

QUALITY CONTROL CHECKLISTS FOR FOUNDATION INSPECTION OF RESIDENTIAL AND OTHER LOW-RISE BUILDINGS

by
The Structural Committee
of
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ISSUE HISTORY

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A	02 Oct 01	For Subcommittee Comments	Jack Spivey	Ron Kelm
B	19 Sep 02	For Subcommittee Comments		Jon Monteith
C	14 Oct 02	For Subcommittee Comments		Michael Skoller
D	26 Nov 02	For Subcommittee Comments		Terry Taylor
E	10 Dec 02	For Subcommittee Comments		Mari Mes
F	24 Jan 03	For Subcommittee Comments		Mike Palmer
G	06 Mar 03	For Subcommittee Comments		Lowell Brumley
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PREFACE

The following documents are the results of two years of work completed in the late nineteen nineties by the Inspections Subcommittee of the Foundation Performance Committee. Jack Spivey chaired this committee and his fellow members were:

MR. MICHAEL SKOLLER P.E.

MR. JOE EDWARDS

MR. LOWELL BRUMLEY P.E.

MR. DEAN EICHELBERGER

Meetings took place on a monthly basis and were attended by many interested parties. Special recognition should be given to Mr. Jim Dutton of Du-West Foundation Repair and Mr. Dan Jagers of Olshan Foundation Repair. Their assistance with the foundation repair sections was invaluable. The topics for discussion have followed a general outline, which was established at the onset of the meetings. It was determined that our basic intent would be to establish a set of standards and procedures for the inspection of foundation construction and foundation repairs. These standards were to be incorporated into an inspection document, which would be thorough in its scope, but also easy to use. It was established early on in our discussions that the best form for our purposes would be a simple checklist, which would fully cover the subject of the inspection. It was also determined that keeping the checklist to one page would afford the most user-friendly instrument for our purposes. Once these parameters were established the subjects of the inspections were taken in the following order:

FOUNDATION MAKE-UP -- POST TENSION
STRESSING POST TENSION
FOUNDATION MAKE-UP -- CONVENTIONAL/REBAR
CONCRETE PLACEMENT
CONSTRUCTION PIERS
REPAIR PIERS
SEGMENTED REPAIR PILES

These topics were judged to represent the major types of foundation construction and foundation repairs found in the Houston area. They are certainly not inclusive of every inspection situation or construction method in use, but they do offer a basic set of standards for the majority of inspections that would be encountered in typical residential construction.

They are also designed to be used by anyone who has some knowledge of foundation construction. It was our intention that they would serve field inspectors, builders, builders' superintendents, municipal inspectors, or anyone with an interest in quality foundations.

The first order of business worked on by the subcommittee was to establish a heading format for each inspection. This portion of the form is meant to establish a context for the inspection. The basics of the site such as, the builder, subdivision, address, lot and block, are all set out at the top of the form. The next section is meant to establish the parameters that will govern the rest of the inspection. The most important of these, deals with the plans. No inspection should be undertaken without a set of plans, which should include the name of the engineer, the date of the plans and the detail sheet. Other pertinent details of the site that are covered in this section are the date, the time, the weather, and whether there is a detached garage.

The above guidelines were followed on each form, with the following variations dictated by the context of the inspection:

- For the Concrete Placement Form there is specific reference to the Foundation Make-Up Form, and the items in need of repair.
- In the Stress Form, there is an added reference to the cable count, the concrete placement date, and the post tension construction company.
- On the Construction Piers Form, there is a reference to the Geotechnical Engineer, and on the Repair Piers and Segmented Repair Piles Forms, there is reference to the design documentation and the municipal permit.

Once the context is established in the heading, the form moves on to sections relating to different aspects of each inspection. In general, these sections are documented by simply checking the item to show that it has been correctly completed. **The checkmark (✓) serves to show that the item has been considered and complies with the plans, whereas an x (X) denotes that the item does not comply with the plans.** In some sections, direct questions are asked that should be answered. Finally, the lower sections of the forms generally have reference to a drawing of the slab, the piers or piles, or the foundation being repaired. The drawings further document the conditions specific to the site and the foundation and allow the inspector to orient the data being described in the conclusion of the inspection.

