rust. Epoxy-coated reinforcing bars shall be stored on protective cribbing.

Epoxy-coated reinforcing bars: Coating damage due to handling, shipment and placing need not be repaired where the damaged area is 0.1 square inches or smaller; damaged areas larger than 0.1 square inches shall be repaired with Section 2.01 C; the maximum amount of damage including repaired and unrepaired areas shall not exceed 2 percent of the surface area of each bar.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Reinforcing Bars: ASTM A615, Grade 60, deformed.
- B. Welded Wire Fabric: ASTM A82 and ASTM A185. (EPOXY COATED)
- C. Epoxy-Coated Reinforcing Bars: ASTM A775. When required, damaged epoxy coating shall be repaired with patching material conforming to ASTM A775 and done in accordance with the material manufacturer's recommendations. Reinforcing bars to be coated shall conform to Section 2.01-A.
- D. Bar Supports: Bar supports and spacing of same shall be per recommendations set forth by Chapter 3 of the "CRSI Manual of Standard Practice." Epoxy coated reinforcing bars supported from formwork shall rest on coated wire bar supports, or on bar supports made of dielectric material or other acceptable materials. Wire bar supports shall be coated with dielectric material, compatible with concrete, for a minimum distance of 2 inches from the point of contact with epoxy-coated reinforcing bars. Reinforcing bars used as support bars shall be epoxy-coated.
- E. Tie Wire: Wire shall be 16 gauge or heavier, black-annealed. Epoxy-coated reinforcing bars shall be tied with plastic coated, epoxy coated, or nylon-coated tie wire or other acceptable materials.
- F. For epoxy grouting reinforcing steel use the Hilti "HIT RE 500 System" supplied by Hilti Fastening Systems, "Dowel Fast" System by Powers Fasteners, or approved equal. Follow manufacturer's directions for installation and required surface preparation.

2.02 FABRICATION

- A. General Requirements: Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication to tolerances complying with CRSI Manual of Standard Practice. In case of fabricating errors, do not rebend or straighten reinforcement in a manner that will injure or weaken the material.
- B. Unacceptable Workmanship: Reinforcement with any of the following defects will not be permitted in the work:
 - 1. Bar lengths, depths and bends exceeding specified fabrication tolerances.
 - 2. Bends or kinks not indicated on drawings or final shop drawings.
 - 3. Bars with reduced cross-section due to excessive rusting or other cause.
- C. When epoxy-coated reinforcing bars are cut in the field, the ends of the bars shall be coated with the same material used for repair of coating damage.

PART 3 - EXECUTION

3.01 PLACING REINFORCEMENT

- A. General Requirements:
 - 1. All reinforcing bars shall be placed in accordance with CRSI "Recommended Practice for Placing Reinforcing Bars."
 - 2. Bars shall be placed to the tolerance specified in ACI 318-99.
 - 3. Place all reinforcement according to the approved placement drawings. Use sufficient bar supports, tie anchors, additional reinforcing bars, if required, and other accessories to hold all bars securely in place.
- B. Concrete Coverage: Place reinforcement to obtain the minimum coverages specified on the drawings for concrete protection. Arrange, space, and securely tie bars and bar supports together with 16 gauge wire to hold reinforcement accurately in position during concrete placement operation. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
- C. Cleaning Reinforcement: Steel reinforcement, at the time concrete is placed around it, shall be free from loose rust and mill scale, oil, grease, paint, earth, ice and all coatings, which would reduce or destroy bond between steel and concrete. Clean reinforcement as necessary prior to, during, or after placement to achieve this result. When bars project from construction joints, all cement mortar clinging to the bars from previous concreting

shall be removed before the ensuing enveloping concrete is placed.

3.02 REINFORCING BAR LAP SPLICES

- A. New slab reinforcing bars may be spliced to existing bars by lapped splices if adequate lengths of exposed existing bars are available. Provide reinforcement lap splices by placing bars in contact and tying with wire tightly. Comply with the requirements of Engineering Data Report Number 45, 'Tension Development and Lap Splice Lengths of Reinforcing Bars Under ACI 318-08' for minimum required length of bar for lap splices. Alternatively, the contractor can follow the values provided below for lap splice lengths based on the following guidelines:

LAP SPLICE LENGTHS FOR BARS IN TENSION (IN INCHES)

<u>Bar Size</u>	<u>Uncoated Reinforcement</u>	<u>Epoxy-Coated Reinforcement</u>
3	19	22
4	19	28
5	24	35
6	28	42
7	41	61
8	47	70

- Note 1. Based on Class B splice = $1.3 l_d$ (l_d = tensile development length) Normal weight concrete
 f'_c = 4,000 psi min.
Grade 60 reinforcement
Concrete cover = 1.00 in. or greater
Bars have less than 12 in. concrete cast below them.
- Note 2. Lap splice lengths for epoxy-coated steel based on concrete cover equal to or greater than 3 bar diameters and clear spacing between bars equal to or greater than 6 bar diameters.
- Note 3. For lightweight aggregate concrete, multiply the tabulated values by 1.3.

- B. Do not make splices at points of maximum stress if possible.
- C. Stagger top splices, and in horizontal wall reinforcement separate at least five feet longitudinally in alternate bars of opposite tiers.
- D. Stubs and dowels required to receive and engage subsequent work shall extend a sufficient length to develop the strength of the bar. Place dowel and stub bars in the forms and secure against displacement during the placing of concrete. Where stub steel and dowels extend through construction joints in walls, they shall be thoroughly cleaned of adhering particles of concrete, before continuing the placing of any subsequent concrete.
- E. Where splicing length is insufficient either additional concrete removal or mechanical bar

splicing shall be implemented at the direction of the Engineer.

3.03 REINFORCING BAR MECHANICAL SPLICES

- A. Bars to be spliced by the mechanical splicing process shall be free of paint, oil, rust, scale or other foreign material. The splice shall be done in accordance with the manufacturer's recommendations which shall be submitted to the Engineer for approval.

The mechanical splice shall meet full tension requirement of 100% of the yield strength (f_y). The mechanical splices shall be performed using the Quick Wedge system manufactured by Erico Products, Inc. (800)248-2677, MBT Bar Lock System (800) 755-4888, or approved equal.

Test assemblies shall include the same bars, couplers and anchors. The same equipment shall be used to make these assemblies as to be used on the project.

- B. Unskilled operators must be trained and indoctrinated by an authorized representative of the system manufacturer. Upon satisfactory completion of the training, a certificate will be issued by the system manufacturer to show the splicer's name, badge, number/Social Security Number and date certified.

- C. Test splices should be made on the size, type and grade of rebar to be used in production. If a change of size, type of grade or rebar occurs, new test results should be obtained.

Minimum rebar deformation heights and spacing within the splice must conform to the requirements of ASTM A625, or ASTM A706 as appropriate. If minimum deformation heights and spacing requirements cannot be satisfied, the system's manufacturer may at its option offer and get an approval for alternate splicing procedure to meet the specified splicing strength requirements.

- D. The frequency of test splices shall be as follows:

First Fifty (50) - One Test
Next Fifty (50) - One Test
Thereafter, every one hundred (100) - One Test

The test splice shall be a SISTER SPLICE (removable splice made in-place and in sequence adjacent to production splices by the same operator and under same conditions.)

Separate test frequencies are not necessary to horizontal, vertical and diagonal splices.

- E. If any splice used for testing fails to meet the design code strength requirements, two splices in-place shall be cut from the previous lot and tested. If these sister splices fail, the contractor shall at his own expense, test as many splices as directed by the Engineer and re-splice all test and failed splices.

END OF SECTION

SECTION 03 30 00

CONCRETE WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section specifies cast-in-place concrete, including formwork, mix design, placement procedures, and finishes.

1.03 SCOPE OF WORK

- A. This work shall consist of full/partial depth removal (using acceptable methods) of deteriorated concrete at locations indicated on the drawings and placing new, low water-cementitious materials ratio, micro fiber-reinforced, air-entrained structural concrete according to the specifications.

1.04 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for proprietary materials and items, including forming accessories, admixtures, patching compounds, bonding grout/agent, joint systems, curing compounds, and others as requested by Consultant.
- C. The Contractor shall submit ACI 318 concrete mix proportioning data with compressive strength test results to the Consultant for approval.
- D. The Testing Agency shall submit test results of cylinders for each day's testing.
- E. The Contractor shall submit the proposed pouring sequence and construction joint layout for approval by the Consultant.
- F. Minutes of pre-concrete conference.

1.05 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
1. ACI 318-11, "Building Code Requirements for Structural Concrete," or AASHTO specifications.
 2. ACI 562-16, "Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures and Commentary"
- B. Materials and installed work may require testing and retesting at any time during progress of work. Retesting of rejected materials for installed work, shall be done at Contractor's expense.
- C. Pre-Concrete Conference: Conduct coordination meeting at Project site to comply with requirements of Division 1 Section 013300 - Submittals, and Section 014500 - Quality Control Services.
- D. At the onset of the project start or at least 30 days prior to the first concrete pour, the contractor shall conduct a meeting to review the proposed mix designs and to discuss the required methods and procedures necessary to achieve the required concrete quality. The meeting will review requirements for submittals, status of coordinating work, and availability of materials. It will also establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Representatives of each entity directly concerned with cast-in-place concrete should attend the meeting, including, but not limited to, the following:
1. Contractor's superintendent.
 2. Laboratory responsible for concrete design mixes.
 3. Laboratory responsible for field quality control.
 4. Ready-mix concrete producer.
 5. Concrete subcontractor, if any.
 6. Primary admixture manufacturers.
 7. Consultant or Owner's representative.

The minutes shall include a statement by the concrete contractor indicating that the proposed mix design and placing techniques will produce the concrete quality required by these specifications.

1.06 APPLICATOR'S QUALIFICATIONS:

- A. The Contractor shall have a minimum of five years of experience in performing work similar to that shown in the drawings and specifications.
- B. The Contractor may be requested to submit a list of five projects in which similar work to that specified was successfully completed. This list shall contain the following for each of

the five projects.

1. Project Name
2. Owner of Project
3. Owner's Representative, Address and Telephone Number
4. Brief Description of Work
5. Cost of Portion of Work Similar to that Specified in this Section
6. Total Restoration Cost of Project
7. Date of Completion

PART 2 - PRODUCTS

2.01 FORM MATERIALS:

- A. Forms for Exposed Finish Concrete: N/A
- B. Forms for Unexposed Finish Concrete: 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, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to exposed surface.
 1. Provide ties that, when removed, will leave holes not larger than 1-inch diameter in concrete surface.

2.02 CONCRETE MATERIALS:

- A. Portland Cement: ASTM C 150, Type I, non air-entraining, of recent manufacture and free of lumps.
 1. Use one brand of cement throughout project unless otherwise acceptable to Consultant.
 2. Pozzolanic materials (fly ash or slag) may be substituted for a portion of the cement when reviewed and approved by the Consultant or Owner's representative. Submittals must indicate testing to prove its suitability in combination with the intended cement and aggregate.
 3. Additional, sustained moist curing of the concrete is required when pozzolans are used.

- B. Normal Weight Aggregates: ASTM C-33 class 4S and as herein specified. Provide aggregates from a single source for exposed concrete. Coarse aggregates shall be clean, sound crushed stone or crushed gravel. Maximum size of coarse aggregate shall be 3/4 inch. No chert shall be permitted.
- C. Water: Potable water.
- D. Sand: ASTM C-33. Sand shall be clean and sharp.
- E. Admixtures, General: Provide admixtures for concrete that are free from chloride ions.
- F. Air-Entraining Admixture: ASTM C-260, certified by manufacturer to be compatible with other required admixtures.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Air-Mix" or "AEA-92," Euclid Chemical Co.
 - b. "Darex AEA" or "Daravair," W.R. Grace & Co.
 - c. "MaterAir VR10" BASF Building Systems
 - d. "Sealtight AEA," W.R. Meadows, Inc.
 - e. "Sika AER," Sika Corp.
- G. Water-Reducing Admixture: ASTM C 494, Type A.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Eucon WR-75," "WAR-91" or "Eucon MR," Euclid Chemical Co.
 - b. "WRDA with Hycol," or "Daracem 65," W.R. Grace & Co.
 - c. "Pozzolith 322" or "Polyheed 997," BASF Building Systems
 - d. "Plastocrete 161," Sika Corp.
- H. High-Range Water-Reducing Admixture (Super Plasticizer):
ASTM C 494, Type F or Type G.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Eucon 37," "Eucon 1037," or "Plastol 5000," Euclid Chemical Co.

- b. "WRDA 19" or "Daracem 100," W.R. Grace & Co.
- c. "Rheobuild 1000," BASF Building Systems
- d. "Sikament 300," Sika Corp.

I. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

- 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
- 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Eucon Retarder 75," Euclid Chemical Co.
 - b. "Daratard-17," W.R. Grace & Co.
 - d. "MasterSet-R-100" BASF Building Systems
 - e. "Plastiment," Sika Corporation.

J. Certification: Written conformance to the above-mentioned requirements and the chloride ion content of admixtures will be required from the admixture manufacturer prior to mix design review by the Engineer.

K. Synthetic Micro-Fiber Reinforcement:

- 1. Available Products: Subject to ASTM C1116-02 and ASTM C1018-97.
- 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Nycon Nylon Fibers.
 - b. Forta Nylo-Mono Nylon Fibers or Mighty-Mono Polypropylene Fibers.
 - c. Fibermesh Fibermix Stealth Polypropylene Fibers.
 - d. Grace Polypropylene Fibers or Polypropylene Microfibers.
 - e. Euclid Fiberstrand 150, Fiberstrand 200 or Fiberstrand 150 ML.
 - f. Axim Fibrasol or Fibrasol IIP.

