HOUSTON PUBLIC WORKS

BUILDING CODE ENFORCEMENT
AUDIT OF FABRICATION PRACTICES (CONCRETING & PRETENSIONING)

Instructions: Form must be completed by the Special Inspection Agency.

FORM G

Fabricator's Name: _____ Fabricator's number: _____ Date: _____

Plant Address: _____

Fabricator's Representative Name: _____ Title: _____

Fabricator's Representative E-Mail Address: _____

Phone Number: _____

INSPECTION AGENCY

AGENCY'S NUMBER: _____ **TIME IN:** _____ **TIME OUT:** _____

Inspector Name: _____ Phone Number: _____

E-Mail Address: _____

COMMENTS PERTAINING TO THIS AUDIT

_____

_____

_____

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INSPECTOR RECOMMENDATIONS

- ❑ NEW CERTIFICATION AS CERTIFIED FABRICATOR OF _____
- ❑ RENEWAL OF CERTIFICATION
- ❑ APPROVED UPON CORRECTION OF FINDINGS
- ❑ DISAPPROVAL

SPECIAL INSPECTOR SIGNATURE: _____ **DATE:** _____

COMPLETE, SIGN, SEAL & DATE THIS FORM AND MAIL OR EMAIL TO THE CITY OF HOUSTON:

Mr. Maher Khansa, P.E.

City of Houston-Building Code Enforcement-CACD, 1002 Washington Ave., Houston, Texas 77002

Email: maher.khansa@houstontx.gov

✱ *Symbol intended for office use only*

AUDIT OF FABRICATION PRACTICES (CONCRETING & PRETENSIONING)

Fabricator's Name: _____ Fabricator's number: _____ Date: _____

A	GENERAL REQUIREMENTS	COMPLIANCE	COMMENTS
A-1	Is the Quality Control Manual fully documented and up to date?	☐ YES ☐ NO	
A-2	Is the Quality Control Manual reviewed at least annually? Provide last review date: _____	☐ YES ☐ NO	
A-3	Are there any revisions to the Quality Control Manual? Provide latest revision date: _____	☐ YES ☐ NO	
A-4	Are there any key personnel changes since last inspection?	☐ YES ☐ NO	
A-5	Are the annual inspections performed as required? Provide last inspection date: _____	☐ YES ☐ NO	
B	**ENGINEERING**	**COMPLIANCE**	**COMMENTS**
B-1	The fabricator can demonstrate that there is either an in-house or an outside licensed engineer to perform necessary designs and/or to consult on technical questions.	☐ YES ☐ NO	
B-2	The fabricator can demonstrate that there is an in-house or outside special process consultant for each special process performed.	☐ YES ☐ NO	
B-3	The contract documents are reviewed to assure that all materials and processes are specified or indicated on the drawings or specifications.	☐ YES ☐ NO	
B-4	The fabricator reviews the contract documents and structural/architectural drawings for correctness.	☐ YES ☐ NO	
B-5	The fabricator has a process to review corrections and the complex design problems encountered in the fabrication process.	☐ YES ☐ NO	
B-6	The fabricator has personnel with adequate knowledge to provide answers to technical questions.	☐ YES ☐ NO	
B-7	The fabricator has personnel with adequate knowledge of applicable material specifications.	☐ YES ☐ NO	
C	**DRAFTING**	**COMPLIANCE**	**COMMENTS**
C-1	Shop drawings are property prepared.	☐ YES ☐ NO	
C-2	The fabricator has personnel capable of supervising, evaluating, and coordinating shop drawing preparation and all shop drawings are reviewed for correctness.	☐ YES ☐ NO	
C-3	The fabricator has an in-house capability of providing special details for the shop/plant to solve fabrication problems.	☐ YES ☐ NO	
C-4	The shop drawings indicate materials to be utilized in the final structure.	☐ YES ☐ NO	
D	**DRAWING CONTROL**	**COMPLIANCE**	**COMMENTS**
D-1	The fabricator can verify control of design drawings as follows: ❑ receipt ❑ on file ❑ revisions	☐ YES ☐ NO	
D-2	The fabricator can verify control of specifications and addendums.	☐ YES ☐ NO	
D-3	The fabricator can demonstrate control of shop drawings: ❑ receipt ❑ on file	☐ YES ☐ NO	
D-4	The Quality Control Manual traces each phase from drawing preparation, to shop drawing, receipt, submittals for approval, approval, resubmittals and date sent to shop/plant for fabrication.	☐ YES ☐ NO	
D-5	The fabricator can demonstrate control of revisions to shop drawings.	☐ YES ☐ NO	
D-6	The fabricator can demonstrate control of obsolete shop drawings.	☐ YES ☐ NO	
D-7	The drawing control system used is the one described in the Quality Control Manual.	☐ YES ☐ NO	

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Fabricator's Name: _____ Fabricator's number: _____ Date: _____

E	WORK ORDER – JOB CONTROL	COMPLIANCE	COMMENTS
E-1	The fabricator has established a job control number/identification system for all work accepted.	☐ YES ☐ NO	
E-2	All correspondence received is marked with its job identification mark.	☐ YES ☐ NO	
E-3	Job correspondence is filed with the job files for that work.	☐ YES ☐ NO	
E-4	All correspondence received is: ❑ stamped received ❑ dated & initialed	☐ YES ☐ NO	
F	**MATERIAL PROCUREMENT**	**COMPLIANCE**	**COMMENTS**
F-1	Materials are procured by a purchase order or some other type of form that provides verification and documentation of the order.	☐ YES ☐ NO	
F-2	All materials are ordered or procured to acceptable standards and/or specifications.	☐ YES ☐ NO	
F-3	The material specifications are indicated/documented on the purchase order/form used for materials procurement.	☐ YES ☐ NO	
F-4	The procurement document states how the material shall be marked/identified.	☐ YES ☐ NO	
F-5	The fabricator requires suppliers to furnish material certification reports on the procurement document.	☐ YES ☐ NO	
F-6	The fabricator has documented the review of the quality status of suppliers on a regular basis.	☐ YES ☐ NO	
F-7	The QA/QC manager has visited and/or reviewed subcontractors' fabrication and/or Quality Control System Program operations on a random basis where applicable.	☐ YES ☐ NO	
G	**RECEIVING MATERIAL**	**COMPLIANCE**	**COMMENTS**
G-1	The fabricator is using a formal method for receiving materials/subassemblies.	☐ YES ☐ NO	
G-2	The fabricator inspects all incoming materials arriving at the facility.	☐ YES ☐ NO	
G-3	The fabricator has a material identification system to assure control of materials of different grades/sizes (as applicable).	☐ YES ☐ NO	
G-4	Receiving inspections are documented.	☐ YES ☐ NO	
G-5	The receiving inspector understand the company system for: ❑ receiving materials ❑ receiving subassemblies ❑ acceptance/rejection of nonconforming materials and/or subassemblies ❑ means of handling correctable nonconformities observed during the receiving inspection	☐ YES ☐ NO	
G-6	Receiving inspector confirms: ❑ quantity of materials ❑ size of material ❑ grade of material ❑ length of material ❋	☐ YES ☐ NO	
H	**HANDLING & STORAGE EQUIPMENT, FACILITIES AND PROCEDURES**	**COMPLIANCE**	**COMMENTS**
H-1	The fabricator has adequate facilities, equipment and illustrated drawings or instructions available to indicate the proper way to: ❑ handle materials in the yard ❋ ❑ handle materials in the plant ❑ store materials/subassemblies ❑ provide correct bracing/blocking for materials/subassemblies ❋ ❑ prevent material/subassembly deterioration ❑ provide correct storage for fabricated products ❑ handle fabricated products	☐ YES ☐ NO	