Each of these forms represents an attempt to document the events related to a specific foundation project or a specific foundation repair. It should be remembered that all the answers and data reported are typically the only documentation of what actually happened during this phase of construction. For this reason, every item is pertinent and should be given careful consideration during the inspection. Though many of the items listed are fairly common knowledge to the typical inspector or builder, it is the sequencing and nuances of certain questions and items listed, which are the greatest advantage of using the forms. The committee felt that all major items such as beam size, tendon counts, plan dates, etc., were adequately covered in each form.

It should be noted that the Repair Piers and Segmented Repair Piles Forms contain information that is not found in any established sources or specifications. This is particularly true of the Segmented Repair Piles Form. It was generally agreed that these items are rarely inspected by an independent inspector.

This document is made freely available to the public through the Foundation Performance Association at www.foundationperformance.org so engineers, architects, inspectors, contractors, and other professionals involved in the quality control of foundations systems for residential and low-rise buildings may have access to the information. To ensure the document remains as current as possible, it will be periodically updated under the same document number but with new revision numbers. Please direct suggestions for improvement to the current chair of the structural committee.

The Foundation Performance Association and its members make no warranty regarding the accuracy of the information contained herein and will not be liable for any damages, including consequential damages, resulting from the use of this document.

QC Checklists

- 1. POST-TENSION SYSTEM FOUNDATION MAKE-UP**
- 2. CONCRETE PLACEMENT**
- 3. POST-TENSION SYSTEM STRESSING**
- 4. CONVENTIONAL (REBAR) FOUNDATION MAKE-UP**
- 5. CONSTRUCTION (BUILDERS) PIERS**
- 6. REPAIR PIERS**
- 7. SEGMENTED REPAIR PILES**

CLIENT _____

QUALITY CONTROL COMPANY _____

QC Checklist #1 - POST-TENSION SYSTEM FOUNDATION MAKE-UP

Builder _____ Subdivision _____ Date _____ Time _____
Site Address _____ Lot _____ Blk _____ Sec _____ Plan site specific Yes No
Plan #: _____ Cable Count _____ Design Engineer _____ Superintendent _____
Plan provided at site Yes No Weather _____ Plan Date _____ Detail Sheet Date _____
Concrete Contractor _____ Detached Garage Yes No Permit #: _____

Check (✓) If Items Comply With The Plans
(X) If Items Do Not Comply With The Plans

SITE

Subdivision Lot _____ Other _____
Lot Description _____
Fill on site Yes No
Compaction verified by Geotechnical Engineer:
Yes No Date _____
Will foundation make up drain: Yes No
Trees removed _____
Are trees within 20' of foundation Yes No

FORMS

Forms secure
 Floats installed
 Proper clearance at floats
 Garage front closed

ADDITIONAL REVIEWS

Date _____ Time _____

SLAB

Thickness _____ (in)
 Measured: Screeds _____ Stringline _____ Other _____
 Describe Pad Material _____
 Level and Firm Yes No

TENDONS

Count: L to R _____ F to B _____ Garage _____
Total _____ Variance _____ Explain _____
Number of tendons left on site _____ Rebar _____
 1/2" tendons _____ Other _____
 No tendons spaced over 6'-0"
 20D nails used at castings
 Live ends stripped of plastic not over 1" or taped
 Cathode clamps all tight
 All intersections tied
 All tendons supported at intersections
 Dead ends have 3/4" clearance to forms
 All S Hooks crimped
 Beam tendons draped and secured by #3 stakes or rebar concrete bricks
 Ample chairs all tied

BEAMS

Design Depth: _____ (in) Exterior _____ Interior _____
 Actual Depth: _____ (in) _____ (in) _____ (in) _____ (in)
 Design Width: _____ (in)
 Actual Width: _____ (in) _____ (in) _____ (in) _____ (in)
 Average depth into undisturbed soil _____ (in)
 Clean of soil & debris
 Water in beams Yes No Average Depth _____ (in)
 Will water drain Yes No
 Plumbing obstructions accommodated _____
 Pier tops clean

Tendon grid secured for concrete placement Yes No

POLYETHYLENE SHEETING

6-mil. Lapped and Taped Seated in bottom of beams

secured at sides Mastic/tape applied at plumbing

REINFORCING STEEL

SLAB SECTION

WWF: (Mesh) Size _____ Roll _____ Sheet _____
 All WWF (mesh) seams lapped 6"
 No rebar or WWF (mesh) touching forms