2.03 RELATED MATERIALS:

- A. Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, fill reglet or cover face opening to prevent intrusion of concrete or debris.
- B. Moisture-Retaining Cover: Burlap and plastic complying with ASTM C 171.
- C. Moist Curing: Curing shall be accomplished by wet curing only. A curing membrane shall only be used in floor areas if approved in writing by the Consultant or Owner's representative.
- D. Liquid Curing and Sealing Compound (VOC compliant, 350 g/l): The compound shall have

30% solids content minimum and will have a maximum moisture loss of 0.039 grams/cm² when applied at a coverage rate of 250 ft²/gallon. Product shall be "Super Aqua-Cure VOX," or "Super Diamond Clear VOX" by the Euclid Chemical Co.

or

Curing and Sealing Compound (VOC compliant, 700 g/l): Liquid type membrane-forming curing compound, clear styrene acrylate type, complying with ASTM C1315, Type I, Class B, 25% solids content minimum. Moisture loss shall be not more than 0.30 Kg/m² when applied at 300 sq. ft./gal. Manufacturer's certification is required. Subject to project requirements provide one of the following products: "Super Rez Seal" by the Euclid Chemical Company, "MasterKure CC 1315" by Master Builders or "MasterKure CC 300 XS" by BASF Building Systems.

2.04 PROPORTIONING AND DESIGN OF MIXES

- A. Prepare design mixes for concrete by laboratory trial batch or field experience methods as specified in ACI 301, Section 4.2.3. Use an independent testing facility acceptable to the Consultant for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.
- B. Submit written reports to the Consultant of each proposed mix at least 15 days prior to start of work. Do not begin concrete production until proposed mix designs have been reviewed and approved by the Consultant. All mix designs shall be submitted on a Mix Design Submittal Form.
- C. Design mix to provide structural concrete with the following properties;
 - 1. **5000-psi, 28-day compressive strength, structural normal weight 145 pcf; W/C ratio: 0.38 maximum; air entrained, micro fiber reinforced.**

2.05 ADMIXTURES

- A. Use high-range water-reducing admixture (Superplasticizer) in concrete for placement and workability.
- B. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content of 6.0% with a tolerance of plus or minus 1.0 percent.
- C. Use admixtures for water reduction and set control in strict compliance with manufacturer's directions.
- D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

1. 3 inches plus or minus ½ inch, prior to addition of superplasticizing admixture.
2. Not more than 8 inches final slump after addition of superplasticizing admixture.

2.06 CONCRETE MIXING

- A. Provide batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.
- B. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as specified.
 1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01. PREPARATION

- A. Remove concrete members as indicated on the drawing. The removal of concrete shall be performed using approved methods and prepare the concrete surfaces to receive new concrete as shown on plans and as directed by the engineer in the field.

3.02 FORMS

- A. General:
 1. The Contractor shall submit detailed drawings for form work for examination by the Consultant. If such drawings are not satisfactory to the Consultant, the Contractor shall make such changes in them as may be required, but it is understood that the Consultant's examination of the drawings as submitted or corrected shall in no way relieve the Contractor of responsibility for obtaining satisfactory results.
 2. All forms shall be so constructed and maintained that the finished concrete will be true to line and grade and of the shape and dimensions shown on the Plans. The forms shall be constructed so that they can be removed without injury to the concrete.
 3. Forms shall be mortar-tight, sufficiently rigid to prevent distortion due to the wet concrete mix and other loads incident to construction operations, including vibration, and so constructed and maintained to prevent warping and opening of the joints due to shrinkage of the form material. Molding strips shall be placed in the corners of forms so as to produce beveled edges on permanently exposed concrete corners.

4. The interior of forms shall be treated with a non-staining form oil before concrete is placed to prevent adhesion of the concrete to the form.
5. All lumber in contact with concrete shall be free from knot holes, loose knots, cracks, splits, warps or any other defects which would mark the appearance of the finished structure. Any lumber which had defects affecting its strength shall not be used.
6. In designing forms, concrete shall be considered as a liquid weighing 150 pounds per cubic foot for vertical loads and for computing the hydrostatic head for horizontal pressure. In addition, a live load allowance of 50 pounds per square foot shall be used on horizontal projections of surfaces. Forms shall be designed so that no member will develop a dead load deflection of more than 1/270th of the span.
7. Spreader blocks and non "stay-in-place" bracing shall be removed from forms before concrete is placed. In no case, shall any portion of wood be left in the concrete.

B. Forms for Permanently Exposed Surfaces:

1. Forms for concrete surfaces that will be permanently exposed to view shall be constructed of plywood or of metal panels. Wood or metal linings for forms shall be of such kind and quality, or shall be so treated or coated, that there will be no chemical deterioration or discoloration of the formed concrete surface. The type and condition of form linings, and the construction of the forms, shall be such that form surfaces will be even and uniform.
2. Plywood sheets less than five-eighth inch in thickness shall be placed against a solid wood backing of three-quarter inch sheathing. Plywood sheets five-eighth inch or more in thickness may be used without backing, provided the forms are constructed to withstand pressure developed during placing of concrete without producing visible waviness between studs. Plywood sheets shall be placed so that joints are tight and with the long dimension horizontal.
3. Metal for forms shall be of such thickness that the forms will remain true to shape. Clamps, pins, or other connecting devices shall be such that they will hold the forms rigidly together in place and allow removal without injury to the concrete. Metal forms which do not present a smooth surface or line up properly shall not be used. All metal forms shall be kept free from rust, grease, or other foreign material which would discolor the concrete.
4. Form panels, either of wood or metal, shall be constructed and assembled so as to result in tight joints between the panels.

C. Form Anchorage:

1. Forms shall be securely tied together with approved rods, and braced in a substantial and unyielding manner. In general, tie rods shall be designed to also act as struts or spreader. Wood struts will not be permitted to remain in the concrete.
2. For concrete surfaces that will be permanently exposed to view, metal ties or anchorages within the forms shall be constructed so as to permit their removal to a depth of at least one and one-half inches from the face without injury to the concrete. The cavities on both sides of the concrete resulting from the removal of the end of form ties shall be filled with dry-pack Portland cement mortar having the same proportions of cement and sand as the mortar in the body of the concrete. The surface of the filling shall be left sound, smooth and even and shall match, insofar as practicable, the color of the surrounding concrete.
3. Devices which, when removed, will leave an opening entirely through the concrete will not be permitted. Wire ties shall not be used. Any parts of metal supports or spacers for reinforcement that are left in place within one and one-half inches of an exposed surface of the concrete shall be of non-rusting metal or have a non-rusting coating. If such parts are galvanized, the weight of zinc coating shall average not less than two ounces per square foot of actual surface.

D. Inspection of Forms:

1. All dimensions of forms in place shall be carefully checked before concrete is placed. Immediately prior to placing concrete, any warpings or bulging shall be corrected and all dirt, sawdust, shavings or other debris removed. In narrow walls where the bottom of the forms are otherwise inaccessible, the lower boards or panels shall be left loose on the back side so that extraneous material can be removed just prior to placing concrete.
2. If during placing of the concrete, the forms show signs of bulging or sagging, they shall be properly realigned and securely braced, and, if necessary to make proper correction, the portion of the concrete affected shall be removed.
3. When forms are unsatisfactory in any way, either before or during the placing of concrete, the placing shall be suspended until the defects are corrected.
4. If the forms develop any defects, such as bulging, sagging, leakage or irregular surfaces after the concrete has been poured, that portion of the work shall be removed, reconstructed or repaired as directed by the Consultant without additional compensation to the Contractor.

3.03 PLACING FINISHING AND CURING:

A. Bonding Grout:

1. After the existing concrete surface has been cleaned, it shall be uniformly saturated by pre-wetting for 2 hours minimum. Surface must be wet to saturated surface dry (SSD) condition, and any freestanding water shall be completely removed prior to placing the bonding grout. Immediately before placing concrete, a thin coating of bonding grout shall be scrubbed into the properly prepared surface of the existing concrete. Proper workmanship shall be exercised to insure that all existing surfaces receive a thorough, even coating and that no excess grout is permitted to collect in pockets. The rate of progress in applying grout shall be limited so that the grout does not become dry before it is covered with new concrete.
2. Bonding grout for patching concrete to existing concrete shall consist of equal parts by weight of Portland Cement and sand mixed in a portable mechanical mixer with sufficient water to form a stiff slurry. The consistency of this slurry shall be such that it can be applied with a stiff brush or broom to the old concrete in a thin, even coating that will not run or puddle in low spots.
3. Should the bonding grout dry before the concrete is placed, the Contractor will remove the dried grout and sandblast clean the grouted surface, at his expense, before placing fresh bonding grout.
4. When the method of concrete removal includes hydromilling or hydrodemolition, the requirements for the use of bonding grout may be waived. Prepared surfaces shall be clean and free of laitance, foreign material and any debris encountered during surface preparation. Do not allow cement to dry and re-adhere on the surfaces. The surface shall be uniformly saturated by wetting for 4 hours (min.) Surface will be saturated surface dry (SSD) condition, and any free standing water shall be completely removed prior to concrete placement. No free moisture or puddles on the surface will be permitted or accepted.

B. Placing and finishing: After the bonding grout has been applied, concrete shall be placed, consolidated by vibration, and shall be finished by screening and bull floating to bring the finished surface to specified elevation. The surface shall then receive a light broom finish, as directed by the Engineer. The reinforcing steel shall have a minimum concrete cover as shown on plans. The finished concrete shall be suitably protected, until the completion of the required curing period. Provide tooled joints between new and existing concrete surfaces.C. Curing: The recommendations of ACI 308 Standard Practice for Curing Concrete, shall be followed. When water is required to wet the surface of the newly placed concrete, it shall be applied as a fine spray so that it will not mark or pond on the surface. Except where otherwise specified, the curing period shall be at least 72 hours. If high early strength concrete is approved by the Consultant, the curing period may be reduced as directed by the Consultant. If fly ash or slag is approved in the mix by the Consultant, the curing time

will be extended. Curing shall be accomplished by wet curing only. The curing and sealing compound shall only be used on floor and slab areas approved by the Consultant.

1. The surface of the newly poured concrete shall be covered with wetted burlap as soon as the concrete has hardened sufficiently to prevent marring of the surface. The burlap shall overlap six inches. At least two layers of wetted burlap shall be placed on the finished surface. The burlap shall be kept saturated by means of a mechanically operated sprinkling system. In place of the sprinkling system, two layers of burlap may be substituted for one layer of burlap and impermeable covering.

The burlap sheets shall be placed so that they are in contact with the vertical faces of concrete slabs after removal of slab forms, and that portion of the material in contact with those faces shall be kept saturated with water.

2. Membrane Curing Method. Membrane curing will not be permitted unless approved in writing by the Consultant. Concrete at these locations shall be cured by another method as specified above.

After the concrete has been finished, the surface shall be cured with the specified curing compound. The seal shall be maintained for the specified curing period. The vertical faces of concrete slabs shall, likewise, be sealed immediately after the forms are removed. This high solids curing and sealing compound shall be applied at a maximum coverage rate of 250 square feet per gallon. These applications shall be made with mechanical equipment.

At locations where the coating is discontinuous or where pin holes show or where the coating is damaged due to any cause and on areas adjacent to sawed joints, immediately after sawing is completed, an additional coating of membrane curing compound shall be applied at the rate of one gallon per 250 square feet.

3. The Consultant may order curing by another method specified herein if unsatisfactory results are obtained with a curing compound. Prior to starting The Work, the Contractor shall have available, at the site of The Work, supply of one of the other approved curing materials sufficient for curing one day's production.
4. The Contractor's construction operations including the management of traffic, shall be such as to avoid damage to the coatings of curing compound for period of not less than the curing period specified. Any curing compound that is damaged or that peels from the concrete surface within the curing period specified, shall be repaired by the Contractor without delay and in an approved manner. No additional compensation will be allowed to the Contractor for performance of this work.

3.04 REMOVAL OF FORMS:

- A. General: Formwork may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 72 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.

3.05 REUSE OF FORMS

- A. Clean and repair surfaces of forms to be reused 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 Consultant.

3.06 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with bonding grout or proprietary repair products immediately after removal of forms, when acceptable to Consultant.
 - 1. 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 grout has dried.
 - 2. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surface texture of surrounding concrete. 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.
- B. Repair of Concrete Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Consultant. Surface defects, as such, include color and texture irregularities, cracks, spalls, 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.
 - 1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

3.07 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General: The Owner will employ a testing laboratory to perform tests and to submit test reports.
- B. Sampling and testing for quality control during placement of concrete may include the following, as directed by Consultant.
- C. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - 1. Slump: ASTM C 143; one test at point of discharge for each truck delivering the concrete; additional tests when concrete consistency seems to have changed.
 - 2. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each truck of air-entrained concrete.
 - 3. Concrete Temperature: Test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and each time a set of compression test specimens is made.
 - 4. 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.
 - 5. Compressive Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. more than the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 3 days, two specimen tested at 7 days, 2 specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 - 6. When frequency of testing will provide fewer than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
 - 7. When total quantity of a given class of concrete is less than 50 cu. yds., Consultant may waive strength test if adequate evidence of satisfactory strength is provided.
 - 8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 - 9. 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 strength by more than 500 psi.

- D. Test results will be reported in writing to the Consultant, Ready-Mix Producer, and Contractor within 24 hours after tests. 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 mix proportions and materials, compressive breaking strength, and type of break for 7-day tests and 28-day tests.
- E. Nondestructive 3-day Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- F. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Consultant. Testing service may 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 when unacceptable concrete is verified.

