



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

February 14, 2018

Addendum No. 2

RE: Contract # C204119

WBS # 15BPR.15

STATE FUNDED

New Hanover County (15BPR.15)

Bridge #13 Over NE Cape Fear River On US-76/421

February 20, 2018 Letting

To Whom It May Concern:

Reference is made to the proposal form furnished to you on this project.

The following revisions have been made to the proposal:

Page No.	Revisions
Proposal Cover	Note added that reads "Includes Addendum No. 2 Dated February 14, 2018".
G-2	Revised the list of Holidays within "Intermediate Contract Time Number 1 and Liquidated Damages"
BP-1	Revised the entry for "Epoxy Overlay System" from (06-12-14) to (Special)
BP-3	Revised the entry for "Epoxy Overlay System" from (06-12-14) to (Special) Re-docusigned the Engineers seal
BP-30 thru BP-34	Revised the project special provision entitled "Epoxy Overlay System" to a more up to date version that requires a 36-month warranty bond
BP-82	Revised to clarify description of west side approach length to be cleaned and painted to include the 99-ft long span. Quantity for area to be cleaned and painted was correct
BP-92	Engineer re-docusigned PE seal
BP-104, BP-105, BP-118 and BP-119	Revised language related to operation of lift span during construction

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
CONTRACT STANDARDS AND DEVELOPMENT
1591 MAIL SERVICE CENTER
RALEIGH, NC 27699-1591

Telephone: (919) 707-6900
Fax: (919) 250-4127
Customer Service: 1-877-368-4968

Location:
1020 BIRCH RIDGE DR.
RALEIGH, NC 27610

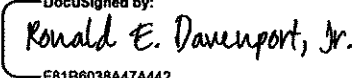
Website: www.ncdot.gov

Page No.	Revisions
BP-273 thru BP-283	Revised provisions for Rack and Pinion Passenger/Service Elevator. The elevator load capacity was revised down to 800 pounds. On most pages the only change is the date at the bottom. The intent is to provide a new elevator system that fits within the existing elevator envelope.

Please void the above listed pages your proposal and staple the revised pages thereto.

The contract will be prepared accordingly.

Sincerely,

DocuSigned by:

 F81B6038A47A442...
 Ronald. E. Davenport, Jr., PE
 State Contract Officer

RED/jag
 Attachments

cc: Mr. Lamar Sylvester, PE
 Ms. Karen Collette, PE
 Mr. Chris Werner, PE
 Mr. Jon Weathersbee, PE
 Mr. Ken Kennedy, PE
 Mr. Mitchell Dixon
 Project File (2)

Mr. Ray Arnold, PE
 Ms. Theresa Canales, PE
 Mr. Mike Gwyn
 Ms. Lori Strickland
 Ms. Jaci Kincaid
 Ms. Penny Higgins

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH, N.C.

PROPOSAL

INCLUDES ADDENDUM No. 2 DATED 02-14-2018
INCLUDES ADDENDUM No. 1 DATED 01-30-2018

DATE AND TIME OF BID OPENING: **FEBRUARY 20, 2018 AT 2:00 PM**

CONTRACT ID C204119
WBS 15BPR.15

FEDERAL-AID NO. STATE FUNDED
COUNTY NEW HANOVER
T.I.P. NO.
MILES 0.575
ROUTE NO. US 76
LOCATION BRIDGE #13 OVER NE CAPE FEAR RIVER ON US-76/421.

TYPE OF WORK BRIDGE PRESERVATION.

NOTICE:

ALL BIDDERS SHALL COMPLY WITH ALL APPLICABLE LAWS REGULATING THE PRACTICE OF GENERAL CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA WHICH REQUIRES THE BIDDER TO BE LICENSED BY THE N.C. LICENSING BOARD FOR CONTRACTORS WHEN BIDDING ON ANY NON-FEDERAL AID PROJECT WHERE THE BID IS \$30,000 OR MORE, EXCEPT FOR CERTAIN SPECIALTY WORK AS DETERMINED BY THE LICENSING BOARD. BIDDERS SHALL ALSO COMPLY WITH ALL OTHER APPLICABLE LAWS REGULATING THE PRACTICES OF ELECTRICAL, PLUMBING, HEATING AND AIR CONDITIONING AND REFRIGERATION CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA. NOTWITHSTANDING THESE LIMITATIONS ON BIDDING, THE BIDDER WHO IS AWARDED ANY FEDERAL - AID FUNDED PROJECT SHALL COMPLY WITH CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA FOR LICENSING REQUIREMENTS WITHIN 60 CALENDAR DAYS OF BID OPENING.

BIDS WILL BE RECEIVED AS SHOWN BELOW:

THIS IS A STRUCTURE PROPOSAL

5% BID BOND OR BID DEPOSIT REQUIRED

HOLIDAY AND HOLIDAY WEEKEND LANE CLOSURE RESTRICTIONS

1. For **unexpected occurrence** that creates unusually high traffic volumes, as directed by the Engineer.
2. For **New Year's Day**, between the hours of **5:00 AM** December 31st and **7:00 PM** January 2nd. If New Year's Day is on a Friday, Saturday, Sunday or Monday, then until **7:00 PM** the following Tuesday.
3. For the **MLK Parade**, between the hours of **5:00 AM** the Sunday before the third Monday of January and **7:00 PM** the following Tuesday.
4. For **Easter**, between the hours of **5:00 AM** Thursday and **7:00 PM** Monday.
5. For **Memorial Day**, between the hours of **5:00 AM** Friday and **7:00 PM** Tuesday.
6. For **Independence Day**, between the hours of **5:00 AM** the day before Independence Day and **7:00 PM** the day after Independence Day.