OR

#3 @ _____ (in.) on center both ways
 #3 Lapped per plans All edges 2" from forms

BEAM SECTION

Rebar: grade _____ Clearances per plan: Sides Bottom Top
 Splices lapped per plan
 Corner rebar installed at corners & dead ends
Typical Rebar/Exterior Beams _____ continuous
Typical Rebar/Interior Beams _____ continuous
Corner bars installed at dead ends Yes No
Bay Windows or Porches _____ Rebar _____ Stirrups _____
Extra Rebar Added _____
Diagonal Rebar at Re-entrant Corners No. of Corners _____
Nose Bars @ _____ Construction Joints _____
Anchor bolts on site Yes No Diameter _____ (in) Length _____ (in)
Other Fasteners _____

IS FOUNDATION READY FOR CONCRETE? Yes No

Sketch

CHANGES NEEDED: _____

Quality Controller's Signature _____

Superintendent's Signature _____

CLIENT _____

QUALITY CONTROL COMPANY _____

QC Checklist #3 – POST-TENSION STRESSING

Builder _____ Subdivision _____ Date _____ Time _____
 Site Address _____ Lot _____ Blk _____ Sec _____ Plan site specific Yes No
 Plan #: _____ Cable Count _____ Design Engineer _____ Superintendent _____
 Plan provided at site Yes No Weather _____ Plan Date _____ Detail Sheet Date _____
 Concrete Placement Date _____ Stress Date _____ Partial Stress Date _____
 Post Tension Company _____ Permit #: _____

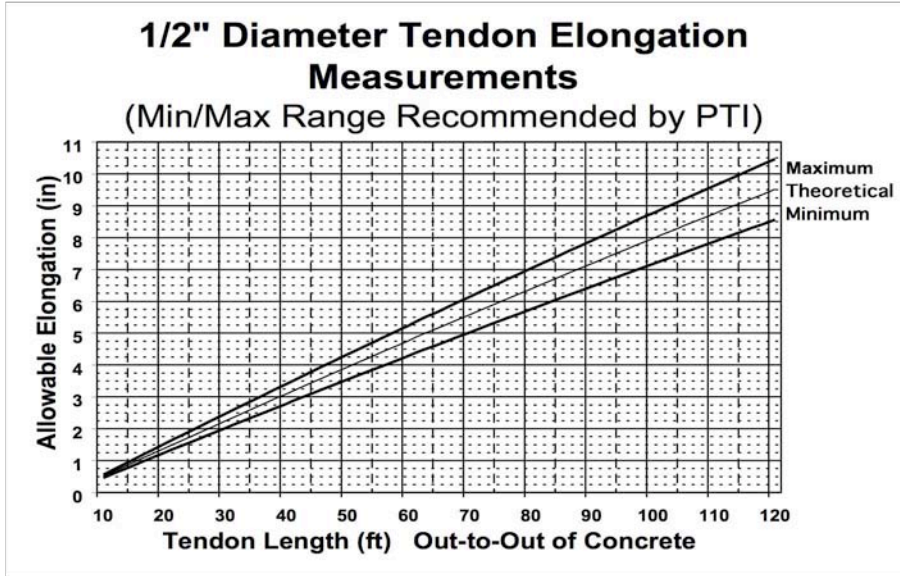
*Check (✓) If Items Comply With The Plans
(X) If Items Do Not Comply With The Plans*

Are there any cracks in the surface of the slab Yes No Describe _____

ADDITIONAL REVIEWS
Date _____ Time _____

Estimate size and locate on the sketch below

- Are elongations specified on the plans Yes No
- Are the tendons painted at the edge of the slab Yes No
- What is the predetermined distance between the mark and the edge of the slab ____ (in)
- Are the wedges placed in a vertical position Yes No
- Is there evidence of gripper marks on the gripper end of all tendons Yes No (If no show location on sketch below)
- Are tendons stressed from two ends Yes No If So, How Many _____



USE CHART IF ELONGATIONS ARE NOT LISTED ON PLAN, OR MULTIPLY TENDON LENGTH IN FEET BY 0.08 TO CALCULATE APPROXIMATE ELONGATION IN INCHES FOR LENGTH OVER 30 FEET.