END OF SECTION

SECTION 03 31 24.16

CONCRETE REPAIR USING HIGH STRENGTH, FAST-SETTING MATERIALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections apply to the work of this section

1.02 SCOPE OF WORK

- A. This work shall consist of the removal of existing delaminated concrete and the installation of a fast-setting, high-strength concrete at locations to be re-opened to traffic the following morning or designated by the Engineer. Materials in this specification may also be appropriate when the scope of concrete work is limited and it is not practical to use ready-mixed concrete.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The fast-setting concrete repairs must achieve a compressive strength of 3,500 psi or safely accept vehicular traffic within 3 hours of placement.
- B. The concrete shall resist freeze/thaw damage and scaling in compliance with ASTM Test Procedures C-666 and C-672. The products approved under this section shall be:
 - 1. "MasterEmaco T 1060" as manufactured by BASF Building Systems (www.buildingsystems.basf.com)
 - 2. "MasterEmaco T 415 or T 430" as manufactured by BASF Building Systems (www.buildingsystems.basf.com)
 - 3. "SikaQuick 1000 or 2500" as manufactured by Sika Corporation (www.sikausa.com)

Note: Products related to those above with extended working times may be acceptable at the discretion of the Engineer.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

- A. The exact location of spalled concrete to be repaired will be determined in the field by tapping of slab with a sounding rod, chain drag or hammer. An outline of the area to be repaired will be marked with chalk.
- B. The areas of the spalled concrete to be removed will be outlined by making a sawcut around the perimeter of the spalled area. The nominal depth of sawcut shall be 1/2 inch. Do not, under any circumstances, cut existing reinforcing bars or post-tensioning strands.
- C. All loose unsound concrete shall be removed with pneumatic or electric jack hammer weighing no more than 15 lbs. may be used for removing concrete around mild steel reinforcement. Where unsound concrete is below reinforcement, removal to 3/4 inch below reinforcement is required.
- D. All deteriorated reinforcing steel bars which have lost more than 20% (or more) of their cross-sectional areas or selected by the Engineer shall be replaced. New reinforcing steel bars shall be furnished and placed in accordance with Section 03200 of the technical specifications and under the directions of the Engineer.
- E. The deck surface shall be blown clean with compressed air to assure that all loose or hollow concrete is removed. The reinforcing steel shall be sand blasted to remove all rust.

3.02 PLACING, FINISHING AND CURING

- A. Place and properly mixed concrete into the prepared area from one side to the other. Do not place concrete in lifts. Work the material firmly into the bottom and sides of the patch to assure good bond. Do not re-temper or finish material after initial set.
- B. For maximum performance and minimal shrinkage, wet curing shall be performed for a minimum of 3 hours followed by the application of an approved curing compound.

3.03 METHOD OF MEASUREMENT

This work will be measured for payment in square feet. The quantity of repair area will be computed from areas marked by the Contractor and approved by the Engineer.

END OF SECTION

SECTION 03 37 15.11

CONCRETE REPAIR USING TROWEL APPLIED MORTAR

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SCOPE OF WORK:

- A. This work shall consist of the removal of existing unsound concrete to required depth and the installation of a trowel applied, fast-setting cement repair material at locations indicated on drawings and/or at other locations designated by the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. The fast-setting polymer repair mortar shall achieve a compressive strength of 5,000 psi in 28 days. The products approved under this section are as follows.
 - 1. "MasterEmaco T310 CI", "MasterEmaco N400 RS or N400" or "MasterEmaco N425" as manufactured by BASF Building Systems (www.buildingsystems.basf.com)
 - 2. "SikaTop-123 Plus or SikaQuick VOH" as manufactured by Sika Corporation (www.sikausa.com)
 - 3. "Verticoat or Verticoat Supreme" as manufactured by the Euclid Chemical Company (www.euclidchemical.com)
 - 4. "CT-40" as manufactured by J.E. Tomes & Associates (www.jetomes.com)

PART 3 - EXECUTION

3.01 SURFACE PREPARATIONS:

- A. All loose and unsound concrete shall be removed with small chipping hammers. Remove concrete a minimum of 3/4" beyond the reinforcing steel.
- B. The surface shall be blown clean with compressed air to assure that all loose and hollow concrete is removed. The reinforcing steel shall be sandblasted to remove all rust.

3.02 PLACING, FINISHING AND CURING (Trowel Applied Mortar):

- A. Apply patching material as follows and in accordance with manufacturer's recommendations.
- B. Saturate the surface with water and allow to dry so that there is no standing water and the surface maintains a dark gray color one half hour before placing.
- C. Scratch a base coat firmly into the dampened surface and apply the balance of the patch before base coat is allowed to dry. Consolidate the mortar for density. For deep patches, add recommended filler and apply the material in lifts, allowing it to stiffen enough between lifts to support its own weight. For repairs over 4 inches deep, steel ties shall be provided to aid in weight support. Maximum filler addition to be 1 part filler to 2 parts by volume. The surface shall be troweled and brushed to match surrounding concrete.
- D. The finished patch shall be cured for at least forty eight hours. Keep damp with water or coat with a water-based curing and sealing compound conforming to ASTM C1315 as recommended by the polymer repair mortar manufacturer.
- E. In hot weather, the surface shall be kept cool by shading. Use cold liquid for mixing. Work material rapidly since heat accelerates set. Cure immediately. In cold weather, do not make repair if temperature is expected to fall below freezing within 48 hours of placing. The patches must be kept at a minimum of 60 degrees F. for seventy two hours for proper curing.

3.03 TESTING:

- A. The patched areas shall be sounded with a chain drag and/or hammer after 7 days after concrete placement; any hollowness detected shall be corrected by the Contractor by removing and replacing the patch at no extra cost to the Owner.

END OF SECTION

DIVISION 7

THERMAL & MOISTURE PROTECTION

SECTION 07 18 16

TRAFFIC BEARING WATERPROOFING MEMBRANE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SCOPE OF WORK

This work shall consist of shotblasting or other approved methods of cleaning on horizontal concrete surfaces, cleaning of vertical surfaces and installation of a thin waterproofing membrane system as specified on floor slabs at locations shown on plans. No substitutions to proposed systems in bid proposals other than the waterproofing membranes specified hereinafter shall be allowed unless approved in writing by the Consultant.

1.03 GENERAL

- A. The work of this Section includes, but is not limited to, surface preparation, installation of a liquid applied elastomeric membrane system to provide a waterproof, chemical and abrasion resistant non-skid traffic bearing topping.
- B. Examine existing surfaces and verify existing conditions. Determine acceptability of the concrete surfaces and notify, in writing, the General Contractor and the Consultant of acceptance. Verify dimensions as no extras will be allowed for inconsistency in dimensions.
- C. Cleaning and preparation of existing surfaces to receive materials shall be the Contractor's responsibility. Prepare surfaces as specified hereinafter and as recommended by manufacturer of the material selected.
- D. Provide and maintain barricades and traffic control at special coating areas during installation and curing period for vehicular and pedestrian traffic.

1.04 QUALIFICATIONS

- A. Work specified herein shall be performed by and be the responsibility of the Installation Contractor authorized, trained, approved and qualified by the manufacturer of materials used; having necessary equipment and facilities to fulfill requirements of the manufacturer and this section.
- B. Manufacturer Qualifications: Manufacturer shall provide evidence showing that the specified materials have been manufactured by the same source and successfully

installed on a yearly basis for a minimum of ten years on projects of similar scope and complexity. Manufacturer to be ISO 9001 certified.

- C. Installer Qualifications: Waterproofing installer shall demonstrate qualifications to perform the work of this Section by submitting the following documentation:
1. Licensing by the waterproofing manufacturer as an applicator of the product to be used in order to provide a warranty as described in Section 1.08 A.
 2. List of at least five projects (with reference names and phone numbers) satisfactorily completed under the current company name within the last 3 years, of similar scope and complexity to this project. Previous experience submittal shall correspond to specific membrane system proposed for use by applicator.
 3. A minimum of five (5) years in business under the same name.

1.05 SUBMITTALS

- A. Manufacturer's Data: Submit specifications, installation instructions and general recommendations by the manufacturer of fluid applied waterproofing materials. Include manufacturer's certified test data showing compliance with the requirements. Provide copy of license agreement between manufacturer and installer indicating division of warranty responsibility.
- B. Shop Drawings: Submit shop drawings showing large scale details of all edge terminations, joint treatments, penetration or projections and flashing conditions.
- C. Samples: Submit complete samples of each membrane system to be used. Sample shall be applied to plywood or similar rigid material.
- D. As-Built Information: Upon completion of the work and prior to final payment, submit two (2) maintenance manuals identified with the project name, location and date, types of coating systems applied and drawings indicating the types of coating systems and their location in the structure. Include a schematic drawing of each membrane type which clearly identified the successive coats or layers of the membrane system. Identify each coat or layer by dry film thickness or application rate and by manufacturer's reference number or name which specifically identifies the product used for each coat. Include recommendations for routine care and maintenance. Provide list of contractors nearest the project location who are qualified to perform repairs to the membrane. Identify common causes of damage and include instructions for temporary patching until permanent repairs can be made by qualified personnel.
- E. VOC Requirements: Where applicable, the manufacturers shall ensure that all components of specified products do not exceed volatile organic compound (VOC) limits of 400 g/l. Projects in the following locations are affected by this requirement.

Maricopa County (Arizona), California (excluding LA, Orange, San Bernadino and Riverside Counties), Connecticut, Delaware, Illinois, Indiana, Maine, Maryland, Massachusetts, New York, New Jersey, New Hampshire, Ohio, Pennsylvania, Vermont, Rhode Island, Washington DC and Arlington County, Alexandria, Fairfax County, Fairfax, Loudoun County, Falls Church, Prince William County, Manassas, Manassas Park, Stafford County (all northern Virginia).

1.06 DELIVERY AND STORAGE

- A. Deliver materials to project site in sealed, original packages or containers bearing name and brand of manufacturer. Each container shall have manufacturer's printed label. Materials shall be stored in the area designated by the General Contractor or Consultant.
- B. Upon delivery, notify the Consultant. Only materials brought to area and approved may be used.
- C. Store materials in single place designated by Owner and/or Consultant. Keep storage place neat and clean. Cleaning rags and waste materials shall be deposited in metal containers having tight covers or removed from the garage each night. Every precaution shall be taken to avoid danger of fire. Provide dry chemical or CO2 fire extinguishers in areas. Allow no smoking or open containers or solvents. Store solvents in safety cans.
- D. Empty containers used on job shall have labels canceled and shall be marked as to reuse.

1.07 JOB CONDITIONS

- A. A specified coating shall not be applied if weather is too cold, raining, snowing or if any other conditions exist that will not permit proper application or curing of coating. Follow manufacturer's written directions. Humidity should not deviate from acceptable ranges during application and curing. Protection required for proper installation and curing shall be the responsibility of the Coating Contractor and shall be reflected in Bid.
- B. Protect adjacent surfaces and materials with covering, duct tape and drop cloths as required to keep adjacent surfaces free of coating. Upon completing, remove protection and clean. Surfaces soiled or damaged by special coating shall be cleaned or replaced at no extra cost to Owner.
- C. Proceed with the installation of waterproofing only after the substrate construction has been completed and cured and after penetrating components have been installed, so that the membrane will not be penetrated or damaged by subsequent work.
- D. When payment for elastomeric deck coating is based on area of application, the area used in calculations shall be horizontal surfaces only.

1.08 WARRANTY

- A. Materials Manufacturer and Installation Contractor shall be jointly and severally responsible and shall submit an affidavit signed by both parties warranting the installed system for a minimum period of five years from date of final completion. The Installer shall repair or replace membrane which leaks water, deteriorates excessively, wears prematurely or otherwise fails to perform as required within the guarantee period, due to failure of materials or workmanship. The guarantee shall include an agreement to remove and reinstall other work which has been superimposed on elastomeric waterproofing work as required to repair or replace the waterproofing system if known at time of installation.

PART 2 - PRODUCTS

2.01 SOURCE OF MATERIALS

- A. The waterproofing membrane system shall be a complete system of compatible materials, designed by the manufacturer to produce a waterproofing, traffic-bearing and chemical resistance surface. Systems approved for use under this section shall be one of the following:

Category A - Standard Applications

Application of systems within this category are designed for stand alone parking structures and/or other structures where the presence of odors due to solvents contained in the membrane materials are not expected to create a disruption to adjacent areas, etc. Precautions should be taken during the installation and for a period of approximately one week thereafter to reduce the risk for fire due to the presence of solvents.

1. "Auto-Gard" as manufactured by Neogard (www.neogard.com).

The system consists of an epoxy or urethane primer applied to the cleaned concrete surface at a minimum rate of 300 square feet per gallon no more than 24 hours prior to base coat application; when cured, apply 70410 or 7430 urethane base coat will be a polyurethane applied to an average thickness of 20 mils dry (25 mils wet). When cured, apply 7430 urethane top coat at an average thickness of 20 mils dry (25 mils wet) and broadcast aggregate at a rate of approximately 15 pounds per 100 square feet and backroll. For heavy traffic areas such as drive aisles, steep or spiraling ramps, ticket booths and turning areas, prior to applying top coat, apply 7430 urethane at an average thickness of 12 mils dry (15 mils wet) with aggregate broadcast at the rate of 10 to 15 pounds per 100 square feet.

2. "Iso-Flex 780 or 750U Coating System," as manufactured by Lym-Tal (www.lymtal.com).

The system consists of a solvent-based primer applied to the cleaned concrete surface at a rate of 250 feet per gallon no more than 7 hours prior to base coat application; the base coat will be a 750 polyurethane applied to an average thickness of 25 mils dry (26 mils wet) or a 780 polyurethane applied to an average thickness of 25 mils dry (29 mils wet). The wearing coat in parking stall areas is a polymer, applied at an average thickness of 15 mils dry (20 mils wet) with aggregate, broadcast at the rate of 8 to 10 pounds per 100 square feet. In drive aisles and heavy traffic areas, a second top coat of urethane at 15 mils dry (20 mils wet) with aggregate, broadcast at the rate of 8 to 10 pounds per 100 square feet with aggregate is applied.