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H-2	The fabricator is utilizing an adequate control process for stocked/stored materials.	☐ YES ☐ NO	
I	**NORMAL AND SPECIAL PROCESSES CONTROL**	**COMPLIANCE**	**COMMENTS**
I-1	The fabricator is controlling normal and special production/work processes.	☐ YES ☐ NO	
I-2	Acceptance standards are readily available or posted near work stations for review by production personnel and inspection personnel.	☐ YES ☐ NO	
I-3	Sufficient work instructions are available to production personnel at each work station.	☐ YES ☐ NO	
I-4	Fabricator is utilizing established qualification standards for special work processes (such as testing samples). ❋	☐ YES ☐ NO	
I-5	Qualifications for personnel performing special work processes are available or posted and maintained up-to-date, readily available to production supervisors and quality control personnel.	☐ YES ☐ NO	
I-6	Special process personnel have been assigned identification symbols to identify work performed by them.	☐ YES ☐ NO	
I-7	The assigned identification symbols for special process personnel are readily available or have been posted for use by Quality Control inspectors.	☐ YES ☐ NO	
I-8	Special process personnel identify work they performed.	☐ YES ☐ NO	
I-9	Key inspections by production personnel are documented.	☐ YES ☐ NO	
I-10	All inspections are documented.	☐ YES ☐ NO	
I-11	The fabricator can demonstrate the system utilized for: ❑ minor repairs ❑ major repairs ❑ documentation of re-inspection of repairs	☐ YES ☐ NO	
I-12	The fabricator can demonstrate system for rejection and disposal of non-repairable nonconformities.	☐ YES ☐ NO	
I-13	The fabricator can demonstrate that surveillance of stored fabricated products is performed on a routine scheduled basis.	☐ YES ☐ NO	
I-14	Fabricated products are stored on a hard compacted well drained surface.	☐ YES ☐ NO	
J	**EQUIPMENT CONTROL & MAINTENANCE**	**COMPLIANCE**	**COMMENTS**
J-1	The fabricator can demonstrate that each piece of equipment in the plant: ❑ is acceptable or not acceptable for use ❑ is documented on the equipment ❑ is on a maintenance program ❑ is listed on a maintenance log ❑ has been calibrated within an acceptable established time frame where applicable ❑ is listed, when appropriate, in a calibration log when actively utilized	☐ YES ☐ NO	
K	**AUDITS/REVIEWS OF THE QUALITY PROGRAM**	**COMPLIANCE**	**COMMENTS**
K-1	Verification was presented to demonstrate that management has reviewed the Quality Control System within the last twelve (12) months.	☐ YES ☐ NO	
K-2	Management has taken steps to measure the effectiveness of the quality program.	☐ YES ☐ NO	
K-3	The QA/QC manager has shown documentation that each Quality Control Manual was reviewed to assure it is complete and up to date within the last six (6) months.	☐ YES ☐ NO	
K-4	The fabricator has established a record retention system and is retaining job records for a minimum of two (2) years after construction completion.	☐ YES ☐ NO	

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L	QUALITY CONTROL PERSONNEL/INSPECTORS	COMPLIANCE	COMMENTS
L-1	Quality control inspectors were available in the plant at the time of this inspection excluding QC manager (applicable when appropriate).	☐ YES ☐ NO	
L-2	The quality control personnel have immediate access to the specifications, addendums to specifications, or to the engineer for answering key questions.	☐ YES ☐ NO	
L-3	The quality control personnel have immediate access to the technical library and other pertinent information.	☐ YES ☐ NO	
L-4	The quality control personnel inform line production supervisory personnel when nonconforming work is observed.	☐ YES ☐ NO	
L-5	The quality control personnel are conversant with qualifications of special process requirements.	☐ YES ☐ NO	
L-6	The quality control personnel have immediate access to approved procedures for special processes.	☐ YES ☐ NO	
L-7	The quality control personnel are conversant with qualifications of special process personnel.	☐ YES ☐ NO	
L-8	The quality control personnel verify equipment is checked for acceptable performance.	☐ YES ☐ NO	
L-9	The quality control personnel verify that production equipment is calibrated.	☐ YES ☐ NO	
L-10	The quality control personnel can verify documentation of equipment maintenance and repairs.	☐ YES ☐ NO	
L-11	Non-conforming tools and equipment are red tagged to prevent their use in production.	☐ YES ☐ NO	
L-12	The quality control personnel are equipped to properly perform assigned tasks. ❑ tapeline ❑ calipers ❑ tag system ✱	☐ YES ☐ NO	
L-13	The quality control personnel understand their responsibility to management.	☐ YES ☐ NO	
L-14	The quality control personnel have sufficient authority to perform their assignments.	☐ YES ☐ NO	

M	ADDITIONAL COMMENTS	COMPLIANCE	COMMENTS
It is evident by this inspection and the review of the Quality Control System and its operation that at this time:			
M-1	All employees are aware of the Quality Control System.	☐ YES ☐ NO	
M-2	Employees are familiar with the Quality Control System as it may pertain to them.	☐ YES ☐ NO	
M-3	Management has taken an active role in the Quality Control System.	☐ YES ☐ NO	
M-4	The following key functions are performed by personnel fully aware of and acquainted with the Quality Control System: ❑ sales ❑ purchasing ❑ other _____ ❑ engineering ❑ production _____ ❑ drafting ❑ quality control	☐ YES ☐ NO	
M-5	The fabricator has completely separated production and QA/QC activities.	☐ YES ☐ NO	
M-6	The fabricator QA/QC program is functioning in each of the key areas without significant omissions, inconsistencies and/or non-compliance with the established program.	☐ YES ☐ NO	
M-7	The fabricator appears to have sufficient procedure/work instructions to assure all products are fabricated to conform to the contract documents and code requirements.	☐ YES ☐ NO	