If **Independence Day** is on a Friday, Saturday, Sunday or Monday, then between the hours of **5:00 AM** the Thursday before Independence Day and **7:00 PM** the Tuesday after Independence Day.
7. For the **YMCA Tri-Span Race**, between the hours of **5:00 AM** the Friday after Independence Day to **7:00 PM** the following Sunday.
8. For **Labor Day**, between the hours of **5:00 AM** Friday and **7:00 PM** Tuesday.
9. For the **IRONMAN Triathlon**, between the hours of **5:00 AM** Friday October 12, 2018 and **7:00 PM** Sunday, October 14, 2018.
10. For the **Battleship Half-Marathon**, between the hours of **5:00 AM** Saturday, November 3, 2018 and **7:00 PM** Monday, November 5, 2018.
11. For **Thanksgiving**, between the hours of **5:00 AM** Tuesday and **7:00 PM** Monday.
12. For the **Holiday Parade and the Wilmington Historic Half-Marathon**, between the hours of **5:00 AM** Friday, November 30, 2018 and **7:00 PM** Monday, December 3, 2018.
13. For **Christmas**, between the hours of **5:00 AM** the Friday before the week of Christmas Day and **7:00 PM** the following Tuesday after the week of Christmas Day.
14. For **The Azalea Festival**, between the hours of **5:00 AM** the **Tuesday** before the weekend of the **Azalea Festival** and **7:00 PM** the following **Monday** after the weekend of the **Azalea Festival**.

Holidays and holiday weekends shall include New Year's, Easter, Memorial Day, Independence Day, Labor Day, Thanksgiving, and Christmas. The Contractor shall schedule his work so that lane closures will not be required during these periods, unless otherwise directed by the Engineer.

The time of availability for this intermediate contract work shall be the time the Contractor begins to install all traffic control devices for lane closures according to the time restrictions listed herein.

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**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
PROJECT NO. 15BPR.15
NEW HANOVER COUNTY
CAPE FEAR RIVER MEMORIAL LIFT BRIDGE**

PROJECT SPECIAL PROVISIONS - STRUCTURE

- PSP 010 - Epoxy Resin Injection (12-05-12)
 - PSP 012 - Shotcrete Repairs (12-05-12)
 - Under Structure Work Platform (Special)
 - PSP 018 - Falsework and Formwork (04-05-12)
 - PSP 019 – Foam Joint Seals (09-27-12)
 - PSP 020 - Crane Safety (8-15-05)
 - PSP 022 - Maintenance of Water Traffic (12-05-12)
 - PSP 023 - Work in, Over or Adjacent to Navigable Waters (12-05-12)
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-
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 - Replacement of Steel Grid Deck (Special)
 - Modified Alaska Barrier Rail (Special)
 - Overlay Surface Preparation for Polyester Polymer Concrete (Special)
 - Polyester Polymer Concrete Bridge Deck Overlay (Special)
 - Hydro-Demolition of Bridge Deck (Special)
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 - Repairs to Prestressed Concrete Girders (Special)
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-
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 - Operator House Renovation (Special)



2/13/2018

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Jason R Doughty
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EPOXY OVERLAY SYSTEM**(SPECIAL)****1.0 GENERAL**

This work shall consist of furnishing and applying an epoxy overlay system over the concrete bridge deck in accordance with the contract documents. Epoxy overlay system consists of a minimum of two (2) layers of hybrid polymer resins, with a special blend of extremely hard aggregate designed to provide a 3/8 inch thick overlay for the purpose of crack treatment, complete waterproofing, and providing a non-skid surface. The overlay system shall be formulated and applied to withstand continuous heavy traffic, extreme changes in weather conditions, and deformations due to structure loading and temperature changes.

2.0 PERFORMANCE GUARANTEE

The Contractor shall provide a warranty bond to the Department, guaranteeing the wearing surface for a period of 36 months against the following defects: delamination of the epoxy overlay from the deck surface, and skid resistance less than 40 as measured by AASHTO T242. The performance bond will be invoked if 25 square feet of the deck surface meets the defect criteria prior to the end of the warranty. The guarantee period will start on the date of Department final acceptance of the project. At the end of the guarantee period, the warranty bond will be invoked if any part of deck surface meets the defect criteria, regardless of quantity.

The Contractor shall replace defective materials and workmanship at no cost to the Department. The Contractor will not be responsible for damage due to normal wear and tear, negligence on the part of the Department, or use in excess of the design.

The warranty bond amount shall be the bid quantity of epoxy overlay multiplied by the statewide average unit bid price for the epoxy overlay. The guarantee period of 36 months and bond value shall be specified in the warranty bond provided to the Department prior to final acceptance of the project.

3.0 MATERIALS

This two-part epoxy polymer overlay system shall be on the NCDOT Approved Products List (APL) and be free of any fillers or volatile solvents and shall be formulated to provide a simple volumetric mixing ratio of two components such as one to one or two to one by volume. The epoxy overlay system shall be formulated to provide flexibility in the system without any sacrifice of the hardness, chemical resistance, or strength of the system. Use of external/conventional flexibilizers will not be accepted. Flexibility shall be by interaction of elastomers, which chemically link during the process of curing so the flexibility of the molecule is least affected during the low temperature conditions that are confronted in actual use.

Epoxy

When the two-component system is mixed at the appropriate ratio, the cured resin shall conform to the following requirements:

EPOXY PROPERTIES		
Property	Requirement	Test Method
Viscosity-Poises at 77°F ± 2°F	7-25	ASTM D2393 (Spindle No.3 at 20 rpm)
Pot Life	15-45 minutes @ 75° F	ASTM C881
Min. Tensile Strength at 7 days	2000 psi	ASTM D638
Tensile Elongation at 7 days	30-70%	ASTM D638
Min. Compressive Strength @ 3 hrs.	1,000 psi	ASTM C109
Min. Compressive Strength @ 24 hrs.	5000 psi	ASTM C109
Min. adhesion strength @ 24 hrs.	250 psi @ 75° F	ASTM C1583
Max. Water Absorption	1%	ASTM D570

Aggregate

Aggregate used for all layers shall be non-friable, non-polishing, clean, and free from surface moisture. The aggregate shall be flint rock, 100% fractured, thoroughly washed and kiln dried to a maximum moisture content of 0.2% by weight, measured in accordance with ASTM C566. The fracture requirements shall be at least one mechanically fractured face and will apply to materials retained on a U.S. No. 10 sieve. Aggregate shall conform to the following requirements:

AGGREGATE PROPERTIES		
Property	Value	Test Method
Moisture Content, max.	0.2% by weight	AASHTO T255
Mohs Hardness, min.	7	
Soundness Loss, 5 cycles in Sodium Sulfate, max.	5.4%	AASHTO T104
Micro-Deval, max.	10%	AASHTO TP58

AGGREGATE GRADATION	
Sieve	Percent Passing
No. 4	100
No. 8	30-75
No. 16	Max. 5
No. 30	Max. 1

4.0 SURFACE PREPARATION

Remove all existing overlays if applicable, and all loose, disintegrated, unsound or contaminated concrete from the bridge deck. Prepare the bridge deck prior to applying the

overlay system, in accordance with the manufacturer's recommendations, the special provision *Concrete Deck Repair for Epoxy Overlay*, and this provision.