3. "Sonoguard Deck Coating," as manufactured by BASF Building Systems (www.buildingsystems.basf.com).

The system consists of a solvent based primer applied at a minimum rate of 300 square feet per gallon. The MasterSeal M200 base coat is a solvent-based, polyurethane applied to the cleaned concrete surface at a rate of 20 mils dry (25 mils wet). The MasterSeal TC225 top (mid) coat is a solvent-based aliphatic polyurethane applied at 20 mils dry (25 mils wet), then broadcast and backroll with 16/30 mesh silica sand at a rate of 20-25 pounds per 100 square feet in parking stall areas. In drive aisles and heavy traffic areas, the mid coat of MasterSeal TC225 urethane is applied at 15 mils dry (20 mils wet) and broadcast with silica sand at a rate of 50-60 pounds per 100 square feet and a second top coat of MasterSeal TC225 is applied at 15 mils dry (20 mils wet). At cashier booths and steep ramps, an additional 8 mils dry (12 mils wet) top coat is required.

4. "Sikalastic 710/715" as manufactured by Sika Corporation (www.sikausa.com).

The system consists of Sikafloor FTP epoxy primer applied to the cleaned concrete surface at a minimum rate of 300 square feet per gallon no more than 48 hours prior to base coat application; when tack free, apply Sikalastic 710 basecoat at a nominal thickness of 23 mils dry (32 mils wet). When tack free, apply Sikalastic 715 topcoat at a nominal thickness of 8 mils dry (11 mils wet) and seed with 10-15 lbs/100 sf of oven dried quartz sand with a minimum gradation of 16/30 mesh and backroll. In drive aisles and heavy traffic areas, a second top coat of Sikalastic 715 at a nominal thickness of 8 mils dry (11 mils wet) and seeded with 10-15 lbs/100 sf of oven dried quartz sand with a minimum gradation of 16/30 mesh is applied and backrolled. When tack free, apply Sikalastic 715 topcoat at a nominal thickness of 12 mils dry (16 mils wet).

5. "Qualideck" as manufactured by Advanced Polymer Technology (www.qualideck.com).

The system consists of a 100% solids polyurethane primer Qualipur 152 applied to the cleaned concrete surface at a minimum rate of 300 square feet per gallon. The base coat application is a low/no odor polyurethane Qualipur 282 that is applied a nominal thickness of 25 mils dry (26 mils wet). In drive aisles and heavy traffic areas, apply an intermediate coat of Qualipur 382 polyurethane at 15-20 mils dry (16-21 mils wet) saturated with angular sand and backrolled. The topcoat is the Qualipur 382 polyurethane applied at 15 mils dry (16 mils wet) then broadcast with 12/20 or 16/30 angular sand at a rate of 20-25 lbs/100 sf.

6. "Kelmar T.E. System," as manufactured by Technical Barrier Systems www.tbsproducts.com

The system consists of a solvent or water based epoxy primer applied to the cleaned surface at a rate of 250-300 square feet per gallon. The base coat is the NEO V II C latex neoprene applied to the primed concrete surface at a rate of 20 mils dry (32 mils wet). The wearing coat is 100% solids coal tar epoxy applied at 23 mils wet/dry in parking stalls then broadcast with sand to saturation. In all areas other than parking stalls, apply a second layer of wearing coat at 23 mils wet/dry coat with aggregate broadcast to saturation. Finally, apply top finish coat of single component, water based acrylic latex emulsion at 125 square feet per gallon.

Category B – Fast Cure and Odor Sensitive Applications

The following systems have been designed to accept vehicular traffic after an application time typically involving a three-day period, most often associated with weekends and on associated holiday the day before or after a weekend. Check with manufacturer and installer regarding specific size areas and time frames which are possible with these systems. Application of systems within this category are also designed for locations where the release of solvents with strong odors would be objectionable.

1. "Auto-Gard FC," as manufactured by Neogard (www.neogard.com).

The system consists of an epoxy or urethane primer applied to the cleaned concrete surface at a minimum rate of 300 square feet per gallon no more than 24 hours prior to base coat application; when cured, apply FC7500/7960 urethane base coat at an average thickness of 20 mils dry (20 mils wet). When cured, apply FC7510/7961 (interior) or FC7540/7964 (exterior) urethane top coat at an average thickness of

20 mils dry (20 mils wet) and immediately broadcast aggregate at a rate of 15 pounds per 100 square feet and backroll. For heavy traffic areas such as drive aisles, ticket booths and turning areas prior to top coat application, apply FC7510/7961 polyurethane at an average thickness of 12 mils dry (12 mils wet) with aggregate broadcast at a rate of 10 to 15 pounds per 100 square feet.

2. "Iso-Flex 760 U Low Odor Coating System," as manufactured by Lym-Tal (www.lymtal.com).

The system consists of a solvent-free epoxy primer applied to the cleaned concrete surface at a rate of 250 feet per gallon no more than 24 hours prior to base coat application; the base coat will be a polyurethane applied to an average thickness of 25 mils dry (26 mils wet). The wearing coat is a polyurethane, applied at an average thickness of 15 mils dry (15 mils wet) with aggregate, broadcast at the rate of 8 to 10 pounds per 100 square feet. In drive aisles and heavy traffic areas, a second top coat with aggregate is applied.

3. "MasterSeal Traffic 2500 Deck Coating," as manufactured by BASF Building Systems (www.buildingsystems.basf.com).

The system consists of the 100% solids polyurethane primer (MasterSeal P 255 Primer) applied at a minimum rate of 300 square feet per gallon. Apply MasterSeal M 265 Base Coat (2 component polyurethane 100% solids) at a rate of 25 mils dry (25 mils wet). Allow base to cure and then apply MasterSeal TC 295 Top Coat (2 component polyurethane 100% solids) at a rate of 15 mils dry (15 mils wet) and broadcast 16/30 mesh silica sand at a rate of 20 to 25 pounds per 100 square feet in parking stall areas. In drive aisles and heavy traffic areas, the MasterSeal TC 275 Top Coat is applied at 15 mils dry (15 mils wet) and broadcast with silica sand at a rate of 50 to 60 pounds per 100 square feet, then apply MasterSeal TC 295 top coat at 10 mils dry (10 mils wet).

4. "Sikalastic 720/745" as manufactured by Sika Corporation (www.sikausa.com).

The system consists of Sikafloor FTP epoxy primer applied to the cleaned concrete surface at a minimum rate of 300 square feet per gallon no more than 48 hours prior to base coat application; when tack free, apply Sikalastic 720 basecoat at a nominal thickness of 23 mils dry (23 mils wet). When tack free, apply Sikalastic 745 topcoat at a nominal thickness of 18 mils dry (18 mils wet) and seed with 10-15 lbs/100 sf of oven dried quartz sand with a minimum gradation of 16/30 mesh and backroll. In drive aisles and heavy traffic areas, a second top coat of Sikalastic 745 at a nominal thickness of 18 mils dry (18 mils wet) and

seeded with 10-15 lbs/100 sf of oven dried quartz sand with a minimum gradation of 16/30 mesh is applied.

5. "Qualideck" as manufactured by Advanced Polymer Technology (www.qualideck.com).

The system consists of a 100% solids polyurethane primer Qualipur 152 applied to the cleaned concrete surface at a minimum rate of 300 square feet per gallon. The base coat application 100% solids, low/no odor Qualipur 252 polyurethane that is applied a nominal thickness of 25 mils dry (25 mils wet). In drive aisles and heavy traffic areas, apply an intermediate coat of Qualipur 372 polyurethane at 15-20 mils dry (15-20 mils wet) saturated with angular sand and backrolled. The topcoat is a 100% solids Qualipur 372 aromatic for interior or Qualipur 512 aliphatic polyurethane for exterior (UV exposure) applied at 15 mils dry (15 mils wet) then broadcast with 12/20 or 16/30 angular sand at a rate of 20-25 lbs/100 sf.

6. "Kelmar FWC 111" as manufactured by Technical Barrier Systems www.tbsproducts.com

The system consists of a solvent or water based epoxy primer applied to the cleaned surface at a rate of 250-300 square feet per gallon. The base coat is the NEO V II C latex neoprene applied to the primed concrete surface at a rate of 20 mils dry (32 mils wet). The wearing coat is 100% solids epoxy applied at 23 mils wet/dry in all areas then broadcast with sand to saturation. In drive aisles, cashier booths and steep helix type ramps, apply second layer of wearing coat at 23 mils wet/dry with aggregate broadcast to saturation. Finally, apply top finish coat of single component, water based acrylic latex emulsion at 125 square feet per gallon.

Category C - Fast Cure Applications for Highest Wear Resistance Locations

The following systems have been designed for loading docks, steep or spiraling ramps that require the highest level of wear resistance and/or where closure of the areas present and future presents a major disruption to the operation of the facility and must be minimized. Check with manufacturer and installer regarding specific size areas and time frames which are possible with these systems.

1. "Auto-Gard E," as manufactured by Neogard (www.neogard.com).

The system consists of an epoxy or urethane primer applied to the cleaned concrete surface at a minimum rate of 300 square feet per gallon no more than 24 hours prior to base coat application; when cured, apply FC7500/7960 urethane base coat at an average thickness of 20 mils dry (20 mils wet). When cured, apply 70714/70715-09 epoxy wear coat at an average thickness of 16 mils dry (16 mils wet) and immediately broadcast 12/20 mesh aggregate at a rate of 15 to 20 pounds per 100 square feet. For interior (no UV exposure) ramps, apply 70714/70715-09 epoxy top coat at an average thickness of 14 mils dry (14 mils wet). For exterior (UV exposure) ramps, apply FC7540/7964 urethane top coat at an average thickness of 14 mils dry (16 mils wet).

2. "Iso-Flex 750/760EU-HVT Flint Coating High Load System," as manufactured by Lym-Tal (www.lymtal.com).

The system consists of a solvent-free epoxy primer applied to the cleaned concrete surface at a rate of 250 feet per gallon no more than 24 hours prior to base coat application; the 750 base coat will be a polyurethane applied to an average thickness of 25 mils dry (26 mils wet). The wearing coat is Epoxy 200, applied at an average thickness of 20 mils dry (20 mils wet) with #4 crushed flint aggregate broadcast at the rate of 50 pounds per 100 square feet or to excess. Apply a 760 AR top coat at an average thickness of 18 mils dry (18 mils wet) and backroll.

3. "MasterSeal Traffic 2530 Traffic System," as manufactured by BASF Building Systems (www.buildingsystems.basf.com).

The system consists of the 100% solids polyurethane primer (MasterSeal P 255 Primer) applied at a minimum rate of 300 square feet per gallon. Apply MasterSeal M 265 Base Coat (2 component polyurethane 100% solids) at a rate of 25 mils dry (25 mils wet). Allow base to cure and then apply MasterSeal 350 epoxy at a rate of 20-25 mils dry and broadcast MasterSeal 940 aggregate to saturation at a

rate of about 10 pounds per 100 square feet in all areas. Remove excess aggregate.

4. "Sikalastic 22 Lo-Mod Traffic System" as manufactured by Sika Corporation (www.sikausa.com).

The system consists of Sikafloor FTP epoxy primer applied to the cleaned concrete surface at a minimum rate of 300 square feet per gallon no more than 48 hours prior to base coat application; when tack free, apply Sikalastic 720 basecoat at a nominal thickness of 23 mils dry (23 mils wet). When tack free, apply Sikadur 22 Lo-Mod bindercoat at a nominal thickness of 32 mils dry (32 mils wet) and seed with 15 lbs/100 sf of #16 aluminum oxide and backroll. When tack free, apply a second top coat of Sikadur 22 Lo-Mod bindercoat at a nominal thickness of 32 mils dry (32 mils wet) and seed with 15 lbs/100 sf of #16 aluminum oxide.

5. "Qualideck Qualipur" as manufactured by Advanced Polymer Technology (www.qualideck.com).

The system consists of a 100% solids polyurethane primer Qualipur 152 applied to the cleaned concrete surface at a minimum rate of 300 square feet per gallon. The base coat application is Qualipur 252 polyurethane that is applied a nominal thickness of 20 mils dry (20 mils wet). When cured apply Qualipur 372 polyurethane intermediate coat at 15 mils dry (15 mils wet) and broadcast 20-30 lbs/100 sf of angular silica aggregate and backroll. For interior (no UV exposure) ramps, apply Qualipur 552-E top coat at an average thickness of 15 mils dry (15 mils wet). For exterior (UV exposure) ramps, apply Qualipur 512 polyurethane top coat at an average thickness of 15 mils dry (15 mils wet).

6. "Kelmar T.E. System," as manufactured by Technical Barrier Systems www.tbsproducts.com

The system consists of a solvent or water based epoxy primer applied to the cleaned surface at a rate of 250-300 square feet per gallon. The base coat is the NEO V II C latex neoprene applied to the primed concrete surface at a rate of 20 mils dry (32 mils wet). The wearing coat is 100% solids coal tar epoxy applied at 23 mils wet/dry with 16/30 mesh silica sand broadcast with sand to saturation. When dry, apply second layer of wear coat using 100% solids coal tar epoxy applied at 23 mils wet/dry with aggregates broadcast to saturation. When dry, for loading docks and/or only if noted on the drawings, apply a third layer of wear coat using 100% solids coal tar epoxy applied neat at 18 mils wet/dry with no aggregate broadcast. Finally, apply top finish coat of

single component, water based acrylic latex emulsion at 125 square feet per gallon.