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M-8	The fabricator has an adequately documented Quality Assurance Program.	☐ YES ☐ NO	
N	**CONCRETING OPERATION ❋**	**COMPLIANCE**	**COMMENTS**
N-1	All storage areas and stockpiles have been assigned identification marks and such identification is posted: ❑ in a selected location in the plant/shop or office ❑ in the storage areas and special selected locations in the yard	☐ YES ☐ NO	
N-2	The fabricator has demonstrated by exhibiting documentation that aggregate gradations are: ❑ received on material test reports with purchased material at time of delivery from suppliers ❑ performed at least once a week on coarse and fine aggregate ❑ performed for each 400 cubic yards of fine aggregate ❑ performed for each 800 cubic yards of coarse aggregate	☐ YES ☐ NO	
N-3	The fabricator has demonstrated that moisture in aggregate is determined: ❑ continuously for fine aggregates ❑ at least twice a day and/or any time a change in moisture content becomes obvious	☐ YES ☐ NO	
N-4	Aggregates are stored on at least a hard compacted well drained surface. If contamination cannot be avoided, area should be paved.	☐ YES ☐ NO	
For questions No. 5-33, the Quality Control Inspector has demonstrated by inspection records that:			
N-5	Bean type scales have been checked at zero loads with bins empty each time the mix is changed.	☐ YES ☐ NO	
N-6	Scales have been checked at least once during each day's operation.	☐ YES ☐ NO	
N-7	Scales have been calibrated within the last six months.	☐ YES ☐ NO	
N-8	The device for measuring water is accurate within one percent of the quantity required by the batch (Checked by weight or volume).	☐ YES ☐ NO	
N-9	Measuring tanks for water have outside taps/valve and have been calibrated and are routinely checked.	☐ YES ☐ NO	
N-10	Liquid admixture dispensers are routinely checked to verify calibrations.	☐ YES ☐ NO	
N-11	Liquid admixture dispensers have diversion tap/valve to verify measured dosage.	☐ YES ☐ NO	
N-12	Entrained air measurements taken during production operations are maintained with ± 2 percentage points.	☐ YES ☐ NO	
N-13	Coarse aggregate stockpiles are periodically purged of excess fines which tend to accumulate near their bases.	☐ YES ☐ NO	
N-14	Coarse aggregate, as delivered to the batching bins, is within specified gradation limits.	☐ YES ☐ NO	
N-15	Mixers are checked daily for changes in condition due to accumulation of hardened concrete or mortar, or wear of blades.	☐ YES ☐ NO	
N-16	Acceptance standards are available for: ❑ blade condition ❑ speed and rotation of mixer drum ❑ cleanliness ❑ minimum mixing times	☐ YES ☐ NO	
N-17	The stationary mixers are operated within the allowable specified times.	☐ YES ☐ NO	
N-18	The cement weighing bin is free of caked and/or hardened cement.	☐ YES ☐ NO	
N-19	The weighing, batching and mixing operations are observed and recorded to be satisfactory.	☐ YES ☐ NO	
N-20	The fine aggregate variation in fineness modulus does not exceed ±0.20 from the average value assumed for the mix design.	☐ YES ☐ NO	
N-21	The fineness modulus for the mix design is a known quantity.	☐ YES ☐ NO	

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N-22	Acceptance test reports are available for the aggregates as follows: ❑ test for organic impurities in sands ❑ test for resistance to abrasion of small size coarse aggregate by use of the Los Angeles machine ❑ test for clay lumps and friable particles in aggregates ❑ test for resistance to abrasion for large size coarse aggregate by use of the Los Angeles machine ❑ test for potential reactivity of aggregates ❑ test for potential volume change ❑ test for concrete resistance to rapid freezing and thawing ❑ other _____	☐ YES ☐ NO	
N-23	Water in tanks for curing concrete compression test specimens is maintained at 73.4°F ± 3°.	☐ YES ☐ NO	
N-24	The frequency of casting compression test specimens is not less than two test cylinders per bed to verify strength at time of stress transfer.	☐ YES ☐ NO	
N-25	A minimum of two cylinders are taken per day for each 50 cubic yards of concrete or fraction thereof for each mix design for 28-day strength (or earlier age strength if specified).	☐ YES ☐ NO	
N-26	For small individual bed placements, a minimum of two test cylinders for each 20 cubic yards or fraction thereof are taken to specify handling strength or strength at stress transfer.	☐ YES ☐ NO	
N-27	Test specimens are taken during latter half of casting when specimens are utilized to determine strength at stress transfer.	☐ YES ☐ NO	
N-28	A correlation has been established and used to transpose concrete strengths determined by specimens smaller than the standard six (6) inch diameter by twelve (12) inch long cylinder.	☐ YES ☐ NO	
N-29	A graph of this correlation is posted near the testing machine.	☐ YES ☐ NO	
N-30	Calibration curves/tables for the compression testing machine are posted near the testing machine.	☐ YES ☐ NO	
N-31	The personnel operating the testing equipment understand the load per unit area applied to the test specimen as detailed in the ASTM specifications. (20 to 50 psi/sec).	☐ YES ☐ NO	
N-32	The personnel operating the testing equipment and the quality control personnel can confirm by documentation that the rate of applied load is verified on a scheduled routine basis. 3"Ø × 6" long min. 140 lbs/sec (8400 lbs./min), max. 354 lbs/sec (21240 lbs/min) 4"Ø × 8" long min. 251 lbs/sec (15060 lbs/min), max. 629 lbs/sec (37740 lbs/min) 6"Ø × 12" long min. 565 lbs/sec (33900 lbs/min), max. 1413 lbs/sec (84780 lbs/min)	☐ YES ☐ NO	
N-33	Maximum size aggregate for size of test specimens utilized is 1/3 of diameter of the test specimen. 3" diameter = 1" max sized aggregate 4" diameter = 1.33" max 1" nominal 6" diameter = 2" max sized aggregate	☐ YES ☐ NO	

Does the fabricator manufacture prestressed/post-tensioned concrete?

❑ No. **STOP** and proceed to page 19 and sign the form.

❑ Yes. Complete Section O. Pretensioning Systems (Pages 8-19)

O	PRESTRESSED SYSTEMS (IF APPLICABLE)		
O-1	**CALCULATIONS**	**COMPLIANCE**	**COMMENTS**
O-1.1	Fabricator can define modulus of elasticity and understands that it is the ratio of unit axial stress to unit axial deformation or strain (y/x, the slope of the stress/strain line is called the modulus of elasticity).	☐ YES ☐ NO	

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O-1.2	Stress-strain relationship for the strands utilized is known within close limits in order to compute elongations resulting from tensioning.	☐ YES ☐ NO	
O-1.3	The modulus of elasticity is determined for the strands used by: ❑ stress-strain curves furnished by the supplier ❑ a modulus of elasticity is indicated on the ticket supplied with each coil of material ❑ an average modulus of elasticity is maintained by the fabricator	☐ YES ☐ NO	
O-1.4	Fabricator verifies that the average value used for modulus of elasticity is within the tolerance limits specified when compared with the value given on each individual coil (5% maximum variance allowed).	☐ YES ☐ NO	
O-1.5	Personnel responsible for performing the tensioning calculations for each bed setup understand the tensioning operations and each of the correction factors that must be considered in order to assure the proper tensioning force can be applied and measured.	☐ YES ☐ NO	
O-1.6	Losses that are incidental to the tensioning operations are compensated for in computing elongations for each casting bed.	☐ YES ☐ NO	
O-1.7	These losses have been adequately listed and measured for use in the required calculations.	☐ YES ☐ NO	
O-1.8	Calculations for elongations and gauge readings include the following correction factors: ❑ friction allowances ❑ strand slippage allowances ❑ movement of abutments ❑ gaging system calibration corrections ❑ temperature correction factors ❑ bed shortening if under load ❑ other compensations for setup	☐ YES ☐ NO	
O-1.9	Calibration records for all tensioning systems in use are on hand for use in preparing theoretical tensioning values.	☐ YES ☐ NO	
O-1.10	Personnel involved in preparing tensioning calculations have a copy of the calibration records for reference.	☐ YES ☐ NO	
O-1.11	The quality assurance inspector understands each of the correction calculations, including when and how they should be applied, in order to assure the proper tensioning force is applied.	☐ YES ☐ NO	
O-2	**UNDERSTANDING, ESTABLISHING AND CONTROLLING LOSSES IN EACH SYSTEM**	**COMPLIANCE**	**COMMENTS**
O-2.1	Losses that are incidental to the tensioning operations vary between casting beds, and have been evaluated for each bed.	☐ YES ☐ NO	
O-2.2	Production field supervisors are able to list the correction factors applied to each tensioning/ stressing setup used.	☐ YES ☐ NO	
O-2.3	Quality assurance inspectors understand the correction factors applied to each tensioning/stressing setup used.	☐ YES ☐ NO	
O-2.4	Production field supervisors understand the corrections that may be required to gauge readings.	☐ YES ☐ NO	
O-2.5	Production field supervisors understand when bed shortening corrections must be included.	☐ YES ☐ NO	
O-2.6	Strand slippage occurs when stressing forces are transferred from jacks to abutments.	☐ YES ☐ NO	
O-2.7	Anchorage movement has been measured for each typical and special strand pattern and group of tensioning forces utilized in production.	☐ YES ☐ NO	
O-2.8	Production field supervisors understand the standards established for chuck replacement to reduce excessive strand slippage.	☐ YES ☐ NO	
O-2.9	Elongation measurements take into account all operational losses in the tensioning system.	☐ YES ☐ NO	
O-2.10	Anchoring losses in single strand tensioning are automatically compensated for since elongations are measured after chuck seating.	☐ YES ☐ NO	
O-2.11	Fabricator has determined the frictional losses in the multi-strand jacking system for each strand pattern, as well as each sized strand utilized and for all variations used in the production process.	☐ YES ☐ NO	