Prior to overlay placement and upon completion of the deck repairs, clean the entire deck surface by steel shot blasting and other means to remove asphaltic material, oils, dirt, rubber, curing compounds, pavement markings, paint carbonation, laitance, weak surface mortar and other materials that may interfere with the bonding or curing of the overlay. Do not begin shotblasting until all grinding or milling operations are completed. Use sandblasting equipment on areas that cannot be reached by the shotblasting operation. If expansion joints are not being replaced or have been replaced prior to shotblasting they shall be protected from damage from the shotblasting operation. Pavement markings shall be considered clean when the concrete has exposed aggregate showing through the paint stripe. Deck drains and areas of curb or railing above the proposed surface shall be protected from the shotblasting operation. Mortar that is soundly bonded to the coarse aggregate shall have open pores to be considered adequate for bond. Provide a self-propelled vacuum capable of picking up dust and other loose material from the shotblasting operation. Provide air compressors equipped with oil/water separator capable of drying all moisture from the bridge deck. Care shall be taken and methods used to fully capture and collect the excess material.

Prior to overlay placement and upon completion of surface preparation, perform bond testing of the epoxy overlay material in accordance with ASTM C1583 on two pre-selected 1.5' x 3' test patches. Test locations will be determined by the Engineer. The tensile strength shall be at least 250 psi and the depth of failure into the concrete deck for 50% of the test patch area shall be ¼" or greater. Install test sections with the same materials, equipment, personnel, timing, and sequence of operations and curing time that will be used for the installation of the overlay. Test locations shall be repaired with approved repair materials.

If the cleaning method, materials, and installation procedure do not produce acceptable test results, the contractor must remove failed test patches, make the necessary adjustments, and retest all patches at no additional cost to the Department until satisfactory test results are obtained.

Epoxy based overlays shall not be placed on hydraulic cement concrete that is less than 28 days old. Patching and cleaning operations shall be inspected and approved prior to placing each layer of the overlay. Any contamination of the deck or intermediate courses, after initial cleaning, shall be removed.

The deck shall be completely dry at the time of application of the epoxy concrete overlay. Deck drains shall be closed off during application of epoxy overlay.

5.0 EQUIPMENT

For mechanical applications, equipment shall consist of no less than an epoxy distribution system, aggregate spreader, application squeegee, and vacuum truck. The distribution system shall accurately measure and mix the epoxy resin and hardening agent, and shall uniformly

and accurately apply the epoxy materials at the specified rate to the bridge deck, in such a manner as to cover 100% of the work area. The aggregate spreader shall be propelled in such a manner as to uniformly and accurately apply the aggregate to cover 100% of the epoxy material. Aggregate shall be sprinkled or dropped vertically in a manner such that the level of the epoxy mixture is not disturbed. The vacuum truck shall be self-propelled.

For hand applications, equipment shall consist of calibrated containers, a "jiffy" type paddle mixer or other paddle designed specifically for epoxy mixing, squeegees, rollers and brooms, which are suitable for mixing the epoxy and applying the epoxy and aggregate. Paddle shall remain submerged when mixing to avoid entraining air. Equipment shall uniformly and accurately apply the epoxy materials at the specified rate to the bridge deck, in such a manner as to cover 100% of the work area. The aggregate shall be applied in such a manner as to uniformly and accurately cover 100% of the epoxy material. Aggregate shall be sprinkled or dropped vertically in a manner such that the level of the epoxy mixture is not disturbed

A source of lighting shall be provided by Contractor, when work is to be performed during times of diminished light.

6.0 APPLICATION

Handling and mixing of the epoxy resin and hardening agent shall be performed in a safe manner to achieve the desired result in accordance with the manufacturer's recommendations as approved and as directed by the Engineer. Epoxy overlay materials shall not be placed when weather or surface conditions are such that the material cannot be properly handled, placed, spread, and cured within the specified requirements of traffic control.

The application rates of the liquid and stone in the two layers shall be as recommended by the manufacturer, but not less than the following rate of application.

TABLE 4		
APPLICATION RATES		
Course	Min. Epoxy Rate (Gal./100 SF)	Min. Aggregate Rate (Lbs./Sq. Yd)
1	2.5	10
2	5	14

The final overlay thickness shall be a minimum of 3/8". Once the epoxy mixture has been prepared, immediately and uniformly apply it to the surface of the bridge deck. There shall be no longitudinal joints of the epoxy overlay in the wheel path. The temperature of the bridge deck surface and all epoxy and aggregate components shall be 60°F or above at the time of application. Epoxy shall not be applied if the air temperature is expected to drop below 55°F within 8 hours after application or if air temperatures would cause the gel time to be less than 10 minutes. Consult with the manufacturer when placing overlay at temperatures above 90°F. The dry aggregate shall be applied in such a manner as to completely cover the epoxy mixture, so that no wet spots appear and before epoxy begins to gel. First course applications that do not receive enough aggregate prior to gel shall be removed and replaced. A second course

insufficiently covered with aggregate may be left in place, but will require additional applications before opening to traffic. After each course is fully cured, all loose aggregate shall be removed by vacuuming or brooming. Traffic shall not be allowed on the first course of the overlay. Traffic and equipment shall not be permitted on the overlay surface during the curing period. The minimum curing periods shall be as follows:

Course: Average temperature of deck, epoxy, and aggregate components in °F

	60-64	65-69	70-74	75-79	80-84	85+
Course 1	4 hrs.	3 hrs.	2.5 hrs.	2 hrs.	1.5 hrs.	1 hr.
Course 2	6.5 hrs.*	5 hrs.	4 hrs.	3 hrs.	3 hrs.	3 hrs.