SKETCH

Draw a simple sketch of the foundation configuration noting all tendon locations and their elongation measurements. Also note any problems which you have observed, particularly blowouts at corners or the garage entry and cracks.

FOLLOWING STRESS VERIFICATION

- Are the tendon ends cut inside the pocket former
- After stressing are the nails cut
- Are the tendon ends grouted with a non-shrink grout

Quality Controller's Signature

Superintendent's Signature

CLIENT _____

QUALITY CONTROL COMPANY _____

QC Checklist #4-CONVENTIONAL (REBAR) FOUNDATION MAKE-UP

Builder _____ Subdivision _____ Date _____ Time _____
Site Address _____ Lot _____ Blk _____ Sec _____ Plan site specific Yes No
Plan #: _____ Design Engineer _____ Superintendent _____
Plan provided at site Yes No Weather _____ Plan Date _____ Detail Sheet Date _____
Concrete Placement Date _____ Detached Garage Yes No Permit # _____

Check (✓) If Items Comply With The Plans
(X) If Items Do Not Comply With The Plans

SITE

Subdivision Lot _____ Other _____
Lot Description _____
Fill on site Yes No
Compaction verified by Geotechnical Engineer:
Yes No Date _____
Will make up drain: Yes No
Trees removed _____
Are trees within 20' of foundation Yes No

FORMS

Forms secure
 Floats installed
 Proper clearance at floats
 Garage front closed

ADDITIONAL REVIEWS

Date _____ Time _____

SLAB

Thickness _____ (in)
 Measured: Screeds _____ Stringline _____ Other _____
 Describe Pad Material _____
 Level and Firm Yes No

BEAMS

Design Depth: _____ (in) Exterior _____ Interior _____
 Actual Depth: _____ (in) _____ (in) _____ (in) _____ (in)
 Design Width: _____ (in)
 Actual Width: _____ (in) _____ (in) _____ (in) _____ (in)
 Average depth into undisturbed soil _____ (in)
 Clean of loose soil & debris
 Water in beams Yes No Average Depth _____ (in)
 Will water drain Yes No
 Plumbing obstructions accommodated _____
 Pier tops clean Yes No

POLYETHYLENE SHEETING

6-mil.Lapped and Taped Seated in the bottom of beams
secured at sides Mastic/tape applied at plumbing

CONSTRUCTION PIERS

Number of piers _____ Are pier tops clean of debris Yes No

REINFORCING STEEL

Grade of Steel _____

BEAM SECTIONS

Exterior Beams: Steel size _____ Number top _____ Bottom _____ Stirrup size _____ Spacing _____ (in)
Interior Beams: Steel size _____ Number top _____ Bottom _____ Stirrup size _____ Spacing _____ (in)
Extra Beam depth Yes No Additional steel required _____
Proper Clearance: Bottom _____ (in) Sides _____ (in) Top _____ (in) Support System _____
Continuity: Splices lapped per plan Yes No Corner bars installed Yes No
Rebar clean of mud and excessive rust Yes No
Void Boxes in bottom of beam Yes No Height _____ (in) Condition _____

SLAB REINFORCING

Mesh: Size _____ Roll _____ Sheet _____ OR #3 @ _____ (in.) on center both ways
 All mesh seams lapped 6" #3 Lapped per plans All edges 2" from the forms
 No rebar or mesh touching forms
Void Boxes Yes No Height _____ (in) Poly covering void boxes Yes No

ADDITIONAL REINFORCING

Diagonals: Size _____ Number in slab _____
Fireplace pads: Size of steel _____ Placement _____
Bay windows: Size of steel _____ Placement _____
Other projections: _____ Control joints _____
Construction joints:
Anchor bolts on site Yes No Diameter _____ (in) Length _____ (in)
Other Fasteners _____

IS THE FOUNDATION READY FOR CONCRETE PLACEMENT? Yes No

SKETCH

CHANGES NEEDED: _____

Quality Controller's Signature _____

Superintendent's Signature _____

CLIENT _____

QUALITY CONTROL COMPANY _____

QC Checklist #5 – CONSTRUCTION (BUILDER’S) PIERS

Builder _____ Subdivision _____ Date _____ Time _____
 Site Address _____ Lot _____ Blk _____ Sec _____ Plan site specific Yes No
 Plan #: _____ Design Engineer _____ Superintendent _____ Geotechnical Engineer _____
 Plan provided at site Yes No Plan Date _____ Detail Sheet Date _____
 Weather at site _____ Concrete Contractor _____ Geotechnical Report # _____