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O-2.12	Fabricator has established a third method of force verification on multi-strand tensioning system in case the first two methods do not agree within the established allowable limits.	☐ YES ☐ NO	
O-2.13	Dead-end slippage is taken care of as the strand seats itself in the dead-end chuck on application of initial load. Some additional seating will typically occur during the application of final load and will show up as an added elongation in the final measurement unless some corrections to the system have been made. How is this handled by this fabricator? Answer: _____ _____	☐ YES ☐ NO	
O-2.14	Splice chucks introduce slippage characteristics similar to that which occurs when the strand is seated in its anchorage system. Are the strands marked on each side of the splice to confirm the assumed slippage to assure the values used in calculations are accurate?	☐ YES ☐ NO	
O-2.15	Fabricator has established acceptance/rejection standards in the Quality Control Program for worn or distorted grips/jaws.	☐ YES ☐ NO	
O-2.16	Fabricator understands that for strands stressed to 175,000 psi, a temperature variation of 10°F results in a stress variation of one (1) percent.	☐ YES ☐ NO	
O-2.17	Fabricator understands that raising the temperature decreases the stress force while reducing the temperature increases the stress force.	☐ YES ☐ NO	
O-2.18	Temperature corrections have been checked to determine effects on: ❑ self-stress forms ❑ each casting bed	☐ YES ☐ NO	
O-2.19	In a 400 foot form during a heat curing cycle from 50°F to 140°F, the form should have a change in length of approximately three inches. How is differential movement controlled between forms and members cast? Answer: _____ _____	☐ YES ☐ NO	
O-2.20	Fabricator has established a standard procedure which sets the frequency for confirming the values utilized. Are calculations revised to bring the assumed and actual measurements within acceptable agreement?	☐ YES ☐ NO	
O-2.21	Personnel have a good understanding of the losses that may occur in each of the systems they use.	☐ YES ☐ NO	
O-2.22	An adequate Quality Control Program has been established to review and document each tensioning operation.	☐ YES ☐ NO	
O-3	**GAUGES**	**COMPLIANCE**	**COMMENTS**
O-3.1	Gauges are mounted at or near working eye level.	☐ YES ☐ NO	
O-3.2	Gauges are positioned so readings can be obtained without parallax.	☐ YES ☐ NO	
O-3.3	Gauges have indicating dials at least six (6) inches in diameter.	☐ YES ☐ NO	
O-3.4	Dials are gauged to indicate pounds of jacking force.	☐ YES ☐ NO	
O-3.5	Gauge used to measure initial load is working within its rated range.	☐ YES ☐ NO	
O-3.6	Gauges have a full range equal to, not less than 1.5 to 2 times the normal working range.	☐ YES ☐ NO	
O-3.7	Loads to be gauged are not less than one quarter (1/4) of the total graduated capacity of the gauge used, unless calibration data gives accuracy over a wider range.	☐ YES ☐ NO	
O-3.8	Loads to be gauged are not more than a three-fourths (3/4) of the total gauge graduated capacity, unless calibration data gives accuracy over a wider range.	☐ YES ☐ NO	
O-3.9	Devices for measuring the stressing load have an accuracy of reading within two (2) percent.	☐ YES ☐ NO	
O-3.10	Gauges have a sticker indicating date of last calibration.	☐ YES ☐ NO	
O-3.11	Calibration sticker indicates the agency that performed the calibration.	☐ YES ☐ NO	

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O-3.12	Calibration records include method of calibration and a curve showing the full range of calibration with gauge readings plotted against actual loads.	☐ YES ☐ NO	
O-3.13	Calibration of load measuring devices is performed by an approved testing laboratory, calibration service or registered professional engineer.	☐ YES ☐ NO	
O-3.14	Gauges are calibrated for the jacks and pumps with which they are used.	☐ YES ☐ NO	
O-3.15	Production gauges calibrated by an outside agency shall have a recalibration frequency not exceeding twelve (12) month intervals.	☐ YES ☐ NO	
O-3.16	Fabricator uses a "master gauge" for ongoing calibration of the system after initial calibration as a total system.	☐ YES ☐ NO	
O-3.17	The master gauge was calibrated by an approved agency within the last six months.	☐ YES ☐ NO	
O-3.18	Intervals for in-house calibrations to a master gauge do not exceed six months.	☐ YES ☐ NO	
O-3.19	Forms used to procure materials are illustrated in the Quality Control Manual.	☐ YES ☐ NO	
O-3.20	Fabricator has: ❑ adequate equipment to gauge the applied loads ❑ personnel with adequate understanding of the system used ❑ the capability to perform this function satisfactorily ❑ adequate QA system to review and document system	☐ YES ☐ NO	
O-4	**CONTROL OF JACKING FORCES**	**COMPLIANCE**	**COMMENTS**
O-4.1	Hydraulic gauges have an appropriate bypass system, valve snubbers and fittings to ensure gauge readings will remain steady until jacking load is released.	☐ YES ☐ NO	
O-4.2	Direct measurement of jacking force is accomplished by use of: ❑ a pressure gauge ❑ a dynamometer ❑ a load cell ❑ the force computed from actual elongation of the strand based on the physical properties of strand	☐ YES ☐ NO	
O-4.3	Jacking force is controlled by a manual pressure cutoff.	☐ YES ☐ NO	
O-4.4	Jacking force is controlled by an automatic pressure cutoff.	☐ YES ☐ NO	
O-4.5	Manual cutoff is such that rate of load application can stop jack within specified load tolerances.	☐ YES ☐ NO	
O-4.6	The automatic cutoff system utilized allows minor adjustment of jacking load.	☐ YES ☐ NO	
O-4.7	Verification of accuracy of automatic cutoff is made at the beginning of each day's production run.	☐ YES ☐ NO	
O-4.8	This verification is made by running to the desired cutoff load.	☐ YES ☐ NO	
O-4.9	Verification of accuracy of automatic cutoff is made at any time improper results are suspected.	☐ YES ☐ NO	
O-4.10	Other methods of determining the stressing force used by this fabricator are: ❑ dynamometers ❑ load cells ❑ dead weight tensioning systems	☐ YES ☐ NO	
O-4.11	Dead weight tensioning systems have a dynamometer or load cell to monitor the load to the system.	☐ YES ☐ NO	
O-4.12	Dynamometers are connected in tension in the stressing system.	☐ YES ☐ NO	
O-4.13	Load cells are connected to ensure the stressing action puts a compressive force on the sensing element.	☐ YES ☐ NO	