*Course 2 shall be cured for 8 hrs. if the air temperature drops below 60°F during the curing period.

The Contractor shall plan and execute the work to provide the curing periods as specified herein, or manufacturer proposed curing periods may be submitted to the Engineer for review and approval.

Do not apply epoxy overlay courses over modular joints, metal expansion joints, or foam joint seals. A bond breaker shall be placed on all expansion joints.

In the event the Contractor's operation damages the epoxy overlay, the Contractor shall remove the damaged areas by saw-cutting in rectangular sections to the top of the concrete deck surface and replacing the various courses in accordance with this Specification at no additional cost to the Department.

Prior to acceptance, perform bond testing for each span or 300 square yards, whichever is smaller, in accordance with ASTM C1583 on 1.5' x 3' test patches. Test locations will be determined by the Engineer. The tensile strength shall be at least 250 psi and the depth of failure into the concrete deck for 50% of the test patch area shall be ¼" or greater. Unacceptable test results will require removal and replacement of overlay as directed by the Engineer at no cost to the Department. Test locations shall be repaired with approved repair materials.

7.0 MEASUREMENT & PAYMENT

Epoxy Overlay System will be measured and paid for at the contract unit price per square feet. The price shall include surface preparation, furnishing, and placing the overlay system, providing a 36-month warranty bond, and all tools, labor, materials, bond strength testing, and any incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
Epoxy Overlay System	Square Feet

DESCRIPTION OF BRIDGE

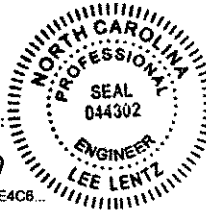
Bridge #13: This bridge was built in 1969 and carries US 76 / US 421 over Cape Fear River. The superstructure of the fixed approach spans that are to be cleaned and painted consist of simple and multi-span continuous span with varying number of girder lines. The steel girders are welded plate girders with varying spacings with steel diaphragms. Refer to the plans for girder spacings and girder section make-up. The west side fixed approach spans to be cleaned and painted are 99'-0", 124'-0", 123'-0", 124'-0" and 153'-3" for a total length of approximately 623'-3". The east side fixed approach spans to be cleaned and painted are 153'-3", 3 spans @ 136'-0", 81'-6" and 2 spans @ 84'-0" for a total length of approximately 810'-9". Each of these fixed approach spans has a concrete deck that is composite with the steel girders. Transverse steel box girders (cap girders) occur at Bents 24 and 25 and each shall be cleaned and painted on the exterior surfaces only. The existing paint system is assumed to be aluminum over red lead, and the estimated area to be cleaned and painted is 272,500 sq. ft.

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
PROJECT NO. 15BPR.15
NEW HANOVER COUNTY
CAPE FEAR RIVER MEMORIAL LIFT BRIDGE**

PROJECT SPECIAL PROVISIONS – MECHANICAL

- Mechanical Operating Machinery (Special)
- Auxiliary Counterweight and Span Guide Repairs (Special)

DocuSigned by:
Lee Lentz
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2/13/18

in such a way as to cancel the effects of bending, so they only measure torsional strain in each shaft. The microstrain shall be recorded on a strip chart or digital data acquisition system simultaneously with lift span height indication for a minimum of three complete lift cycles. Span imbalance for each corner of the lift span shall be determined. The percentage of full load torque of the span drive motor(s) and the friction for the vertical lift system measured for the full operating cycle shall also be determined and submitted.

- C. The Contractor will be responsible for adjusting the span balance as necessary during construction. The Contractor shall develop and maintain a spreadsheet to track all additions and removals of components and materials to and from the lift span and counterweights. The spreadsheet and all associated calculations shall be submitted to the Engineer for approval prior to the start of work. When weight adjustments are necessary to maintain the balance condition, weight shall be added to or removed from the counterweight pockets in accordance with the approved calculations. The bridge balance conditions shall be adjusted the same day that construction activities result in any alteration of the bridge balance, and prior to any required openings for waterway traffic. At no time shall any brakes or span locks be released or disengaged, respectively, until bridge balance has been properly adjusted. Temporary equipment and tools shall be removed from the lift span prior to each bridge operation, and therefore need not be included in the balance spreadsheet.
- D. The Contractor shall be responsible for all labor and materials required to provide an acceptable balance, as directed by the NCDOT. All testing, data analysis, and weight adjustments shall be carefully documented and formally submitted.

Adjust the balance of the lift span to meet the following requirements (all reactions listed are dead load only, no live loading):

During Construction, Bridge Operation Not Permitted. Bridge is in the Closed Position, with Span Locks Engaged: The lift span must be span heavy, with a minimum positive reaction for each corner of 3,000 lbs with the bridge in the closed position.

During Construction, Bridge Operation Permitted: The lift span must be span heavy in the closed position, with a positive reaction for each corner between 3,000 lbs and 12,000 lbs.

Final Balance Condition of Bridge Following Construction: The lift span must be span heavy in the closed position, with a positive reaction at for each corner between 11,000 lbs and 12,000 lbs.

- E. Once the desired final lift span balance is achieved and accepted by the NCDOT, the Contractor can proceed with test operating the span. The span shall be tested with at least ten complete full operating cycles, including all necessary systems of the span. Machinery shall be monitored during these openings for leaks, noise, excessive vibration, hot components, and misalignment.

3.7 CONTRACTOR SUPERVISED OPERATION OF THE BRIDGE

- A. This work consists of operation of the bridge during construction activities and supervision of Department personnel in the operation of the bridge.
- B. The Department will provide bridge operators for operating the bridge throughout the duration of the work. However, the Contractor shall supervise, and be in responsible charge of, bridge operations from the time that the normal operating procedure is affected by construction activities until the work is complete and the bridge is fully operable in its final form and as approved by the Engineer. During this period, the Contractor shall also be the

primary contact for coordination before, during, and after operations. This coordination shall include all on site personnel and activities, and other agencies as required by this contract, such as the USCG. The Contractor shall provide the Engineer with proposed dates for commencement and conclusion of temporary Contractor supervised operation of the bridge.