B. WATERPROOFING MEMBRANE (Base Coat)

- (1) The base coat (membrane) shall meet the following minimum performance criteria:
 - (a) Minimum Tensile Strength (ASTM D412):
Base Coat - 1,000 psi
Top Coat – 2,000 psi
 - (b) Minimum Elongation (ASTM D412):
Base Coat - 350%
 - (c) Minimum Adhesion – one of the following:

ASTM D903: Base Coat - 20 psi
ASTM C794: Base Coat – 25 pli
ASTM D4541: Base Coat – 250 psi
ACI 503: Failure occurs in concrete when $f_c < 6000$ psi
 - (d) A light application of primer compatible with the elastomeric seal coat shall be applied onto the clean, dry concrete surface. The elastomeric coating shall be applied uniformly to the primed surface. The elastomeric base coat shall be applied in strict accordance with manufacturer's requirements for the system and verified by wet mil thickness testing (minimum one test per 500 square feet). The coating shall be allowed to cure adequately. Special treatment shall be provided at all construction joints, cove joints and at all cracks over 1/16" in width. This special treatment shall be included in the bid price for the waterproofing membrane installation. The coating shall also be applied at base of columns, walls and curbs to produce a 4" minimum high base.
- (2) Minimum System Thickness (Dry Mils): 20 mils

C. WEARING COURSE

- (1) A compatible wearing course shall be applied over the base coat in accordance with the manufacturer's instructions. A selected aggregate shall be broadcast evenly over the surface and fall on the surface in vertical direction so as not to displace uncovered coating.

- (2) Aggregates should be spread to an excess thickness until surface appears dry. After the coating has sufficiently cured, the excess aggregates shall be removed and the tie coat shall be applied to the surface.

D. LEVELING COURSE (IF REQUIRED)

- (1) A compatible leveling course shall be applied directly onto the concrete surface after cleaning and prior to application of the primer. The leveling course is intended to fill and smooth pop-outs, scaling, depressions and pitting in the concrete surface due to abrasion, finishing problems or other existing conditions. Products listed below should be confirmed with the manufacturer's instructions.

Neogard - Leveling of the concrete surface prior to membrane system application in order to achieve a suitable substrate shall be performed using a Neogard 70714/70715-09 epoxy and sand mixture or FC base coat, depending on profile of concrete.

Lym-Tal - Leveling of the concrete surface prior to membrane system application in order to achieve a suitable substrate shall be performed using Iso-Flex 750 base coat extended with sand.

MasterSeal - Traffic 1500 / 2500 - Leveling of the concrete surface prior to membrane system application in order to achieve a suitable substrate shall be performed using MasterSeal 350 two component, fast-setting 100% solids epoxy, extended with 16 - 30 sieve aggregate as needed.

Sika - Leveling of the concrete surface prior to membrane system application in order to achieve a suitable substrate shall be performed using either the Sikalastic 720 base coat with a mixture of sand, or by using the Sikadur 21 Lo-Mod with a mixture of sand as needed.

Qualideck - Leveling of the concrete surface prior to membrane system application in order to achieve a suitable substrate shall be performed using Qualipur 152, a two component, 100% solids polyurethane with a mixture of angular sand as needed.

Kelmar - Leveling of the concrete surface prior to membrane system application in order to achieve a suitable substrate shall be performed using Kelmar RC, a two component, low modulus, 100% solids epoxy and sand mixture.

D. TOTAL SYSTEM REQUIREMENTS

- (1) Minimum System Thickness without Aggregate (Dry mils) in parking areas: 40 mils
- (2) Minimum System Thickness without Aggregate (Dry mils) in heavy wear areas: 50 mils
- (3) All systems shall be wear balanced for parking stall and drive aisle applications according to the manufacturer's recommendations.
- (4) Color of Wearing Course/Wearing Surface shall be as selected by the Consultant/Owner.

PART 3 - EXECUTION

3.01 CONDITION OF SUBSTRATE

- A. Examine the substrate and the conditions under which the elastomeric waterproofing work is to be applied. Do not proceed with the work until unsatisfactory conditions have been corrected and approved by the manufacturer's representative.
 - (1) Installation of products constitutes Installers and Manufacturer's acceptance of existing construction.

3.02 PREPARATION OF SUBSTRATE

- A. Clean the substrate of protrusions, dust, debris, oily materials and other substances detrimental to the work, as recommended by the waterproofing system's manufacturer.
 - (1) Shot blast horizontal surfaces to remove contaminants and to provide a clean uniform textured surface. Any other proposed cleaning methods must be submitted and approved by the Engineer.
 - (2) Clean vertical surfaces of column bases, spandrels, walls, protrusions, etc., to provide a clean uniform textured surface.
- B. Install cant strips and similar accessories as shown and as recommended by the waterproofing manufacturer (even though not shown) in the manner recommended by the manufacturer.

3.03 FLASHINGS, PRIMERS AND JOINT CONTROL

- A. Cracks/Construction Joints: At locations of possible movement in the substrate construction, including cracks which have developed and construction joints, prepare the substrate to increase the fluid applied waterproofing capability for bridging the

movement without failure. Use only products which have been determined to be compatible with the elastomeric waterproofing.

- B. Fill voids and non-moving cracks and joints in the substrate with sealant or other compounds as recommended by the waterproofing manufacturer for compatibility. Fill rough areas of substrate (rough within limitations specified by the manufacturer) with a feathered-out coating of elastomeric waterproofing, squeegee-applied to form a smooth top surface.
- C. Prime substrate as recommended by the waterproofing system's manufacturer.
- D. Mask off adjoining surfaces not to receive fluid applied waterproofing, to effectively prevent the spillage or migration of materials outside the membrane area.

3.04 INSTALLATION

- A. Manufacturer's Technical Representative: Start the installation of elastomeric waterproofing membrane, only in the presence and with the advice of the manufacturer's technical representative. A series of four (4) wet mill gauge tests shall be conducted for every 1000 sq. ft. on the first day of installation in the presence of the representative to ensure proper coverage rate.
- B. General: Comply with manufacturer's instruction, except where more stringent requirements are shown or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
- C. Mix separately packaged components in accordance with manufacturer's instructions.
- D. Apply the elastomeric membrane to the primed deck within the time specified by the manufacturer.
- E. Apply a uniform coating of cold applied elastomeric waterproofing to the substrate and adjoining surfaces indicated to receive the membrane.
 - (1) Apply coating by hand, complying with manufacturer's recommendations regarding horizontal and vertical surfaces.
 - (2) Provide waterproof membrane at base of columns, spandrels, to produce a 4" minimum high base. Curb surfaces shall be considered floors and waterproofed unless otherwise noted.
- F. Wearing Surface: Apply top coat in one or two applications to achieve the specified dry film thicknesses.
 - (1) While coating is still fluid, uniformly broadcast aggregate over the surface at the rate specified.

- (2) After top coat has cured, remove all excess aggregate from the deck surface.
- (3) Apply a tie coat to the cured surface to encapsulate the top layer of aggregate.

G. Permit cold applied membrane to cure without delay, and under conditions which will not contaminate or deteriorate the fluid applied waterproofing material. Block off traffic and protect membrane from physical damage.

3.05 CLEAN-UP

- A. Upon completion of work, carefully examine entire installation. Correct all defective or damaged work.
- B. Upon completion, or at such other times as directed, remove all surplus materials, cartons, rubbish and debris resulting from these operations and legally dispose of off-site.

3.06 PERFORMANCE REQUIREMENTS

- A. It is required that traffic topping be watertight and not deteriorate excessively under normal weather exposure and for normal traffic conditions in applications indicated, not under manufacturer-recommended cleaning procedures, for period of warranty.
- B. It is required that traffic topping work not deteriorate under spillage of motor oil, transmission fluids, and other motor vehicle operating compounds, nor for exposure to normal ice/snow melting substances not specifically excluded by manufacturer's product information.

3.07 PROTECTION

- A. Provide protection to ensure that work will be without damage or deteriorations at time of final acceptance.

END OF SECTION

SECTION 07 19 00

CLEAR PENETRATING CONCRETE SEALERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SCOPE OF WORK

- A. Provide concrete penetrating sealer system on all slab on grade, supported horizontal concrete deck surfaces, and 6" of all vertical concrete surfaces adjacent to horizontal deck surfaces as herein specified, unless otherwise noted.

1.03 QUALITY CONTROL

- A. Codes and Standards:
 - 1) Specified products in Category A shall comply with the provision of the following specification and standards, except as otherwise noted.
 - a) NCHRP 244 procedure - Series II & IV.
 - b) Scaling Resistance of Concrete (ASTM C-672) - No Scaling.
 - c) Alberta Department of Transportation and Utilities B388 Penetrating Sealer for Traffic Bearing Surfaces Type 1B - Water Repellency after Abrasion (minimum) 86.0%.
 - d) National Volatile Organic Compound Emission Standards For Architectural Coatings (40CFR Part 59) limiting VOC (Volatile Organic Compounds) to no more than 600 grams/liter.
 - 2) Specified products in Category B shall comply with the provision of the following specification and standards, except as otherwise noted.
 - a) NCHRP 244 procedure - Series II & IV.
 - b) Scaling Resistance of Concrete (ASTM C-672) - No Scaling.
 - c) Alberta Department of Transportation and Utilities B388 Penetrating Sealer for Traffic Bearing Surfaces Type 1B - Water Repellency after Abrasion (minimum) 86.0%.
 - d) VOC Requirements: Where applicable, the manufacturers shall ensure that all components of specified products do not exceed volatile organic compound (VOC) limits of 600 g/l.

- e) Projects in the following locations have stricter VOC limits of 400 g/l.

Connecticut, Delaware, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, New York, New Jersey, New Hampshire, Ohio, Pennsylvania and Washington DC.

Additionally, Virginia as follows: Arlington, Fairfax, Loudoun, Prince William, Stafford, Spotsylvania, Charles City, Chesterfield, Hanover, Henrico and Prince George Counties. Also Cities of Alexandria, Fairfax, Falls Church, Manassas, Manassas Park, Fredericksburg, Colonial Heights, Hopewell, Petersburg and Richmond.

Additionally, California as follows: Shasta, Tehama, Butte, Colusa, Yolo, Sonoma (northern half), El Dorado, San Luis Obispo and San Diego Counties.

Additionally, Arizona as follows: Maricopa County (396 g/l)

- e) Projects in the following locations have stricter VOC limits of 350 g/l.

California as follows: Imperial, Riverside, San Bernardino, Orange, Los Angeles, Ventura, Santa Barbara, Kern (western half), Tulare, Kings, Monterey, San Benito, Fresno, Madera, Merced, Stanislaus, Santa Clara, Santa Cruz, San Mateo, Alameda, San Francisco, Marin, Contra Costa, San Joaquin, Solano, Sonoma (southern half) Placer, Yuba and Sutte Counties.

Also, Utah as follows: Box Elder, Cache, Weber, Davis, Tooele, Salt Lake and Utah Counties.

B. Field Testing Acceptance:

- 1) Category A - Meet or exceed the following requirements for this project based on testing performed on a minimum of three, 3 inch diameter (or larger) core samples removed from the treated area.
 - a) Repellency Rating (Waterproofing Performance) - 80% or better, based on comparison of untreated versus treated samples. Test procedure for waterproofing performance shall be according to ASTM D 6489-99, "Standard Test Method for Determining the Water Absorption of Hardened Concrete Treated with a Water Repellent Coating".
 - b) Penetration (1 application) 1/8 inch minimum (3 mm), based on the average of a series of measurements on the split face of core samples.

- 2) Category B - Meet or exceed the following requirements for this project based on testing performed on a minimum of three, 3 inch diameter (or larger) core samples removed from the treated area.
 - a) Repellency Rating (Waterproofing Performance) - 85% or better, based on comparison of untreated versus treated samples. Test procedure for waterproofing performance shall be according to ASTM D 6489-99, "Standard Test Method for Determining the Water Absorption of Hardened Concrete Treated with a Water Repellent Coating".
 - b) Penetration (1 application) 1/4 inch minimum (6 mm), based on the average of a series of measurements on the split face of core samples.

C. Sealer Coordination:

- 1) Review other sections of these specifications in which curing compounds or paints, are to be provided on concrete surfaces to be sealed to ensure compatibility with the concrete sealer.

D. Warranty:

- 1) The system manufacturer shall furnish the Owner a written single-source performance warranty that the Concrete Penetrating Sealer System will be free of defects related to workmanship or material deficiency and meet or exceed the requirements of Part B for a ten (10) year period from the date of substantial completion of the work provided under this section of the specification.
- 2) Any required repairs under the warranty shall be made by the system manufacturer. The required written warranty shall be provided by the system manufacturer.

1.04 SUBMITTALS

- A. Submit manufacturer's product, application and surface preparation specifications, testing data and warranty for approval prior to sealing concrete decks.
- B. When payment for sealer application is based on square foot area of application, the area used in calculations shall be horizontal surfaces only.
- C. As a condition for payment of the sealer application, the contractor must submit an invoice indicating the delivery and site receipt of the quantity of material calculated and designated for this project. In addition to the calculated quantity, the invoice shall also

reflect the project address, or be designated for use on this project, if delivered to the contractor's address. No leftover material from previous projects will be permitted for use on this project.

1.05 JOB CONDITIONS

A. Environmental Requirements:

1. Do not proceed with application of materials if ambient temperature is below 20 degrees F. or if ice or frost are covering the substrate. For Enviroseal 40, do not proceed with application of materials if ambient temperature is below 40 degrees F.
2. Do not proceed with application if ambient temperature of surface temperature exceeds 100 degrees F.
3. Do not proceed with application of materials in rainy conditions or if rain is anticipated within 8 hours after application. Materials shall not be applied to damp substrates. The surface should be sufficiently dry to observe the spray pattern during application.