AUDIT OF FABRICATION PRACTICES (CONCRETING & PRETENSIONING)

Fabricator's Name: _____ Fabricator's number: _____ Date: _____

O-5	CHUCKS/ANCHORAGE SYSTEMS	COMPLIANCE	COMMENTS
O-5.1	Strand chucks for pretensioning are capable of anchoring the strand positively without slippage after seating.	☐ YES ☐ NO	
O-5.2	Lengths of grips and configuration of serrations are such as to insure against strand failure within the grips at stresses less than 100% of ultimate strength.	☐ YES ☐ NO	
O-5.3	Steel cases for strand chucks are proof tested by the manufacturer to at least 100% of the ultimate strength of the strand.	☐ YES ☐ NO	
O-5.4	Strand chucks consist of a barrel, grooved jaws with an O-ring pulling them together, and a spring-equipped cap.	☐ YES ☐ NO	
O-5.5	Strand chucks and splice chucks are capable of positively anchoring the stressing loads with a minimum of differential slippage.	☐ YES ☐ NO	
O-5.6	Chucks are used as complete units.	☐ YES ☐ NO	
O-5.7	Components from different chuck manufacturers are not interchanged.	☐ YES ☐ NO	
O-5.8	Strand chucks are assembled of compatible elements to avoid improper fit and seating on strands.	☐ YES ☐ NO	
O-5.9	Strand chucks designed with spring-equipped caps are actually used with such caps.	☐ YES ☐ NO	
O-5.10	Fabricator has established acceptance/rejection standards in his Quality Control Manual for worn or distorted grips/jaws.	☐ YES ☐ NO	
O-5.11	Fabricator has established excessive slippage standards for discarding grips/jaws.	☐ YES ☐ NO	
O-5.12	Strand chucks/vises are inspected using a 3-power magnifying glass.	☐ YES ☐ NO	
O-5.13	Strand chuck components are cleaned and inspected between each use.	☐ YES ☐ NO	
O-5.14	Strand chuck components are lubricated as necessary.	☐ YES ☐ NO	
O-5.15	Barrels, jaws or caps that become visibly worn, cracked or distorted, or which allow excessive slippage are discarded.	☐ YES ☐ NO	
O-5.16	Care is taken to assure the proper sized components are used when inspecting and on reassembly of strand chucks and splice chucks.	☐ YES ☐ NO	
O-5.17	Fabricator's inspector personnel are acquainted with the acceptance/rejection standards established by the fabricator for strand chuck components.	☐ YES ☐ NO	
O-5.18	Fabricator has the equipment to assess strand chuck components adequately.	☐ YES ☐ NO	
O-5.19	Fabricator has the personnel with sufficient expertise to assess strand chuck components adequately.	☐ YES ☐ NO	
O-5.20	Fabricator's Quality Assurance Program is adequate to assure assess strand chuck components is properly performed.	☐ YES ☐ NO	
O-6	**STRAND**	**COMPLIANCE**	**COMMENTS**
O-6.1	Fabricator's Quality Assurance Program requires that prestressing tendons conform to the following specifications: ❑ uncoated, stress-relieved strand conforming to ASTM A-416, Grade 250 ❑ uncoated, stress-relieved strand conforming to ASTM A-416, Grade 270 ❑ uncoated, low relaxation strand conforming to ASTM A-416, Supplement Grade 250 ❑ uncoated, low relaxation strand conforming to ASTM A-416, Grade 270 ❑ coated, stress relieved strand (A-416, Grade 270) coated in accordance with ASTM method G-12 tested in accordance with ASTM A370	☐ YES ☐ NO	
O-6.2	Each shipment of tendons is accompanied by a mill certificate indicating it has been manufactured and tested in accordance with the applicable ASTM specifications.	☐ YES ☐ NO	
O-6.3	When mill certificates are not furnished with a shipment of strand, it is replaced by a certified test report furnished with every 20 tons or part thereof to provide documentation of compliance with the applicable ASTM specifications.	☐ YES ☐ NO	

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O-6.4	When a stress-strain curve is furnished, it shall be certified as representative of the material delivered.	☐ YES ☐ NO	
O-6.5	When the fabricator uses an average modulus of elasticity in computing elongations the quality program allows no more than a 2.5 percent variation between the average modulus and the actual modulus of the strand being used.	☐ YES ☐ NO	
O-6.6	Strand is furnished: ❑ in reel-less packs or ❑ on reels	☐ YES ☐ NO	
O-6.7	Fabricator stores prestressing steel under cover as a means of minimizing corrosion.	☐ YES ☐ NO	
O-6.8	Fabricator inspects and documents inspections of the prestressing steel for: ❑ deeply etched corrosion ❑ deep pits caused by corrosion ❑ any pits and etches that may cause strand failure during stressing operations	☐ YES ☐ NO	
O-6.9	Storage of prestressing steel is such that it is not close to galvanic causing agents or battery acid. This includes dissimilar metals adjacent to an ionized medium common to both metals.	☐ YES ☐ NO	
O-6.10	Quality Assurance Program is adequately performed in confirming requirements are met.	☐ YES ☐ NO	
O-7	**STRINGING THE STRAND**	**COMPLIANCE**	**COMMENTS**
O-7.1	Forms are inspected for accuracy prior to stringing the strands.	☐ YES ☐ NO	
O-7.2	Forms are inspected for cleanliness prior to stringing the strands.	☐ YES ☐ NO	
O-7.3	Strands are pulled from: ❑ a coil ❑ a reel-less pack ❑ a reel	☐ YES ☐ NO	
O-7.4	Stringing is done in: ❑ single strands ❑ multiple strands ❑ single and multiple strands	☐ YES ☐ NO	
O-7.5	Fabricator is capable of identifying a particular strand to a particular load recording device.	☐ YES ☐ NO	
O-7.6	Fabricator has established a procedure to assure that strands are pulled from the correct side of the pack as identified by the manufacturer.	☐ YES ☐ NO	
O-7.7	The strand rotates each time a revolution is pulled from the coil.	☐ YES ☐ NO	
O-7.8	Provisions have been made to relieve the rotations to ensure the measured elongations are not affected.	☐ YES ☐ NO	
O-7.9	The stringing procedure requires that tendons be protected during handling and/or moving.	☐ YES ☐ NO	
O-7.10	When moving or handling tendons, handling devices are required to be attached to the flanges of reels or coils.	☐ YES ☐ NO	
O-7.11	The stringing procedure requires that approved swivel grips or other approved methods be used to assure control of strands being strung.	☐ YES ☐ NO	
O-7.12	The stringing procedure requires that sharp hand tools are not carelessly used which may cause mechanical damage to the tendons.	☐ YES ☐ NO	
O-7.13	The procedure in the fabricator's Quality Control System for pulling strand makes a point to assure the strand does not kink.	☐ YES ☐ NO	
O-7.14	Personnel pay close attention for notches and/or nicks in the strand/wire.	☐ YES ☐ NO	
O-7.15	The procedure for pulling strand requires that the strand is checked for nicks.	☐ YES ☐ NO	
O-7.16	The fabricator's quality control program requires that tendons that are corrosion pitted be discarded.	☐ YES ☐ NO	