- C. Factors that are considered as affecting the normal operating procedure include: work on the bridge machinery, work on the bridge electrical control system, work on the Operator's House, work that affects the barrier gates, any work that affects span balance, Contractor staff, materials and/or equipment on the lift span or interfering with the bridge operator's view of roadway or waterway traffic.
- D. The Contractor shall maintain and provide any required adjustments and/or corrections to the mechanical and electrical equipment of the bridge during construction and through the period of temporary Contractor supervised operation.
- E. The Contractor shall perform work in a way that allows for continued operation of the bridge.

3.8 BASIS OF PAYMENT:

Payment for Mechanical Operating Machinery will be made at the contract lump sum price bid for which price and payment shall be full compensation for furnishing all labor, materials, equipment, and incidentals necessary to complete the work under the item in accordance with the Contract Drawings and these Special Provisions, including painting, lubricating, and all other features necessary to insure the satisfactory operation of the bridge.

Lubricants will not be measured for payment but the cost thereof shall be included in the prices stipulated.

Payment will be made under:

<u>Description</u>	<u>Units</u>
Mechanical Operating Machinery	Lump Sum

from all surfaces prior to painting after erection. If the anti-rust coating on any part becomes compromised prior to part installation, the coating shall be restored immediately. As an alternative, metallic components may be wrapped in paper treated with volatile corrosion inhibitors (VCIs) or polyethylene VCIs, and further wrapped in polyethylene. VCIs are available from Daubert Chemical of Burr Ridge, IL; Grofit Plastics of Northbrook, IL; Cromwell-Phoenix of Alsip, IL; or CorTec of St. Paul, MN. When weatherproof containers are used, they shall be lined with multiple bags of silica gel desiccant.

- E. All wire ropes shall be shipped on reels, the diameter of which is not less than 25 times the diameter of the ropes, which shall be mounted on skids or otherwise crated for protection during shipment and storage.
- F. Material storage on site shall afford easy access for inspection and identification, protection from the ground and prevent distortion or damage.
- G. The Contractor shall dispose of all removed materials in accordance with all pertinent existing legal and environmental requirements and guidelines for material disposal in effect at the time of letting. The NCDOT shall specifically identify which items are to be retained. Retained items shall be delivered and stored as directed by the NCDOT, and all others shall be properly discarded as required.

3.5 LIFT SPAN BALANCING

- A. It is anticipated that the imbalance per tower at the beginning of construction will be 8000 lbs +/- 1000 lbs in the fully seated position. Coordinate with the NCDOT to confirm this condition prior to beginning work.
- B. The Contractor will be responsible for adjusting the span balance as necessary during construction. The Contractor shall develop and maintain a spreadsheet to track all additions and removals of components and materials to and from the lift span and counterweights. The spreadsheet and all associated calculations shall be submitted to the Engineer for approval prior to the start of work. When weight adjustments are necessary to maintain the balance condition, weight shall be added to or removed from the counterweight pockets in accordance with the approved calculations. The bridge balance conditions shall be adjusted the same day that construction activities result in any alteration of the bridge balance, and prior to any required openings for waterway traffic. At no time shall any brakes or span locks be released or disengaged, respectively, until bridge balance has been properly adjusted. Temporary equipment and tools shall be removed from the lift span prior to each bridge operation, and therefore need not be included in the balance spreadsheet.
- C. The Contractor shall be responsible for all labor and materials required to provide an acceptable balance, as directed by the NCDOT. All weight adjustments shall be carefully documented and formally submitted.
- D. Once the desired final lift span balance is achieved and accepted by the NCDOT, the Contractor can proceed with test operating the span.

3.6 CONTRACTOR SUPERVISED OPERATION OF THE BRIDGE

- A. This work consists of operation of the bridge during construction activities and supervision of Department personnel in the operation of the bridge.
- B. The Department will provide bridge operators for operating the bridge throughout the duration of the work. However, the Contractor shall supervise, and be in responsible charge of, bridge operations from the time that the normal operating procedure is affected by

construction activities until the mechanical rehabilitation is complete and the bridge is fully operable in its final form and as approved by the Engineer. During this period, the Contractor shall also be the primary contact for coordination before, during, and after operations. This coordination shall include all on site personnel and activities, and other agencies as required by this contract, such as the USCG. The Contractor shall provide the Engineer with proposed dates for commencement and conclusion of temporary Contractor supervised operation of the bridge.

- C. Factors that are considered as affecting the normal operating procedure include: work on the bridge machinery, work on the bridge electrical control system, work on the Operator's House, work that affects the barrier gates, any work that affects span balance, Contractor staff, materials and/or equipment on the lift span or interfering with the bridge operator's view of roadway or waterway traffic.
- D. The Contractor shall maintain and provide any required adjustments and/or corrections to the mechanical and electrical equipment of the bridge during construction and through the period of temporary Contractor supervised operation.
- E. The Contractor shall perform work in a way that allows for continued operation of the bridge. During the portion of the work when the auxiliary counterweight is removed, the span shall be lifted and lowered at 1/5th of the normal bridge operating speed. During operation of the span during this temporary condition, the span and drive machinery shall be monitored closely by the Contractor. Because the lift span will not remain span heavy during the entire lift, the operating characteristics of the bridge may change, especially after it passes 35 feet of lift and the balance approaches 0 lbs, and then becomes more and more counterweight heavy.

3.8 BASIS OF PAYMENT:

Payment for Auxiliary Counterweight and Span Guide Repairs will be made at the contract lump sum price bid for which price and payment shall be full compensation for furnishing all labor, materials, equipment, and incidentals necessary to complete the work under the item in accordance with the Contract Drawings and these Special Provisions, including painting, lubricating, and all other features necessary to insure the satisfactory operation of the bridge.

Lubricants will not be measured for payment but the cost thereof shall be included in the prices stipulated.