(THIS FORM NOT APPLICABLE FOR SLURRY PLACED PIERS)

*Check (✓) If Items Comply With The Plans
(X) If Items Do Not Comply With The Plans*

SITE

Subdivision Lot _____ Other _____ Explain _____
 Fill on site Yes No
 Compaction verified by Geotechnical Engineer Yes No Date _____
 Trees removed Yes No Location: _____
 Are trees within 20’ of foundation Yes No

ADDITIONAL REVIEWS

Date _____ Time _____

PIERS

Name of drilling company: _____
 Can drill equipment access all pier locations Yes No
 Type of drilling apparatus: Truck Mounted _____ Bobcat: _____ Other: _____
 Total number of piers: _____

PIER SIZES

Shaft	Bell Dia.	Pier Depth	No. Rebar	Rebar Size	Stirrups Piers	Spacing	Total
_____(in)	_____(in)	_____(ft)	_____	_____	_____	_____(in)	_____
_____(in)	_____(in)	_____(ft)	_____	_____	_____	_____(in)	_____
_____(in)	_____(in)	_____(ft)	_____	_____	_____	_____(in)	_____
_____(in)	_____(in)	_____(ft)	_____	_____	_____	_____(in)	_____
_____(in)	_____(in)	_____(ft)	_____	_____	_____	_____(in)	_____

Sketch Typical Pier Showing Depth

Describe the manner of measuring the bell sizes: _____
(Bell checking tool required)

Boring logs from Geotechnical report on site Yes No
 Describe bearing strata: _____

Pocket Penetrometer reading taken from auger cutting Yes No _____ TSF Note locations below _____
 Was water apparent in pier hole Yes No Depth _____ “ Action Taken _____

REINFORCING

Rebar placed per plan Yes No
 Rebar grade _____
 Does rebar extend above pier top Yes No How much above _____ (in) Sleeved Yes No Describe _____

CONCRETE

Will concrete truck be able to access site Yes No
 Concrete company: _____ Truck numbers: _____
 Was pump truck used Yes No
 Specified strength of concrete: _____ psi
 Was concrete placed on the same day as the pier drilling Yes No
 Estimated time of completion _____
 If not, explain: _____
Draw a sketch of the structure indicating the pier placement

SKETCH

ARE THE PIER HOLES READY FOR CONCRETE PLACEMENT Yes No

CHANGES NEEDED: _____

Quality Controller’s Signature _____

Superintendent’s Signature _____

CLIENT _____ QUALITY CONTROL COMPANY _____

QC Checklist #6 – REPAIR PIERS

Owner _____ Subdivision _____ Date _____ Time _____
 Site Address _____ Lot _____ Blk _____ Sec _____ Plan site specific Yes No
 Plan #: _____ Design Engineer _____ Superintendent _____ Geotechnical Engineer _____
 Plan provided at site Yes No Plan Date _____ Detail Sheet Date _____
 Weather at site _____ Permit # _____ Geotechnical Report # _____

Check (✓) If Items Comply With The Plans
(X) If Items Do Not Comply With The Plans

SITE

Subdivision Lot _____ Other _____ Explain _____
 Soils Report on site Yes No Bearing Soils at what depth _____ (ft)
 Test hole drilled to what depth _____ (ft) Bearing soils at _____ (ft)
 Underground plumbing test Yes No Water lines under slab Yes No
 Site obstructions to drilling, Describe: _____
 Trees removed Yes No Location _____

ADDITIONAL REVIEWS

Date _____ Time _____

UNDERPINNING

Name of repair contractor: _____
 Method of repair: _____
 Total number of piers: _____ Interior _____ Exterior _____

PIER SIZES

Shaft	Bell Dia.	Pier Depth	No. Rebar	Rebar Size	Stirrups Piers	Spacing	Total
_____ (in)	_____ (in)	_____ (ft)	_____	_____	_____	_____	_____ (in)
_____ (in)	_____ (in)	_____ (ft)	_____	_____	_____	_____	_____ (in)
_____ (in)	_____ (in)	_____ (ft)	_____	_____	_____	_____	_____ (in)
_____ (in)	_____ (in)	_____ (ft)	_____	_____	_____	_____	_____ (in)
_____ (in)	_____ (in)	_____ (ft)	_____	_____	_____	_____	_____ (in)