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O-7.17	The fabricator's quality control program allows the use of tendons with a light coating of surface rust.	☐ YES ☐ NO	
O-7.18	Fabricator has established a definite sequence of stringing and tensioning strands to avoid possible entanglement of strands.	☐ YES ☐ NO	
O-7.19	Personnel (stringing the strands) are familiar with the established procedure and with the identification system used by the manufacturer of the strand. Each strand can be identified as to its location within the member cast.	☐ YES ☐ NO	
O-7.20	Fabricator requires that strand be cut with shears or an abrasive grinder during the stringing operations	☐ YES ☐ NO	
O-7.21	When stringing strand, each piece of strand is cut between the strand vise and the coil or reel.	☐ YES ☐ NO	
O-7.22	Personnel stringing strand make sure that strand that has been gripped previously by strand chucks does not occur within lengths of strand to be stressed.	☐ YES ☐ NO	
O-7.23	Strand lengths spliced together are required to have the same lay of wire to avoid unraveling.	☐ YES ☐ NO	
O-7.24	Strand splices are not allowed to fall within a member unless they are the type that will develop the full ultimate strength of the wire.	☐ YES ☐ NO	
O-7.25	Either all wire is spliced or no wire is spliced, because multiple strand tensioning prevents correcting single strand differential slippage normal for spliced wire.	☐ YES ☐ NO	
O-7.26	The Quality Control Program does not allow stringing of strand previously gripped by strand chucks within lengths of the strand that are to be stressed.	☐ YES ☐ NO	
O-7.27	Personnel are aware that local stress concentration occurs at nicks and notches.	☐ YES ☐ NO	
O-7.28	Personnel understand that these nicks/notches may sometimes cause failure during strand stressing operations.	☐ YES ☐ NO	
O-7.29	Personnel understand that nicks/notches lower the fatigue and ultimate strength of the strand.	☐ YES ☐ NO	
O-7.30	Personnel pay close attention to assure that strand chucks do not nick or notch the strand/wire.	☐ YES ☐ NO	
O-7.31	The strand chucks are checked to assure they are properly seated.	☐ YES ☐ NO	
O-7.32	The strand chucks are checked to assure the vice system is in the line of the pull.	☐ YES ☐ NO	
O-7.33	Fabricator ensures the strand grips and anchor plates are set normal to the line of pull.	☐ YES ☐ NO	
O-7.34	Fabricator has adequate procedures to properly perform this work function.	☐ YES ☐ NO	
O-7.35	Personnel have adequate knowledge to perform this work function.	☐ YES ☐ NO	
O-7.36	Quality Control Program adequately reviews this work function.	☐ YES ☐ NO	
O-8	**THE TENSIONING OPERATIONS**	**COMPLIANCE**	**COMMENTS**
O-8.1	The quality control inspector reviews the theoretical calculations before the stressing operations are started.	☐ YES ☐ NO	
O-8.2	The production manager/quality control inspector determines the elongation measurement that will be used to confirm the actual measured elongation before stressing operations are started.	☐ YES ☐ NO	
O-8.3	The production manager/quality control inspector determines the actual gauge reading that should show on the dial gauge when the correct elongation is attained before stressing operations are started.	☐ YES ☐ NO	
O-8.4	Production personnel, responsible for performing the tensioning operations, understand each correction factor that must be considered, and how each correction is applied in order to assure the proper tensioning force has been applied, and the elongation measurements are modified to verify the correct end results.	☐ YES ☐ NO	
O-8.5	The quality control inspector understands each correction factor that must be considered in order to assure the proper tensioning force has been applied.	☐ YES ☐ NO	

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O-8.6	Personnel understand how the force generated by friction in the system affects: ❑ the gauge reading ❑ the elongation measurements	☐ YES ☐ NO	
O-8.7	Personnel understand how the strand slippage developed in the system affects: ❑ the gauge reading ❑ the elongation measurements	☐ YES ☐ NO	
O-8.8	Personnel understand how the elastic movement of the abutments affects the measuring system as to: ❑ the gauge reading ❑ the elongation measurements	☐ YES ☐ NO	
O-8.9	Personnel understand how casting beds, which are capable of resisting the prestressing forces without auxiliary assistance, affect the measuring system when under load.	☐ YES ☐ NO	
O-8.10	Personnel understand how the gauging system calibration affects the gauge readings and how corrections are made.	☐ YES ☐ NO	
O-8.11	Personnel understand the effects of the temperature from sun heat on the strand and on the forms and if temperature correction factors should be introduced into the system.	☐ YES ☐ NO	
O-8.12	Personnel understand how temperature affects the tension force in the tendons: ❑ an increase in temperature will increase/decrease the tension force ❑ a decrease in temperature will increase/decrease the tension force	☐ YES ☐ NO	
O-8.13	Personnel understand how temperature affects the prestress tensioning force and how temperature corrections are used to reach the proper force.	☐ YES ☐ NO	
O-8.14	Personnel responsible for the stressing operations understand the effects of inaccurate and variable stressing result in three principal types of problems: ❑ differential camber ❑ misalignment of members ❑ reduction of cracking moment	☐ YES ☐ NO	
O-8.15	Stresses induced in the tendons are determined by: ❑ measurement of elongation ❑ direct measurement of jacking force	☐ YES ☐ NO	
O-8.16	Personnel responsible for the stressing operations make two independent determinations of the prestress applied as followed: ❑ measurement of elongation ❑ pressure gauge, dynamometer, load cell (a gauging system)	☐ YES ☐ NO	
O-8.17	The two independent determinations of the prestress applied compare to each other and to theoretical values within a tolerance of five percent (5%).	☐ YES ☐ NO	
O-8.18	The fabricator uses: ❑ single strand stressing ❑ multiple strand stressing ❑ both, single strand and multiple strand stressing	☐ YES ☐ NO	
O-8.19	Only calibrated jacks that have current calibrations are used for tensioning strands.	☐ YES ☐ NO	
O-8.20	The procedure states that tensioning should not be performed on strands that have been nicked.	☐ YES ☐ NO	
O-8.21	The procedure requires that any strand with a broken wire not be tensioned.	☐ YES ☐ NO	
O-8.22	Pretensioning load is applied in two increments.	☐ YES ☐ NO	
O-8.23	After strands are positioned, an initial tensioning force between five and twenty-five percent (5%-25%) of the final force is applied.	☐ YES ☐ NO	
O-8.24	Initial load is measured with a tolerance of +100 pounds when equal to/or less than 10% of final load, and with a tolerance of +200 pounds when more than 10% of final load.	☐ YES ☐ NO	
O-8.25	Initial load is used to straighten, eliminate slack and provide a starting reference for elongation measurement.	☐ YES ☐ NO	
O-8.26	Initial elongation measurements are not made on application of initial tensioning force.	☐ YES ☐ NO	