Payment will be made under:

<u>Description</u>	<u>Units</u>
Auxiliary Counterweight and Span Guide Repairs	Lump Sum

142400 RACK AND PINION PASSENGER / SERVICE ELEVATOR

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Rack and Pinion Passenger / Service Elevator

1.2 APPLICABLE CODES

- A. All elevators shall be designed and supplied in accordance with ASME 17.1, Safety Code for Elevators and Escalators, latest edition. Elevators 1000 lbs capacity and less may be designed under Part 5.7 "Special Purpose" Elevators. Elevators exceeding 1,000 lbs capacity must be designed to comply with Part 4.1 (Rack & Pinion) and Part 2 of the code requirements. Any variances from these codes must be clearly stated and offered only as options to a fully code compliant design.
- B. Elevator supplier to furnish copies of elevator controller and door interlock systems certified to ANSI code by UL, CSA, or ETL as recognized organizations.
- C. Materials are to be supplied to standard ASTM specifications or Western Europe equivalent standards. Motors to be NEMA rated or the Western European IEC equivalent ratings.

1.3 MINIMUM SUPPLIER EXPERIENCE

- A. Rack & pinion elevators are specialty machines designed for many locations unsuitable for "conventional" elevators. As such, proven designs with rugged components and proven performance should be a main consideration in the specification process. Typical machines should be designed to last 15 to 20 years or more, depending upon the environment. Minimum supplier operating experience is to be 10 elevators operating for 5 or more years (experience with each unit condition verified in the field by a condition assessment).

1.4 QUALITY ASSURANCE

- A. Services, materials and equipment provided by the Contractor shall be in accordance with the Contractor's Quality Program. At a minimum the quality program shall be developed per applicable national codes, standards and provide requirements for the control of design, document and data control, procurement, inspection and test, corrective actions, handling, storage, packaging/ delivery quality records, audits and training. Manufacturing facilities to be ISO 9001 certified.
- B. All materials, equipment and products furnished by the Contractor shall be new and for the service intended. Any defective material found during the progress of the work shall be promptly replaced or corrected by the Contractor at its own expense.

- C. Rack & pinion supplier shall have a local organization in the US with a reasonable level of required spare parts to support the elevator system over its useful life. Also, supplier is to demonstrate it possesses a secure level of service technician support resources to ensure support during the elevator life.

1.5 INSURANCE REQUIREMENTS

- A. Due to the nature of the elevator installation work, and the operating environment in which rack & pinion products generally should be designed to function, the following insurance coverage should be provided:

General Liability – Minimum \$1 million per occurrence
 Automobile Liability – Minimum \$1 million per occurrence
 Completed Products Liability Insurance from Elevator Manufacturer– Umbrella coverage, including this - at least \$10 million

1.6 SUBMITTALS

- A. Necessary general arrangement drawings and wiring schematics covering the elevator installation are to be provided by the elevator contractor. No work shall commence before these drawings are approved by the owner or his agent. The following minimum documentation should be supplied during the design, manufacture and installation of the elevator system:

Standard General Layouts
 Standard hoist way conduit layout
 Proof of code labeled car and landing door interlocks and controllers by certified testing lab
 Applicable MSDS sheets
 CPM Schedules (updates as applicable)
 Ships list & documentation
 Standard wiring diagrams – As Built
 Standard Operator’s manuals
 As built drawings
 Elevator manufacturer’s field test report + State or other governing body inspection and signoff certificate

- B. Drawing dimensions must be in US or a combination of US and metric. Metric units alone will not be acceptable. All wiring diagrams, drawings, manuals and other documentation to be furnished in English language.

1.7 WARRANTY

- A. The elevator contractor shall guarantee the materials and workmanship of the apparatus furnished under these specifications, and will make good any defects not due to ordinary

wear and tear or improper use or carelessness which may develop within one (1) year from date of completion of each elevator, including labor and traveling expenses.

1.8 PERMITS & INSPECTIONS:

- A. The elevator contractor shall furnish all licenses and permits and shall arrange for and make all inspections and tests required when installation is included in this scope.
- B. Testing and Commissioning
- C. Contractor shall perform necessary tests as required by applicable codes to obtain a certificate of operation. Contractor shall comply with the commissioning schedule set forth by this specification.

1.9 GUARANTEED SERVICE

- A. The elevator shall be supplied with one year of quarterly service visits by factory trained technicians to assure acceptable first year "run-in" and maintenance.
- B. Scheduling of the Elevator Work and Preparatory Work Not Included in the Elevator Contractor Scope (to be supplied by General Contractor):
 - 1. Legal hoist way, fascia, dry pit, machine room or base control area, and hoist way ventilation. Landings to be plumb to ½ inch per 100 feet of elevation.
 - 2. Adequate foundation to support footprint as shown in plan at bottom landing. See data on this drawing for foundation forces.
 - 3. Minimum clear pit required (or pad) across entire pit area including footings and other vertical or horizontal protrusions.
 - 4. Minimum clear overhead required across entire clear hoist way area including roof supports and other vertical or horizontal protrusions.
 - 5. Adequate supports for guide mast fastening per tie in schedule. See data on drawing for guide mast forces.
 - 6. Fused Disconnect (or circuit breaker), suitable for motor starting, 480 Volt main line disconnect for each elevator with feeder or branch wiring circuit located within 5 feet of base control cabinet. If temporary power is provided for installation, it must be of permanent characteristics with main line switch, and brought to within 5 feet of elevator base control cabinet. Permanent power required for final testing of elevator.
 - 7. Fused Disconnect (or circuit breaker), 120 Volt ac single-phase SPST disconnect switch adjacent to the main line switch for car lighting supply. Separate 120 Volt circuit for pit lighting supply. See Alimak Hek conduit layout drawing.
 - 8. Properly sized ground wire from the elevator controller to the primary building ground.
 - 9. Lighting at landings, base controller and related areas as required by applicable codes.
 - 10. A dedicated phone line from telephone service to elevator base panel. Line must be monitored 24 hours a day.
 - 11. Remote wiring to outside alarm bell as required by the safety code where applicable. Remote wiring to any remote equipment or monitoring devices.
 - 12. Adequate support for landing doors and enclosure panels.
 - 13. Code compliant hoist way enclosure protection, near the elevator shaft other than at landing door side enclosures, which Alimak Hek supplies as standard. Base landing