PART 2 - PRODUCTS

2.01 SEALER MATERIAL

- A. Provide a clear liquid "silane" type sealing compound, minimum 40 percent solid content, which will penetrate the concrete to provide a surface which is resistant to salts, de-icer chemicals, moisture, gasoline, oil and acids. Sealer material shall not permanently alter the appearance or surface texture of concrete surfaces.
- B. Sealer material shall be one of the products offered by the manufacturer's listed below. Substitute materials or manufacturers will not be allowed.

Category B

- 1) Evonik Degussa Corporation – Protectosil 300S or BHN. Apply at application rate of 200 sf/gal.
- 2) BASF Building Systems Inc. – MasterProtect H 1000 or H 1001. Apply at application rate of 200 sf/gal.
- 3) LymTal International – ISO-FLEX 618-100 CRS. Apply at application rate of 200 sf/gal.
- 4) SIL-ACT ATS-100. Apply at application rate of 200 sf/gal.

- C. All penetrating sealers applied shall contain fugitive dye to demonstrate complete and thorough application to surface.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine surfaces to receive sealer to assure that conditions are acceptable for application of materials. Concrete shall be cured a minimum of 28 days.
- B. Remove dirt, dust and materials that will interfere with the proper and effective application of the water repellent coating.
- C. All caulking, patching and joint sealants should be installed prior to application of this product.

3.02 INITIAL TEST APPLICATION AND TESTING

- A. Test Procedure:
 - 1) Prior to full scale surface preparation and application of selected material, a trial application shall be conducted. The locations shall be 11 feet by 11 feet in size for products applied at 125 square feet per gallon, 12 feet 3 inches by 12 feet 3 inches for products applied at 150 square feet per gallon, 13 feet 3 inches by 13 feet 3 inches for products applied at 175 square feet per gallon and 14 feet by 14 feet for products applied at 200 square feet per gallon, at a location determined by the Architect. The preferred location will be on a sloping ramp.
 - 2) The trial area shall be cleaned according to manufacturer's recommendations in the same manner as planned for the entire project. This may include sweeping and cleaning with compressed air, water cleaning under pressure or shotblasting. For the purposes of this test only, sandblasting is an acceptable substitute for shotblasting.
 - 3) Upon completion of surface preparation, a core will be removed from the cleaned surface and tested for water absorption. This is the Untreated Water Absorption value. The test area will then be treated with one gallon of the selected material. From the treated area, two core samples shall be removed. Both cores are to be tested for Treated Water Absorption and split with a chisel and dye tested for depth of sealer penetration. The repellency rating is calculated on the basis of untreated and treated water absorption values.
 - 4) Once field test results are obtained, which meets or exceeds requirements of Section 1.03.B.1.a and 1.03.B.1.b., the contractor will be authorized to perform

full scale surface preparation and application of the selected material. Do not proceed with application unless directed in writing by the Architect and Material Manufacturer.

- 5) Cost of trial area application and testing shall be included in the contractor's price for sealer installation. Testing shall be conducted by the Architect or his designee. Additional quality control testing, if desired by the Owner in other areas or subsequent to the installation to determine warranty performance, shall be paid for by the Owner.

3.03 APPLICATION

- A. Product shall be applied at a rate as specified above. Do not dilute or alter the material
- B. Preferred method of application is with low pressure (15 PSI) airless spray equipment or with a heavily-saturated brush or roller. Spray equipment should be equipped with solvent resistant gaskets and hoses.
- C. When applying by brush or roller, care will be taken to ensure that sufficient material is being applied to thoroughly saturate the treatment surfaces maintaining the appropriate square foot coverage rate required.
 - 1) Product shall be applied to horizontal surfaces in a single saturating application.
 - 2) Sufficient material shall be applied so that treated surfaces remain wet for a few minutes before penetration into the surface.
 - 3) Surface residues, pools and puddles shall be broomed out thoroughly until they completely penetrate into the surface.
 - 4) Treated surfaces shall be protected from rain and other surface water for a period of not less than eight (8) hours after application.
 - 5) Treated surfaces shall be protected from excessive foot and vehicular traffic for a period of not less than eight (8) hours after application.

3.04 CLEAN-UP

- A. When the work of this Section is complete, and at such other times as directed, remove surplus and waste materials, debris, rubbish, equipment, and implements from the site, and leave the work in a clean, neat and acceptable condition, as approved by the Architect.

END OF SECTION

SECTION 07 92 00

SEALANTS AND CAULKING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SCOPE OF WORK:

- A. Furnish labor, materials and equipment for sealing and caulking of cracks, construction or control joints and cove in the reinforced concrete structural slabs as shown on drawings or designated by the Consultant. The sealant shall be compatible with any specified waterproofing membrane base coat material.

1.03 JOB CONDITIONS:

- A. The sealant shall be installed in floor cracks, construction and/or control joints in the areas shown on drawings or designated by the Consultant. In the case of repair of existing cracks which are sealed or filled with other materials, the existing sealant material shall be raked out and the exposed concrete cleaned by sandblasting or grinding at those locations designated for repair.

1.04 FULL RESPONSIBILITY:

- A. System manufacturer will have the full responsibility for: (1) Instructing the Contractor on the required configuration of joints and (2) Reviewing and approving tooled joints constructed as a part of surface preparation prior to installing the sealant.

1.05 GUARANTEE:

- A. The Contractor shall provide a single source performance guarantee that the joint system repaired, including related work in the slab installed by the Contractor, will not leak water or de-bond from adjacent concrete for a 5 year period starting from the date of substantial completion. Any repairs required during the guarantee period starting from the date of substantial completion shall be performed by the Contractor at no additional cost to the Owner.

1.06 APPLICATOR QUALIFICATIONS:

- A. The Contractor shall have a minimum of three years of experience in performing work similar to that shown in the drawings and specifications.
- B. The Contractor shall submit a list of five projects in which similar work to that specified hereinbefore was successfully completed. The list shall contain the following for each of the five projects:
 - 1. Project Name
 - 2. Owner of Project
 - 3. Owner's Representative, Address and Telephone Number
 - 4. Brief Description of Work
 - 5. Cost of Portion of Work Similar to that Specified in this Section
 - 6. Total Restoration Cost of Project
 - 7. Date of Completion of Work

The sum of the costs of the five projects provided shall be a minimum of \$50,000.

- C. A full time on-site supervisor shall be provided by the contractor for the duration of the sealant and caulking work. This supervisor shall have had a minimum of 2 years documented supervisory experience with the products to be used.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. The joint sealant to be used for cracks and construction joints shall be two component polyurethane sealants of the chemically curing type containing no asphalt, coal tar, or plasticizers. The sealant shall be used with a compatible primer specified by the manufacturer. Approved products for use are:
 - 1. "MasterSeal-SL-2" as manufactured by BASF Building Systems (www.buildingsystems.basf.com)
 - 2. "Vulkem 245/255 or THC-900" as manufactured by Tremco (www.tremcosealants.com)
 - 3. "Iso-Flex 880GB Sealant" as manufactured by LymTal International, Inc. (www.lymtal.com)
 - 4. "Sikaflex-2C-SL," as manufactured by Sika Corporation (www.sikausa.com)
- B. The sealant to be used shall meet or exceed the requirements of Interim Federal Specification TT-S0027-E, Sealants Class A, Type 1 and 2. The sealant shall not de-bond

or fail while elongated 25 percent in a water immersion test, according to Federal Specification TT-S-0027-E. When tested according to Paragraph 4.3.5. of Federal Specification TT-S-0027-E, weight loss shall not be greater than 5 percent. Shore A hardness under standard conditions shall be 25-30.

- C. The cove sealant to be used shall be a non-sag, two component polyurethane sealants of the chemically curing type containing no asphalt, coal tar, or plasticizers. The cove joint sealant shall comply with Federal Specification TT-S-00227E, Type II, Class A, Corporation of Consultants CRD-C-506-72; ASTM C-920-79, Type M, Grade NS, Class 25.

Approved Cove Sealants are as follows:

1. "MasterSeal-NP-2" as manufactured by BASF Building Systems (www.buildingsystems.basf.com)
2. "THC-901" as manufactured by Tremco (www.tremcosealants.com)
3. "Iso-Flex 881 NS Sealant" as manufactured by LymTal International, Inc. (www.lymtal.com)
4. "Sikaflex-2C-NS," as manufactured by Sika Corporation (www.sikausa.com)

- D. The joint sealant to be used on the exterior, vertical control joints shall be a one-part, fast curing, non-sag, silyl-terminated polyether elastomeric sealant. If necessary, the sealant shall be used with a compatible primer specified by the manufacturer. Approved products for use are:

1. "MasterSeal-NP-150" as manufactured by BASF Building Systems (www.buildingsystems.basf.com)
2. "Iso-Flex 825" as manufactured by LymTal International, Inc. (www.lymtal.com)

Note: Color selection shall be by the **Owner** from standard choices available.

- E. The manufacturer of the sealant system used in this project shall share responsibility for all sealant work and joint preparation work in slab.

PART 3 - EXECUTION

3.01 TYPICAL SURFACE PREPARATION:

The Contractor shall either grind the surface of all cracks and construction joints designated for repair with sealant to the shape of 1/2" x 1/2" v-groove, or sawcut a square 1/2" x 1/2" groove, grind sharp corner of groove and apply bond breaker to bottom horizontal surface. Edges of cracks or joints to be sealed shall be of sound concrete. Prior to installing sealant, surfaces shall be cleaned of foreign materials and debris, V-groove ground and primed.

3.02 RECORD OF SEALED CRACK AND JOINT LOCATIONS AND TYPES:

- A. After determining the cracks and joints to be sealed and the detail types required, the Contractor shall prepare scale shop drawings showing the sealed crack and/or joint locations and submit them to the Consultant for his approval. The Shop Drawings submitted shall be reviewed by the Consultant for the condition of the existing cracks/joints, the size/shape of the routed crack, and the type of detail selected.
- B. The Shop Drawings submitted shall be used as a record of the detail types used and the measured number of linear feet of each sealed crack. Quantities of work done on a unit price basis shall be recorded on the document and submitted to the Consultant with Request for Payment.

END OF SECTION

SECTION 07 92 23

PRESSURE EPOXY INJECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 DESCRIPTION

- A. The Contractor shall provide all necessary materials, equipment, and labor required to epoxy inject cracks at locations shown on drawings or as directed by the Consultant.

1.03 APPLICATOR QUALIFICATIONS

- A. The Contractor shall have a minimum of three years of experience performing work similar to that shown in the drawings and specifications.
- B. The Contractor shall submit a list of five projects in which similar work to that specified herein was successfully completed. The list shall contain the following for each of the five projects:
 - 1. Project Name
 - 2. Owner of Project
 - 3. Owner's Representative, Address and Telephone Number
 - 4. Brief Description of Work
 - 5. Cost of Portion of Work Similar to that specified in this Section
 - 6. Total Restoration Cost of Project
 - 7. Date of Completion of Work
- C. The sum of the costs of the five projects provided in B.5 above shall be a minimum of \$50,000.
- D. A full-time on-site supervisor shall be provided by the Contractor for the entire duration of the epoxy injection work. The supervisor shall have had a minimum of 2 years of documented supervisory experience with the products to be used. If the supervisor does not have that experience, the supplier or manufacturer of the materials shall provide a full-time qualified, certified by the manufacturer, field inspector on jobsite during the entire period of material application. The Installation Contractor shall submit with his bid to the Consultant a proof of obtaining licenses or permits as required.

1.04 QUALITY CONTROL

A. The materials supplier shall provide the following test data for each production run or batch of epoxy formulation to be used:

1. Tensile strength by ASTM D638
2. Elongation at break by ASTM D638
3. Flexural strength of ASTM D790
4. Flexural modulus by ASTM D790
5. Compressive yield strength by ASTM D695
6. Compressive modulus by ASTM D695
7. Heat deflection temperature by ASTM D648
8. Slant shear strength by AASHTO-237

1.05 SUBMITTALS

A. The Contractor shall submit the following to the Consultant:

1. Documentation showing compliance with the Applicator Qualifications as specified hereinbefore.
2. Technical data sheets published by the material manufacturers for each epoxy product or formulation to be used showing that his products meet the requirements of the specifications. Technical data shall include the following:
 - a. Intended use
 - b. Pot life (neat)
 - c. Initial cure time (1000 psi)
 - d. Tack free (thin film)
 - e. Final cure (75% ultimate strength)
 - f. Tensile strengths by ASTM D638-76 (14 days)
 - g. Tensile elongation by ASTM D638-76 modified (14 days)
 - h. Flexural strength and modules per ASTM D790-71 at 24 hours, 3 days, and 7 days at 77 degrees F.
 - i. 24-hr. compressive strength by ASTM C109 modified (1 part epoxy to 3-1/4 parts aggregate)
3. Submit safety data sheets for each product.

1.06 PRODUCT DELIVERY

A. The product shall be delivered and handled strictly according to the manufacturer's recommendations. Any containers of the material to be used which have been opened previously shall not be accepted.

1.07 JOB CONDITIONS

- A. Existing and environmental conditions: The Installation Contractor shall examine the condition of surfaces into which the epoxy is to be injected. He shall follow the recommendations of the manufacturer with regard to limitations of the materials in various moisture and temperature levels.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The epoxy injection materials shall be a two-component, 100% solids, low viscosity, high strength epoxy resin adhesive.