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O-8.27	Fabricator understands that the reference points for measuring elongation are established after an initial tension force has been applied.	☐ YES ☐ NO	
O-8.28	The location of reference points for measuring elongations will vary with: ❑ the type and physical characteristics of the equipment used ❑ the different methods of tensioning the tendons	☐ YES ☐ NO	
O-8.29	Each of the two independent determinations of the prestress applied indicate three separately related items: ❑ the prestress force is indicated by the gauging system ❑ the correct size of tendon has been used, and the operational losses are within the acceptable tolerance as indicated by the elongation measurement ❑ elongations verify the possible accuracy of the gauging system	☐ YES ☐ NO	
O-8.30	In single strand tensioning, the initial and final loads are applied in immediate succession on each strand.	☐ YES ☐ NO	
O-8.31	Rotation of the jacking ram is limited to not more than one revolution per 100 feet of exposed strand.	☐ YES ☐ NO	
O-8.32	In single strand tensioning, the initial load is applied and held momentarily while reference marks are made for elongation and slippage measurement; then load is increased to its full value, the strand is seated and elongation measurements are made.	☐ YES ☐ NO	
O-8.33	Final tensioning is measured by gauging and cross checking with elongation measurements.	☐ YES ☐ NO	
O-8.34	Accuracy of measurement of elongations should be to the nearest 1/4 inch, this corresponds to an error of + 1/8 inch.	☐ YES ☐ NO	
O-8.35	When the forces determined by elongation measurement differ from that obtained by the gauging system, the procedure indicated below is followed: ❑ 5% or under, operations will continue ❑ more than 5%, tensioning operation is suspended and the source of error is determined before proceeding further	☐ YES ☐ NO	
O-8.36	The procedure for tensioning strands requires that elongations are continually checked during the tensioning operations.	☐ YES ☐ NO	
O-8.37	When using completely open beds (only straight strands with no headers or other possible sources of friction), strand elongation may be checked on first and last strands and 10% of all others. Does this fabricator utilize this production short cut? Is it documented in the Q.C. manual? Is this production shortcut utilized?	☐ YES ☐ NO	
O-8.38	Live end seating in single strand tensioning, considering that the chucks are in good condition with properly functioning spring caps, generally range in a strand slippage of 3/8" to 3/4". This slippage is monitored on a scheduled basis by production/quality control personnel to determine the appropriate value to be used as a correction factor in the tensioning system utilized. What is this frequency? _____	☐ YES ☐ NO	
O-8.39	Failure of a wire or wires in a strand in a pretensioned system is acceptable provided total area of wire failures is not more than 2% of the total tendons in any one member. Is this controlled?	☐ YES ☐ NO	
O-8.40	Failure of a wire or wires in a strand in a pretensioned system is acceptable provided the chief engineer assures himself the failure is not symptomatic of a more extensive condition. Is this controlled?	☐ YES ☐ NO	
O-8.41	Where rods under stress are used in the abutment anchoring system, the elongation of the rods is considered in the elongation calculations.	☐ YES ☐ NO	
O-8.42	Fabricator has a copy of the PCI safety and Loss Prevention Manual.	☐ YES ☐ NO	
O-8.43	Each employee is familiar with the fabricators safety program.	☐ YES ☐ NO	
O-9	**DRAPED STRANDS**	**COMPLIANCE**	**COMMENTS**
O-9.1	The tensioning procedure requires that draped strand tensioned with hold-downs in place use rollers and pins or other approved friction reducers at all hold down locations and at all support points.	☐ YES ☐ NO	

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O-9.2	The tensioning procedure requires that strand tensioned in a straight line and then deflected into a draped position be deflected simultaneously or on a predetermined schedule symmetrically about the center of the bed.	☐ YES ☐ NO	
O-9.3	Temporary overstressing is sometimes used for final stressing of draped strands to overcome friction in the system. This overstress should not exceed 80% of the specified tensile strength of the strand. Is this controlled by the fabricator?	☐ YES ☐ NO	
O-9.4	Strands are not seated in the above overstress condition.	☐ YES ☐ NO	
O-9.5	Suitable stress measurements are made at each anchorage at each end of a bed to verify calculated strand stresses.	☐ YES ☐ NO	
O-9.6	The verification is made prior to first casting for any new design, new strand pattern, and on a random scheduled basis during production operations.	☐ YES ☐ NO	
O-9.7	Tension of draped strands between ends of the bed agrees within 5% of specified values.	☐ YES ☐ NO	
O-9.8	In order to control distribution of stress in several members along a bed using draped strands, the stress in separate members can be determined by measurement of elongation in a predetermined length of strand within that member. This elongation shall be measured to the nearest 1/16th of an inch. Does this fabricator control stress distribution in draped tendons?	☐ YES ☐ NO	
O-9.9	Fabricator has minimized the frictional forces developed in the multi-strand tensioning system by: ❑ keeping the contact steel surfaces clean ❑ keeping the adjacent steel surfaces that can come in contact clean ❑ keeping the affected steel surfaces well lubricated	☐ YES ☐ NO	
O-9.10	Fabricator has: ❑ the necessary equipment ❑ capable personnel ❑ the quality program necessary to accomplish this work function within the established quality requirements	☐ YES ☐ NO	
O-10	**PRECONCRETING**	**COMPLIANCE**	**COMMENTS**
O-10.1	Torches and welding equipment are required to be kept clear of tensioned strand or strand to be tensioned.	☐ YES ☐ NO	
O-10.2	The prestressing operations procedures require that no welding be done above or around the tendons.	☐ YES ☐ NO	
O-10.3	The prestressing operations procedures require that electric chords are kept clear of pretensioned steel because an electric arc can damage and/or cause failure of the tendon.	☐ YES ☐ NO	
O-10.4	Form surfaces in contact with concrete are treated with an effective release agent.	☐ YES ☐ NO	
O-10.5	Fabricator exercises special care to prevent contamination of strand by form release agent, mud, grease or other coatings.	☐ YES ☐ NO	
O-10.6	Strands are checked to assure they are sufficiently clean to develop high bond with the concrete.	☐ YES ☐ NO	
O-10.7	Fabricator uses a release agent of the type that dries to a degree after application since the stringing of the strands is done after the release agent is applied.	☐ YES ☐ NO	
O-10.8	Fabricator exercises special care to protect strands since the release agent is applied after stringing the strands.	☐ YES ☐ NO	
O-10.9	Fabricator uses a sheet metal or similar type shield to protect strand from release agents applied after stringing strand.	☐ YES ☐ NO	
O-10.10	Strand is inspected after stringing to assure it is free of contamination.	☐ YES ☐ NO	
O-10.11	When contaminated strand is observed, it is cleaned with an effective solvent.	☐ YES ☐ NO	
O-10.12	Fabricator inspects and documents inspections of prestressing steel to assure it is free of deleterious materials such as grease, oil, wax, dirt, paint, loose, rust, other contaminants.	☐ YES ☐ NO	
O-10.13	Fabricator requires all prestressing steel, in members to be cast, be inspected prior to placement of concrete.	☐ YES ☐ NO	