- enclosure protection is also provided by Alimak Hek. Hoist way protection between landings is by others and is governed by code.
14. Provide OSHA compliant hoist way protection during construction. Solid panels, a minimum of 48" high at each opening/landing. Hoist way protection to be maintained during installation by installer.
 15. Location of mast centerline.
 16. Electric power required for lights, tools, hoists, etc. during installation.
 17. Locate equipment in secure area within 30 feet of the hoist way at ground level at time of installation. Long term storage, if applicable, shall be in accordance with manufacturer's instructions. Adequate ingress and egress will also be provided.
 18. Any governmentally required safety provisions not directly involved with the actual installation of the elevator.
 19. Lifting equipment with operator including crane for unloading and erection of base, car, mast tower and landing doors. Man lift or basket for access to tie in support surface if required.
 20. Certified drop test weights for final inspection and test.
 21. Fire watch personnel if required for hot work.
 22. Approval of Alimak Hek submittals. Approval will supersede all other documents.
 23. Smoke detectors with normally open dry contacts required at each floor, in hoist way and associated machine room or base control cabinet location in accordance with N.P.F.A. #72E chapter #4 with required wiring to properly marked terminals in elevator controller (applicable only if application requires Fire Service).
 24. Furnish and install hoist way conduit and wiring material (applicable only if installation is not included in the Alimak Hek proposal.)
 25. Purged Air Supply (only on XP with Variable Frequency Drives)

PART 2 - PRODUCTS

2.1 SPECIFICATION FOR ELEVATOR WORK

A. Furnish and Install:	Electric Elevator(s)
B. Type of Machine:	Rack & Pinion
C. Load (Capacity):	800lbs
D. Car Speed:	to be determined by Owner
E. Operation:	Full-Collective
F. Motor Control :	Variable Frequency Control.
G. Rise (Lifting Height):	200ft
H. Number of Stops (including Base):	Two (2) Top & Bottom
I. Number of Openings:	3
J. Maintenance:	Quarterly maintenance for 1 year required after turnover

- K. Power Supply: 440-480 Volts, 3 Phase, 60 Hertz
- L. Lighting Supply: 120 Volts, 1 Phase, 60 Hertz (by electrician)
- M. Car Enclosure: Aluminum; Marine Grade, Anodized Extruded
- N. Clear Car Inside: 3'deep x 7' wide minimum
- O. Inside Car Height: 7'1" Minimum
- P. Type of Car Door: Folding gate (code minimum)
- Q. Car Operating Panel: Located in car wall or on top of car

2.2 COMPLETE SYSTEM:

- A. Elevator system to be a complete factory engineered and manufactured system to meet design, performance and code requirements. All structure required for installation must be provided as part of the installation. Local distributor or field modifications shall not be permitted.
- B. Manufacturer may be required to submit proof of design conformance prior to shipment from the primary
- C. Manufacturing facility.

2.3 MACHINERY:

- A. The complete drive consists of an appropriate number of squirrel cage TEFC motors, reduction gear(s), drive pinions, and an over speed governor/safety device, all mounted on a machinery plate. Drives also to include an electric disc brake provided with an external manual brake release mounted on the reduction gear. Measures shall be considered in the design to reduce vibration and noise transmission to the building structure. The machine shall be mounted on the car frame. For capacities under 1,000 lbs, single motor drives shall be supplied.
- B. Elevator cars to be made from galvanized carbon steels, aluminum or stainless steel. Cars to be fully enclosed with no mesh or expanded metal walls. Panels must comply with 16CFR part 1201 along with ASME 17.1, Part 2.14.2.5 and 2.11.7.1. Windows in cars must not exceed 155 square inches.

2.4 MOTOR: WITH VARIABLE FREQUENCY CONTROL

- A. The motor shall be alternating current, reversible type designed for elevator service with high starting torque and low starting current. Overload relays shall be provided. Space heater for motor is included in this offering.

2.5 ELECTRICAL ENCLOSURES

- A. For duty in exposed environments, all enclosures shall be of 304 stainless steel, and NEMA 4X design. This includes interior car operating panels, car top enclosure panels, hoist way junction boxes, base enclosure panels and floor hall call station boxes.

2.6 RACK AND DRIVE PINIONS

- A. Rack and pinions used to drive the elevator car shall be designed with a minimum safety factor of 8:1 between drive pinions and the rack (per elevator codes).

2.7 BRAKES:

- A. The brake shall be spring applied and electrically released and designed to provide smooth stops under variable loads.

2.8 EMERGENCY LOWERING DEVICE

- A. The emergency lowering device feature applies during a potential power failure. Should a power failure take place, this allows the passengers in the car to lower the car under reduced and controlled speed to the next lowest landing. With other lifts, passengers must call for help, remaining in the stopped car until help arrives. The emergency lowering device only works when due to a power failure and the car is stopped in-between landings.

2.9 COMMUNICATION

- A. Elevator Contractors standard elevator phone shall be provided. This phone shall be wired to the elevator control panel at the base of the elevator. Site telephone wiring from the base of the elevator to the telephone system will be by the Owner.

2.10 CAR FRAME AND GOVERNOR / SAFETY DEVICE:

- A. A car frame fabricated from formed or structural steel members shall be provided with adequate bracing to support the platform and car enclosures. The car safety shall be of integral design with car frame and shall be of the Rack & Pinion type designed to stop the car should it attain excessive descending speed.
- B. The car safety shall be operated by an integral centrifugal speed governor. The governor shall actuate a switch when excessive speeds occur, disconnecting power to the motor and applying the brake before application of the safety.
- C. Safety device pinion design to be in accordance with ASME 17.1 and thus shall have a safety factor of not less than 3.5 to 1 in accordance with these elevator code requirements.

2.10 HOIST WAY WIRING:

- A. All wiring and electrical interconnections shall comply with the governing codes. Insulated wiring shall have flame retardant and moisture-proof outer covering, and shall be run in galvanized rigid conduit, tubing or electrical wire ways. Traveling cables shall be flexible and suitably suspended to relieve strain on individual conductors.