One of the following approved products shall be used:

1. "Sikadur 35, Hi-Mod LV or LPL" as manufactured by the Sika Corporation (www.sikausa.com)
2. "MasterInjet 1500" as manufactured by BASF (www.buildingsystems.basf.com)
3. "Euco epoxy Injection Resin" as manufactured by the Euclid Chemical Company (www.euclidchemical.com)

Or approved equal.

- B. One of the following approved products shall be used to seal injection ports and cracks for injection grouting:

1. "Sikadur Injection Gel" as manufactured by the Sika Corporation.
2. "MasterEmaco ADH 327RS" as manufactured by BASF.
3. "Euco #452 or #620 Gel" as manufactured by the Euclid Chemical Company.

or approved equal.

- C. Aggregate:

1. Aggregate shall be clean, dry, graded, and bagged
2. Well-rounded or spherical-shaped sand is recommended for flowability
3. Aggregate may be graded as follows by volume:

2 parts, 12 mesh to 1 part, 80 mesh, or
3 parts, 16 mesh to 1 part, 90 mesh

4. If the above sand is not used, 30-mesh silica sand shall be used.

2.02 MIXES

- A. Where approved by the Consultant, the Contractor may use a pre-placed aggregate technique. The ratio of binder to aggregate by volume shall be 0.8 or greater. Test data shall be submitted for conformance with the following:
 1. Compressive strength by ASTM D695-76-8000 psi minimum
 2. Compressive modulus by ASTM D695-76-2.75 x 10⁶ minimum

2.03 EQUIPMENT

- A. The equipment used to inject the epoxy shall meet all of the following performance requirements:
 1. Automatic proportioning of materials within the mix ratio tolerances set by the manufacturer of the epoxy material.
 2. Mix the epoxy automatically and completely in line (batch mixing will not be permitted).
 3. Inject the material under pressures recommended by the materials supplier.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION, INJECTION, AND DELIVERY SYSTEM

- A. The epoxy shall be injected into the cracks or joints only from the lower elevations of the members. The bottom, side, and top surfaces of cracked members must be sealed with a gel-consistency epoxy prior to injection, and must contain appropriate injection ports.
- B. The Contractor shall notify the Consultant of the start of the first injected cracks. In the event that unsound concrete is located in a zone along a crack, and this prevents the complete injection of the cracks, then the unsound concrete shall be removed prior to injection.
- C. The epoxy material injected into the cracks or joints shall be highly suited for this usage. The pressure injection system shall be capable of filling cracks as small as 0.002 inches in width.
- D. Where cracks to be injected have any existing sealant, waterproofing materials, or other debris in the cracks, these cracks shall be cleaned using low-pressure hot water or high-pressure water jet, as appropriate.

- E. The Contractor shall clean surfaces of excess epoxy by grinding or other appropriate means so that only the edge thickness of completed epoxy-injected cracks is noticeable. Injection ports shall not extend beyond the plane of the surfaces of the existing concrete.

3.02 PREPACKING LARGE CRACKS

- A. Where required in cracks of large thickness, the Contractor shall prepack the cracks with fine aggregates to minimize the effects of exotherm, or reduce tensile stresses caused by volume reduction during cooling of the injected epoxy.

3.03 FIELD QUALITY ASSURANCE

- A. The Contractor shall supply samples of the injection epoxy, non-sag epoxy, and epoxy mortar to the Testing Laboratory for the purpose of performing compression tests.
- B. A minimum of three samples per day of each epoxy formulation or use shall be made.
- C. Samples shall be made by placing epoxy into 3/8-in. inside diameter test tubes. The height of the sample shall be approximately 1 in. so that after trimming a cylinder of 3/8 in. diameter and 3/4" length can be obtained.
- D. The Contractor shall be responsible for drilling and removing two 1-in. diameter by 2-in. long cores into the side of injected members at the direction of the Consultant to determine whether the crack injection is complete. The contractor also shall provide samples of mixed epoxy for testing. If injection is incomplete (less than 90% of the injected crack filled), reinjection and additional cores may be required at the direction of the Consultant at no extra cost to the Owner.

END OF SECTION

SECTION 07 95 00

EXPANSION JOINT SEALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SCOPE OF WORK

- A. Furnish labor, materials, equipment and supervision to install watertight, traffic bearing expansion joint seals in accordance with these specifications and as shown on the drawings.

1.03 QUALITY ASSURANCE

- A. The manufacturer and approved applicator shall provide a 5 year guarantee that the joint seal will not leak or fail from normal vehicular traffic. Any type of failure of the new joint seal which occurs within the specified warranty period shall be repaired by the Contractor at no cost to the Owner.
- B. Consult the Manufacturer's representative and establish the minimum provisions required to ensure satisfactory work. A licensed applicator with a minimum of 5 years experience on similar joints shall install the specified joint seal.

1.04 SUBMITTALS BY THE CONTRACTOR

- A. The Contractor shall submit shop drawings showing all the expansion joint details required for this particular project for approval by the Consultant in addition to Manufacturer's literature with an applicable portions deleted.
- B. Where required by jurisdiction, the Contractor shall submit test data showing that the expansion joint system (including fire barrier material) meets or exceeds fire rating requirements. Testing procedures shall be in accordance with requirements set forth or adopted by the local jurisdiction.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

All materials shall be delivered on the job and stored in a place protected from damage, moisture and exposure to the elements in exact accordance with manufacturer's instructions.

1.06 JOB CONDITIONS

Weather Conditions: Do not proceed with installation of expansion joints and sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation. Proceed with the work only when forecasted weather conditions are favorable for proper cure and strength development of the nosing material.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The expansion joint seal system shall be a complete system of compatible materials designed by the manufacturer to produce a waterproof, traffic-bearing expansion joint seal. The system shall also meet or exceed any fire rating requirements set forth by the local building code requirements.
- B. The gland elements shall be a continuous, factory extruded unit for the entire straight run length of the joint. Changes in direction or elevation shall be accomplished by factory molded elbows, tees, crosses and the like. The seal shall be turned up a minimum of 6 inches (vertically) unless otherwise shown on plans. The seal element shall not be mitered/jointed unless approved by the Consultant in writing and shall meet the following performance criteria.

Tensile Strength	ASTM D412	1,500 psi
Elongation at Break	ASTM D412	175 % (Min.)
Hardness, Type A durometer	ASTM D2240	64 ± 5

The premolded elements shall be a continuous, factory molded unit for the entire straight run length of the joint. Changes in direction or elevation shall be accomplished by factory molded elbows, tees, crosses and the like. The seal shall be turned up a minimum of 6 inches (vertically) unless otherwise shown on plans. The seal element shall be mitered/jointed at all changes in direction and shall meet the following performance criteria.

Tensile Strength	ASTM D412	250 psi
Elongation at Break	ASTM D412	500 % (min)
Hardness, Type A durometer	ASTM D2240	30+/-5

- C. Expansion joint systems approved for use in one or more applications are provided in the master list below. Due to variations in specific details of the locations, expected movement, expected traffic exposure, availability, ease of installation and existing blockout geometry, all systems are not suitable for one particular project. The Contractor shall reference the specific expansion joint detail on the specific project

drawings and list of approved products shown on the drawings, including gland size, etc. for the respective condition.

D. Approved Products – Horizontal Applications

1. “Wabocrete/Membrane 201 system,” model as applicable, manufactured by Watson Bowman Acme, (www.wbacorp.com).
8. “Iso-Flex Winged Expansion Joint Sealing System”, seal type as applicable, as manufactured by LymTal International, Inc. (www.lymtal.com).
11. “Emseal Thermaflex,” model as applicable, manufactured by Emseal Joint Systems, Ltd. (www.emseal.com).
13. “WF Elastomeric Expansion Joint System”, model as applicable, manufactured by Conspec Systems, Inc., (www.c-sgroup.com).
14. “Zip Block Expansion Joint System”, model as applicable, manufactured by Conspec Systems, Inc., (www.c-sgroup.com).

G. Contractor shall review specific details on drawings for each project regarding products and model numbers approved for use.

Due to various joint width openings and overall block-out dimensions, the Contractor and expansion joint supplier should verify field condition prior to bid submission and execution of the work.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Preparatory Work

1. The block-out shall be provided to the specified dimensions and acceptable to the manufacturer. The licensed installer shall additionally verify that the ‘as-built’ configuration of the block-out for the expansion joint will allow the expansion joint to be installed such that elevation differences in the vicinity of the joint and across the joint will not exceed industry and ADA-related recommendations. Any edge raveling at the joint opening or spalls shall be repaired with a suitable compound to provide a solid, square block-out.
2. The block-out substrate shall be sandblasted clean of all contaminants and impurities immediately prior to the system installation to assure proper adhesion.

3. The membrane gland element shall be unpackaged and laid in a relaxed position to relieve any temporary set from shipment packaging prior to placement. The pre-molded element shall be wiped clean with a solvent solution such as toluene.
4. It is recommended that adjacent deck surfaces be taped off and protected to assure a clean, neat professional installation.

B. Installation

The entire installation shall be made in strict accordance with the manufacturer's written instruction.

1. Follow standard manufacturer's recommendation for installation of the material, taking into account block-out dimensions, joint width and ambient temperature conditions.

3.02 TESTING

All new expansion joint seals shall be tested. Any leaking observed shall be rectified by the Contractor and the joint shall be re-tested until no leakage is observed. It is the responsibility of the Contractor to absolutely make certain that the joints are totally waterproofed.

END OF SECTION

DIVISION 9

FINISHES

SECTION 09 90 00

PAINTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 DESCRIPTION OF WORK

- A. The extent of painting work is shown on the drawings and could include, but not be limited to, the following:
1. Painting parking lines, arrows, handicap symbols and curb edges.
 2. Painting exposed steel reinforcing and miscellaneous metals where noted with a zinc rich primer containing 92-95% metallic zinc in dry film.

1.03 QUALITY ASSURANCE

- A. Paint Coordination:

Provide finish coats which are compatible with the prime paints used. Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of the total coatings system for the various substrates.

- B. Codes and Standards:

- SSPC-"Systems and Specifications", published by the Steel Structure Painting Council.
- Painting and Decorating Contractor's of America (PDCA) Technical Manual as a reference standard.

1.04 SUBMITTALS

- A. Manufacturer's Data:

1. Submit manufacturer's technical information in standard printed published form, including performance criteria, label analysis, application instructions and MSDS sheets for each material proposed for use.

2. List each material and cross-reference to the specific paint and finish system and application. Identify by manufacturer's catalog number and general classification.

B. Samples:

1. Submit color chip samples and verify color selections from 12" x 12" draw down cards of each color required, for Owner/Consultant's review.
2. Color shall be as herein specified or as selected by the Consultant prior to the start of work and final confirmation based on actual samples in the field.

1.05 OWNER'S INVENTORY

- A. Provide one gallon of each color used, to Owner, for maintenance purposes.

1.06 DELIVERY AND STORAGE

- A. Deliver all paint to site in manufacturer's sealed and labeled containers. Labels shall bear manufacturer's name, brand, type of paint, Federal spec. number (if applicable), color of paint, and instructions for reducing.
- B. Store materials and equipment in a designated storage space on the site. Keep storage space neat, clean and accessible at all times. Protect floors from paint spillage.

1.07 PROTECTION

- A. Place paint or solvent-soaked rags, waste, or other materials which might constitute a fire hazard in metal containers and remove from premises at the close of each day's work. Take every precaution to avoid damage by fire.
- B. Provide foam type 2-1/2 gallon capacity fire extinguishers for each paint storage space.
- C. Protect the work of all other trades against damage, marking or injury by suitable covering during the progress of the painting and finishing work.

1.09 JOB CONDITIONS

- A. Examine all surfaces to receive coatings and report to the Consultant any condition which is not acceptable. Commencement of work and in any area constitutes acceptance of conditions and places the responsibility for a workmanlike job on this Section.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F. and 95 degrees F., unless otherwise permitted by the paint manufacturer's printed instructions.

- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.

PART 2 - PRODUCTS

2.01 MATERIAL QUALITY

- A. Provide only absolutely pure linseed oil, turpentine, shellac, and other like materials that are of the highest quality, with identifying labels intact and seals unbroken. Use no thinners other than those specified by the manufacturer.
- B. Use only primers and undercoaters that are suitable for each surface to be covered and that are compatible with the finish coat required.
- C. Use products of the same manufacturer for succeeding coats.
 - 1. Where shop primed materials are to be finish painted and/or prime coat materials are by a different manufacturer than the finish coat materials, confirm compatibility of the primers with the manufacturer of the finish coat paints.
 - 2. Where existing previously painted surfaces are to be finish painted, confirm compatibility of existing painted surfaces with the manufacturer of the succeeding new paints.
 - 3. Where specific products by selected manufacturers are named, approved equals from ICI Paint Stores, Dunn Edwards Corp., Frazee/Deer-O, Sherwin-Williams Paint Co. and Pioneer Paint may be submitted.
- D. All materials shall comply with Environmental Protection Agency Pt. 59, Subpt. D, Table 1 of Section 40CFR Parts 53-59, Volume 5, 2004 Edition.

2.02 METAL PRIMERS

- A. General:
 - 1. For new metal surfaces not otherwise specified for shop prime painting and for touch-up painting of shop prime coats, provide one of the following metal primers as appropriate for the surface condition and finish coats of the metal.
 - a. Field touch-up painting shall be in accordance with SSPC-PA 1-64 and shall be of the same kinds and number of coats as applied in the shop.

- b. Refer to other sections of these specifications for shop primed items.

B. Ferrous Metal Primers:

- 1. Hot rolled steel surfaces to receive alkyd or acrylic latex finish coats shall be primed with one of the following primers:
 - a. Syn-Lustro (W8), Corrobar (43-5), Galv-Alum (43-7) or Bloc-Rust (43-4) by Dunn Edwards PRO-CRYL B66-310; Sherwin Williams.
 - d. PPG 94-231or approved equal.