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O-10.14	Fabricator realizes the problem with using PVC pipe or conduit in concrete containing prestressing steel.	☐ YES ☐ NO	
O-10.15	The Quality Control Program adequately reviews this work function.	☐ YES ☐ NO	
O-11	**DRY MIX OPERATIONS**	**COMPLIANCE**	**COMMENTS**
O-11.1	A quality control inspector is present during all detensioning operations of dry-mix, machine-cast products.	☐ YES ☐ NO	
O-11.2	Prior to release of the prestress force, reference lines are drawn across the ends of the slabs as near as possible to their "free ends" of all dry-mix, machine-cast products.	☐ YES ☐ NO	
O-11.3	All strands are marked at a measured distance from the reference mark established in O-11.2 above in order to determine strand slippage after detensioning of all dry-mix, machine-cast products.	☐ YES ☐ NO	
O-11.4	Minimum concrete transfer strength for dry-mix, machine-cast products is not less than 4500 psi in order to minimize difficulties with loss of bond.	☐ YES ☐ NO	
O-12	**DETENSIONING**	**COMPLIANCE**	**COMMENTS**
O-12.1	Detensioning stress transfer is not performed until concrete test specimens indicate acceptable specified concrete transfer strength.	☐ YES ☐ NO	
O-12.2	Minimum concrete transfer strength is not less 3000 psi.	☐ YES ☐ NO	
O-12.3	Fabricator has indicated that concrete strength influences the following items: ❑ camber ❑ dimensional changes due to strains in the concrete	☐ YES ☐ NO	
O-12.4	Fabricator realizes that concrete transfer strength above 2500 psi is required on wet-mix concretes to minimize difficulties with loss of bond.	☐ YES ☐ NO	
O-12.5	Heat/steam-cured concrete is detensioned immediately following the curing period while the concrete is still moist and warm.	☐ YES ☐ NO	
O-12.6	Fabricator has indicated he understands the following two things occur if heat/steam cured concrete is allowed to cool and dry out: ❑ causes cracking ❑ causes undesirable stresses in concrete	☐ YES ☐ NO	
O-12.7	Fabricator has a standard system for detensioning operations.	☐ YES ☐ NO	
O-12.8	The procedures used for single strand detensioning are listed in this fabricator's Quality Control Manual.	☐ YES ☐ NO	
O-12.9	The sequence normally used for cutting strands on a single strand detensioning system for any tensioning pattern is detailed in the fabricators Quality Control Manual.	☐ YES ☐ NO	
O-12.10	Fabricator has established a detensioning system to minimize: ❑ sudden loadings ❑ shock loadings	☐ YES ☐ NO	
O-12.11	Fabricator has established a detensioning system that keeps the prestressing forces nearly symmetrical about the vertical axis of the member.	☐ YES ☐ NO	
O-12.12	Fabricator releases single strand systems by simultaneously cutting the strand at both ends.	☐ YES ☐ NO	
O-12.13	This release is normally achieved by heating both ends at the same time until the metal gradually loses its strength.	☐ YES ☐ NO	
O-12.14	Fabricator uses production drawings which indicate detensioning schedule/procedures for all unusual shapes.	☐ YES ☐ NO	
O-12.15	Fabricator has a system of detensioning which establishes a procedure for: ❑ form removal ❑ tie release ❑ inserts release ❑ hold-down removal ❑ removal of any device which restricts movements	☐ YES ☐ NO	

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O-12.16	Production personnel understand the system for detensioning multiple strand systems.	☐ YES ☐ NO	
O-12.17	Fabricator has established a production procedure for detensioning prestressed concrete shapes using draped strands as a portion of the total reinforcement or as total reinforcement.	☐ YES ☐ NO	
O-12.18	Fabricator has computation of hold down forces and makes comparison with member weight calculations for all hold-down release operations.	☐ YES ☐ NO	
O-12.19	Fabricator has a positive system to assure no longitudinal movement of a concrete unit is allowed until hold-down devices are removed.	☐ YES ☐ NO	
O-12.20	Quality control inspector has computation sheet showing required hold-down forces and member weights for utilization/comparison for all hold-down release operations.	☐ YES ☐ NO	
O-12.21	Production/inspection personnel understand horizontal movement along the span may be detrimental until hold-down devices are removed.	☐ YES ☐ NO	
O-12.22	Fabricator's system establishes a method of releasing the following: ❑ hold-down devices ❑ bolts connected to hold-down devices.	☐ YES ☐ NO	
O-12.23	Production personnel understand the hold-down system used.	☐ YES ☐ NO	
O-12.24	Production personnel have a definite procedure to use for releasing hold-down devices and detensioning the strand.	☐ YES ☐ NO	
O-12.25	Some horizontal movement of the cast sections is expected, is this controlled?	☐ YES ☐ NO	
O-12.26	Fabricator's system releases hold-down prior to release of anchorage stress if the weight of the member weighs at least twice the force retained by the hold-down member.	☐ YES ☐ NO	
O-12.27	Fabricator's system allows release of the hold-down forces if these forces are less than 3/4 of the weight of the member and nominal reinforcing steel is carried in the top flange or slab.	☐ YES ☐ NO	
O-12.28	Fabricator has a special system if hold-down forces are more than 3/4 of the weight of the member.	☐ YES ☐ NO	
O-12.29	Fabricator uses dead weight placed along and on top of the member to compensate for the force retained by hold-downs.	☐ YES ☐ NO	
O-12.30	Fabricator has a special set up to add a vertical restraint applied over the hold-down points so the hold-down can be released prior to detensioning draped strands.	☐ YES ☐ NO	
O-12.31	Fabricator does not allow concrete to crack to facilitate release of hold-downs and the detensioning the draped strands.	☐ YES ☐ NO	
O-12.32	Sometimes it is necessary to release some of the draped strands in a bed to counteract vertical forces at hold-downs when hold-downs are released. Is this controlled?	☐ YES ☐ NO	
O-12.33	Detensioning of heavily stressed sections should be done at all points between members simultaneously to avoid damage caused by product movement or shock. Is this controlled?	☐ YES ☐ NO	
O-12.34	Heavily stressed sections with draped strand may require a partial release of draped strand at ends of members before releasing hold-downs in order to avoid top fiber cracking. Is this controlled?	☐ YES ☐ NO	
O-12.35	Fabricator detensions multiple strand systems by simultaneously releasing the tensioning by use of a hydraulic dejacking system.	☐ YES ☐ NO	
O-12.36	Total force is transferred from the header by the jack and gradually released. Because of this method of detensioning, some horizontal movement is expected. Fabricator makes a positive effort to minimize this movement.	☐ YES ☐ NO	
O-12.37	Fabricator understands that the movement mentioned above is proportional to the exposed lengths of stressed strands between members and between the last member and the fixed end.	☐ YES ☐ NO	
O-12.38	Fabricator has indicated that he understands that the overstress required to loosen lock nuts or other anchoring devices at the header should not exceed the force in the strand by five percent.	☐ YES ☐ NO	
O-12.39	This work function is properly performed.	☐ YES ☐ NO	
O-12.40	Quality Control Program adequately reviews and documents this work function.	☐ YES ☐ NO	

AUDIT OF FABRICATION PRACTICES (CONCRETING & PRETENSIONING)

Fabricator's Name: _____ Fabricator's number: _____ Date: _____

O-13	DOCUMENTATION	COMPLIANCE	COMMENTS
O-13.1	Calibration records for all jack equipment are available and show the following: ❑ date of calibration ❑ agency performing calibration ❑ method of calibration is by: ☐ providing ring ☐ load cell ☐ testing machine ❑ a curve showing full range of calibration with gauge reading plotted against actual loads	☐ YES ☐ NO	
O-13.2	Each inspection performed by production personnel is documented.	☐ YES ☐ NO	
O-13.3	Each inspection performed by quality assurance personnel is documented.	☐ YES ☐ NO	
O-13.4	Fabricator has developed a documentation system that confirms each item verified in each inspection performed.	☐ YES ☐ NO	
O-13.5	Documentation of inspections is initialed or marked by special identifying mark by each person performing an inspection.	☐ YES ☐ NO	
O-13.6	The identification system utilizes: ❑ special identification mark (initials, a number, a letter) ❑ special colored pen ❑ special colored see-through "highlighter pen"	☐ YES ☐ NO	

COMMENTS

SPECIAL INSPECTOR NAME: _____

(ENGINEER'S SEAL)

SPECIAL INSPECTOR SIGNATURE: _____

DATE: _____