2.11 TRAVELLING CABLE TROLLEY:

- A. Tension on the hoist way travelling cable shall be maintained with a weighted trolley system that follows the cable as the elevator travels. Cable guides shall be placed every 15 – 20 feet to further protect the cable from wind and damage. No free hanging cables or winding type reels shall be allowed.

2.12 HOIST WAY OPERATING DEVICES:

- A. Normal terminal stopping devices shall be provided to slow down and stop the car automatically at the terminal landings. Final terminal stopping devices shall automatically cut off the power and apply the brake, should the car travel beyond the terminal landings.

2.13 PIT SWITCH:

- A. An emergency stop switch shall be located in the pit accessible from the pit access door.

2.14 BUFFERS:

- A. Buffers shall be installed in the pit as a means for stopping the car and counterweight (if provided) at the bottom limits of travel.

2.15 GUIDE MASTS:

- A. Steel elevator guide masts shall be furnished to guide and support the car and counterweight, erected plumb and securely fastened to the building structure. They shall be hot dipped galvanized.

2.16 ROLLER GUIDES:

- A. Steel, iron or polyurethane lined roller guides shall be mounted on top and bottom of the car frame to engage the guide masts and to provide for smooth operation. Structural steel safety back up tabs should be mounted on the elevator car frame to assure car remains on the mast with pinion engaged in case of roller failure.

2.17 PLATFORM:

- A. The car back frame to hold the car shall be of all galvanized steel (or aluminum) construction. The cap floor shall be heavy duty aluminum or hot dipped galvanized checker plate or other non-skid pattern.

2.18 ELEVATOR CAR

- A. Elevator car to be made of aluminum panels for long life and rust & corrosion resistance. The walls shall be firmly braced to meet maximum deflection criteria stated in the ASME 17.1 code.

2.19 EMERGENCY CAR LIGHTING:

- A. An emergency power unit employing a rechargeable battery shall illuminate the elevator car and provide current to the alarm bell in the event of normal power failure. The equipment shall comply with the requirements of the latest revision of the ASME A17.1.

2.20 HALL BUTTONS:

- A. At each landing, a push button fixture shall be provided to correspond to control system used. NEMA 4X boxes are required.

2.21 INSPECTION AND/OR MAINTENANCE OPERATION:

- A. An enabling key switch shall be provided in the car-operating panel to permit operation of the elevator from on top of the car, for inspection purposes, and make car and hall buttons inoperative.
- B. On top of the car an operating fixture shall be provided containing "UP" and "DOWN" buttons, an emergency stop button, and a switch that makes the fixture operable and, at the same time, makes the door operator and car and hall buttons inoperable.

2.22 PIT AREA

- A. In accordance with code, a pit conforming to ASME 17.1 shall be provided. In absence of such a pit, Elevator contract shall be required to supply a raised base platform that allows the same pit refuge space. All pits need to be supplied with a pit ladder and pit light conforming to code.

2.23 CONTROLLER: ALIMAK ALCII

- A. A modern, microprocessor based, programmable elevator controller shall be provided in or on the car including necessary starting switches of adequate size together with all relays, switches and hardware required to accomplish operation specified. Remote monitoring capability shall be provided. System shall provide the option of real time reporting of specific faults and systems monitoring via internet based system.

2.24 DOOR OPERATION:

- A. Manually operated car doors and manually operated landing doors to be provided. Door/gate shall meet all code requirements for protection of persons riding in the car or standing on the landing.

- B. A proven electrical & mechanical interlock, labeled by a code recognized body, shall be provided for each hoist way entrance that shall prevent operation of the elevator unless all doors for that elevator are proven closed and locked and shall maintain the doors in their closed position while the elevator is away from the landing. Emergency access to the hoist way as required by governing codes shall be provided.

PART 3 EXECUTION

3.1 EXAMINATION

A. Before starting elevator installation, inspect hoistway, hoistway openings, pits and machine rooms/control space, as constructed and verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.2 INSTALLATION

A. Install elevator systems components and coordinate installation of hoistway wall construction.

1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.
2. Comply with the National Electrical Code for electrical work required during installation.

B. Perform work with competent, skilled workmen under the direct control and supervision of the elevator manufacturer's experienced foreman.

C. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports, and bracing including all setting templates and diagrams for placement.

D. Jack unit excavation: Drill or otherwise excavate below elevator pit construction as required to install the jack unit.

1. Install casing for jack unit.
2. Provide HDPE jack protection system for all in ground jacks.
3. Set casing for jack unit assembly plumb, and partially fill with water-settled sand, eliminating voids. Back fill depth shall be sufficient to hold the bottom of the jack in place over time.

- E. Set jack unit-cylinder assembly plumb, centered accurately and shimmed to proper elevation, using centering lugs to prevent dislocation during filling. Fill space between casing and cylinder with clean, dry, compacted sand.
- F. Welded construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn Parts. Comply with AWS standards for workmanship and for qualification of welding operators.
- G. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.
- H. Install machinery, guides, controls, car and all equipment and accessories to provide a quiet, smoothly operating installation, free from side sway, oscillation or vibration.
- I. Sound isolation: Mount rotating, vibrating elevator equipment and components on vibration-absorption mounts, designed to effectively prevent the transmission of vibrations to the structure, and eliminate sources of structure-borne noise from the elevator system.
- J. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.
- K. Erect hoistway sills, headers, and frames before erection of rough walls and doors; erect fascias and toe guards after rough walls are finished. Set sill units accurately aligned and slightly above finish floor at landings.
- L. Lubricate operating parts of system where recommended by manufacturer.

3.3 FIELD QUALITY CONTROL

- A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required by A17.1 Code and local authorities having jurisdiction. Perform other tests, if any, as required by governing regulations or agencies.
- B. Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times tests are to be performed on the elevator.

3.4 ADJUSTING

- A. Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.

3.5 CLEANING

- A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided. Stainless steel shall be cleaned with soap and water and dried with a non-abrasive surface; shall not be cleaned with bleached-based cleansers.
- B. At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoistway. Remove trash and debris.

3.6 PROTECTION

- A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

3.7 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.
- B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

END OF SECTION 14240