C. Non-ferrous Metal Primers:

- 1. Surfaces to receive alkyd or acrylic latex finish coats shall be primed with one of the following primers:
 - a. Syn-Lustro (W8), Galv-Alum (43-7) or Ultra-Grip (W 715) by Dunn Edwards.or approved equal.

D. Primers for Galvanized Metal:

Existing galvanized surfaces should be etched with Metal Etch (JASCO-0702-1) or approved equal after being solvent cleaned to remove oil, grease and other contaminants.

2.03 PAINT SYSTEMS

- A. Provide the following paint systems for the various substrates, as indicated.

B. Ferrous or Non –Ferrous Metals:

- 1. Acrylic Latex Semi-Gloss or Gloss Finish
 - a. 1st Coat-metal primer as specified elsewhere in this section.
 - b. 2nd Coat-Semi-Gloss or High gloss acrylic enamel Syn-Lustro W9 or Permagloss W960 by Dunn Edwards, or approved equal.
 - c. 3rd Coat- Semi-Gloss or High gloss acrylic enamel Syn-Lustro W9 or Permagloss W960 by Dunn Edwards, or approved equal.

- d. Not less than 4.0 mils dry film thickness including primer.

C. Zinc Coated Metal:

- 1. Acrylic Direct-To-Metal (DTM) system.
 - a. Pretreat galvanized metal as specified elsewhere in this section.
 - b. 1st Coat-Semi-Gloss or High gloss acrylic enamel Syn-Lustro W9 or Permagloss W960 by Dunn Edwards, or approved equal.
 - d. 2nd Coat- Semi-Gloss or High gloss acrylic enamel Syn-Lustro W9 or Permagloss W960 by Dunn Edwards, or approved equal.
 - e. Not less than 4.0 mils dry film thickness including primer.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

A. General:

- 1. Perform all preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.
- 2. Clean surfaces to be completely dry prior to applying primers, paints or surface treatments. Remove oil and grease with clean cloths and cleaning solvents. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film. For excessive chalked surfaces, pressure washing or scrubbing the surface with a stiff brush and mild detergent is necessary. Rinse thoroughly with a strong stream of water.
- 3. Before applying succeeding coats, primers and undercoats shall be completely integral and shall perform the function for which they are specified. Properly prepare and touch up all scratches, abrasions or other disfigurements and remove any foreign matter before proceeding with the following coat. All spot-priming or spot-coating shall be featheredged into adjacent coatings to produce a smooth and level surface.

B. Cementitious Materials:

Prepare cementitious surfaces of concrete to be painted by using approved cleaning solvents and high-pressure power washing with minimum pressures of 2,500 to 5,000

PSI at a flow of 4 to 14 gallons per minute in accordance with SSPC SP1 to thoroughly remove all efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze, or provide sufficient bite on existing painted surfaces.

C. Ferrous Metals:

1. For new ferrous metals, after erection is completed, touch-up heads of bolts, welded surfaces which are unpainted, and surfaces or areas where the primer has been abraded or otherwise damaged. For Paint System 2.07 B.1 use SSPC SP-2 and SSPC PC-3 Hand and Power tool Cleaning prior to application of the touch-up painting. For Paint System 2.07 B.2 use SSPC-SP6.
2. For existing ferrous metals in good condition, power wash using approved cleaning solvents and minimum pressures of 2,500 to 5,000 PSI at a flow of 4 to 14 gallons per minute in accordance with SSPC SP1.
3. For ferrous metals that are heavily corroded metal, or have loose rust, mill scale, coatings, or other detrimental foreign matter, sandblast clean to SSPC-SP6.

D. Galvanized Metals:

1. All galvanized metals to receive factory Paint-Grip Phosphate Surface Treatment, or approved equal.
2. Prior to paint application, clean galvanized metal surfaces of all oil, grease and other contaminants in accordance with the applicable requirements of SSPC-SP 1-63 "Solvent Cleaning" and prime as specified elsewhere in this section.
3. Prior to application of subsequent coats, thoroughly clean all surfaces to ensure the removal of any grease, soil, dust or foreign matter. Take particular care to prevent the contamination of cleaned surfaces with salt, acids, alkali or other corrosive chemicals before prime coating and between subsequent coats of paint.

3.02 MATERIALS PREPARATION

- A. Mix and prepare painting materials in strict accordance with the manufacturer's directions.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir all materials before application to produce a mixture of uniform density, and as required during the application of the materials.

3.03 APPLICATION

- A. Apply paint with brush, roller, spray, or other acceptable practice in accordance with the manufacturer's directions.
- B. Spread all materials evenly and smoothly without runs, sags or other defects. Make edges of paint adjoining other materials or colors sharp and clean, without overlapping.
- C. The number of coats and paint film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has completely dried. Sand between each enamel coat application with fine sandpaper, or rub surfaces with pumice stone where required to produce an even, smooth surface in accordance with the coating manufacturer's directions.
- D. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. Give special attention to insure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a film thickness equivalent to that of flat surfaces.
- E. For each coat of paint use slightly different shade than preceding coat. Tint final undercoat to color of finish coat.
- F. Paint directional arrows, parking stalls, marking lines, handicap symbols, etc., to be as detailed on the Drawings. Unless otherwise detailed, single line width to be four (4") inches wide. Striped areas shall be four (4) inch wide lines eighteen (18) inches on center. Lay out all painted lines and define with chalk markings for approval before proceeding with painting.
- G. Install stall striping using a gravity flow method approved by the Consultant. Spray painting will not be approved.

3.04 APPLICATION OF CONCRETE COATING

- A. Apply concrete coating in accordance with manufacturer's printed instructions, employing technically trained personnel, using equipment specifically designed for this purpose.
- B. Apply Concrete Coating in two applications with a fine texture to match approved sample.
- C. Minimum dry film thickness shall be 6.0-8.0 mils per coat.
- D. Finished work shall match approved samples; be uniform in sheen, color and texture and be free from defects detrimental to appearance or performance.

- E. Verify dry film thickness of completed surfacing system in the field, at random, using a Tooke Inspection Gauge. Minimum thickness shall be as specified excluding foundation or fill coats. Conduct tests in presence of Consultant or his representative.

3.05 CLEAN-UP

- A. During the progress of the work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.
- B. Upon completion of painting work, clean paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- C. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

END OF SECTION

SECTION 09 90 14
PAVEMENT MARKING PAINT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Contract 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 all labor, equipment and services to paint following items of types, patterns, sizes, and colors as shown on Contract Drawings:
 - 1. Parking Stall Stripes
 - 2. Traffic Arrows, crosswalks, accessible stall access aisles, walkways, symbols, stop bars, words and other markings
 - 3. International Symbol of Accessibility
 - 4. Curbs and curb ramps at unobstructed locations subject to tire impact.
- B. Related Work:
 - 1. Pavement Marking Contractor shall verify compatibility with sealers, joint sealants, caulking and all other surface treatments as specified in Division 7.

1.3 SUBMITTALS

- A. Provide paint specifications data as follows:
 - 1. Manufacturer's certification that the material complies with Federal specifications where required in this Section.
 - 2. Intended paint use.
 - 3. Pigment type and content.
 - 4. Vehicle type and content.
- B. Submit list of similar projects (minimum of 5) where pavement-marking paint has been in use for a period of not less than 2 yrs.
- C. Material Safety: Contractor shall provide Engineer/Architect with Material Safety Data Sheets (MSDS) for all materials and supplies used.
- D. See requirements of Division 1 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
- E. See requirements of Division 1 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

1.4 QUALITY ASSURANCE

- A. Provide written 1year warranty to Owner that pavement markings will be free of defects due to workmanship, inadequate surface preparation, and materials including, but not limited to, fading and/or loss of markings due to abrasion, peeling, bubbling and/or delamination. Excessive delamination, peeling, bubbling or abrasion loss shall be defined as more than 15% loss of marking material within one year of substantial completion and/or occupancy of the parking area. With no additional cost to Owner, repair and/or recoat all pavement marking where defects develop or appear during warranty period and all damage to other Work due to such defects.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All paint products shall have drying characteristics in accordance with the drying time performance requirements of Type I of Federal Standard TT-P-1952D.
- B. Pavement marking materials shall meet Federal, State and Local environmental standards.
- C. Acceptable pavement marking paints:
 - 1. Concrete Surfaces:
 - a. Sherwin Williams - Pro-Park Waterborne Traffic Marking Paint B97 Series.
 - b. Provide Aggregate for slip resistance at crosswalk markings.
 - 2. Traffic Membrane Surfaces:
 - a. Urethane Paint - Sherwin Williams – Corothane I HS, B65 Series.
 - 3. Single Paint for both Concrete and Traffic Membrane Surfaces:
 - a. Urethane Paint - Sherwin Williams - Corothane I HS, B65 Series.
 - 4. Asphalt Surfaces:
 - a. Sherwin Williams – Hotline Waterborne Traffic Paint or approved equal. The contractor shall establish compatibility of traffic paint with sealcoating products proposed and submit evidence to Engineer for review and approval.
- D. Water-borne paint may be used for special color pavement markings (blue) meet requirements of Federal Specification TT-P-1952D. Special color marking materials shall be compatible with the white and yellow pavement markings where they are layered.
- E. Paint shall be manufactured and formulated from first grade raw materials and shall be free from defects or imperfections that might adversely affect product serviceability.
- F. Paints shall comply with the National Organic Compound Emission Standards for Architectural Coatings, Environmental Protection Agency, 40 CFR Part 59 (1998.)
- G. The product shall not contain mercury, lead, hexavalent chromium, or halogenated solvents.

- H. Color of paint, unless noted otherwise on Contract Drawings, shall be white and daylight directional reflectance (without glass beads) shall not be less than 84% (relative to magnesium oxide) when tested in accordance with Federal Test Method Standard 141, Method 6121.
- I. Paint color for blue accessible parking space pavement markings, if shown on Contract Drawings, shall match federal color chip No. 35180. Color shall have daylight directional reflectance (without glass beads) of not less than 52% (relative to magnesium oxide) when tested in accordance with Federal Test Method Standard 141, Method 6121.
- J. Pavement marking materials shall have a static coefficient of friction equal to 0.8 for markings on accessible ramps, curbs and curb ramps and a static coefficient of friction equal to 0.6 for all other markings. Silica sand and/or glass beads may be used to achieve the required coefficient of friction, in accordance with manufacturer's recommendations.
- K. International Symbol of Accessibility proportions shall be as shown in ANSI A117.1-1992 and Americans with Disabilities Act (ADA) Accessibility Guidelines - 1991.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect surfaces to which paint will be applied and report immediately in writing to Engineer/Architect as required in General Conditions any conditions detrimental to proper execution of this Work.
- B. Do not proceed until unsatisfactory conditions are acceptably remedied.
- C. Striping shall not be placed until full cure of concrete slab and sealer. Concrete surfaces generally require 30 to 90 days @ 70°F or higher.

3.2 PREPARATION

- A. Before commencing work, make certain that Work to be painted is in proper condition to receive painting materials, that surfaces are clean, dry, smooth, and at proper temperature as recommended by paint manufacturer.
- B. Do not paint or finish any surface that is wet or damp.
- C. Clean all surfaces free of adhering foreign matter, dirt and dust.
- D. Lay out all striping, using dimensions and details shown on Contract Drawings, before painting. Report any discrepancies, interferences or changes in striping due to field conditions to Engineer/Architect prior to painting. Pavement Marking Contractor shall be required to remove paint, repair surface treatment and repaint stripes not applied in strict accordance with Contract Drawings.
- E. Work Areas:
 - 1. Store, mix and prepare paints only in areas designated by Contractor for that purpose.

2. Provide clean cans and buckets required for mixing paints and for receiving rags and other waste materials associated with painting. Clean buckets regularly. At close of each day's Work, remove used rags and other waste materials associated with painting.
3. Take precautions to prevent fire in or around painting materials. Provide and maintain appropriate hand fire extinguisher near paint storage and mixing area.

F. Mixing:

1. Do not intermix materials of different character or different manufacturer.
2. Do not thin material except as recommended by manufacturer.

G. Disposal:

1. Contractor shall properly dispose of unused materials and containers in compliance with Federal Resource Conservation Recovery Act (RCRA) of 1976 as amended, and all other applicable laws and regulations.

3.3 APPLICATION

- A. Apply paint in 2-coat system; first coat shall be 50% of total 15 wet mil minimum thickness, (urethane paint has smaller mil thickness) not to exceed 8 mils. First coat shall be cured prior to installation of second coat. At Contractor's option, one coat may be applied before substantial completion, with a second coat delayed for 3-6 months until weather conditions are appropriate and the concrete has cured sufficiently for proper adhesion.
- B. Apply painting and finishing materials in accordance with manufacturer's directions. Use applications and techniques best suited for material and surfaces to which applied. Minimum air shall be used to prevent overspray. Temperature during application shall be minimum of 40° F and rising, unless manufacturer requires higher minimum temperature. Maximum relative humidity shall be as required by manufacturer.
- C. All lines shall be straight, true, and sharp without fuzzy edges, overspray or non-uniform application. Corners shall be at right angles, unless shown otherwise, with no overlaps. Line width shall be uniform (-0%, +5% from specified width). No excessive humping (more material in middle than at edges or vice versa.)

3.4 CURBS AND CURB RAMPS

- A. Paint vertical surface and the first 6 in. of the abutting horizontal surface at the top of all curbs within parking facility except those which do not exceed 3'0" in width and abut a wall, bumper wall guardrail or other construction (not including landscaping or equipment) which prevents passage of pedestrians.
- B. Paint color for curbs and curb ramps shall be yellow.

END OF SECTION