Sketch Typical Pier Showing Depth

Describe the manner of measuring the bell sizes: _____
(Bell checking tool required)

Describe bearing strata: _____

Pocket Penetrometer reading Yes No _____ TSF _____ Note locations below _____
 Was water apparent in pier hole Yes No Depth _____ " Action Taken _____

REINFORCING

Rebar per plans Yes No
 Rebar grade _____

HELICAL PIERS

Test hole depth _____ (ft) Bearing Data _____ Pier Log Onsite Yes No
 Helix Size _____ Bracket Style _____ Shaft Diameter _____

CONCRETE

Will concrete truck be able to access site Yes No Was pump truck used Yes No
 Concrete company: _____ Truck numbers: _____ Batch Time _____ Onsite Time _____
 Specified strength of concrete: _____ psi Slump as delivered _____ Water added Yes No Amount _____
 Was concrete placed on the same day as the pier was belled Yes No
 Projected time of completion of concrete placement _____

If not, explain: _____
 ESTIMATED MAXIMUM LIFT _____ INCHES: TO BE GROUTED Yes No

Draw a sketch of the structure indicating the pier placement

SKETCH

ARE THE PIER HOLES READY FOR CONCRETE PLACEMENT Yes No

CHANGES NEEDED: _____

Quality Controller's Signature _____

Superintendent's Signature _____

CLIENT _____ QUALITY CONTROL COMPANY _____

QC Checklist #7 – SEGMENTED REPAIR PILES

Builder _____ Subdivision _____ Date _____ Time _____
 Site Address _____ Lot _____ Blk _____ Sec _____ Plan site specific Yes No
 Plan #: _____ Design Engineer _____ Superintendent _____ Geotechnical Engineer _____
 Plan provided at site Yes No Plan Date _____ Detail Sheet Date _____
 Weather at site _____ Permit # _____ Geotechnical Report # _____

Check (✓) If Items Comply With The Plans
(X) If Items Do Not Comply With The Plans

SITE

Subdivision Lot _____ Other _____ Explain _____
 Geotechnical Report on site Yes No Bearing Soils at what depth _____ (ft)
 Test hole drilled to what depth _____ (ft) Bearing soils at _____ (ft)
 Underground plumbing test Yes No Water lines under slab Yes No
 Site obstructions to drilling, Describe: _____
 Trees removed Yes No Location _____
 Were builder's piers present Yes No

ADDITIONAL REVIEWS

Date _____ Time _____

UNDERPINNING

Name of repair contractor: _____
 Piling system: _____
 Total number of piles: _____ Interior _____ Exterior _____

FIELD OBSERVATIONS

Round	Pile Size		Segment Length	Number of Segments	Pile Cap Size	Pile Cap Quantity	Distance From Top of Slab To Top of Pile Cap	Total Depth From Top of Slab	Observed Measurement of Lift at Refusal
	Round	Square							
_____	_____ (d)	_____ (in)	_____ (in)	_____	_____	_____	_____	_____ (ft)	_____ (in)
_____	_____ (d)	_____ (in)	_____ (in)	_____	_____	_____	_____	_____ (ft)	_____ (in)
_____	_____ (d)	_____ (in)	_____ (in)	_____	_____	_____	_____	_____ (ft)	_____ (in)
_____	_____ (d)	_____ (in)	_____ (in)	_____	_____	_____	_____	_____ (ft)	_____ (in)
_____	_____ (d)	_____ (in)	_____ (in)	_____	_____	_____	_____	_____ (ft)	_____ (in)

$(A \times B) + (C \times D) + E = \text{TOTAL DEPTH}$

Total number of pilings observed driven to completion _____ (Minimum five is recommended)
 Was pile log available at the site Yes No Explain _____
 Were the piles shimmed immediately upon completion of being driven Yes No
 If no, explain _____
 Is the piling cap horizontal Yes No If no, explain _____
 Were the piles driven without interruption Yes No If no, explain _____
 Were builders piers detached prior to jacking Yes No
 Were final shims determined to be tight Yes No
 What is the method of interlock _____
 Were interior piles installed Yes No If so, were tunnels used Describe _____
 Was dewatering system used and maintained in excavating and tunnels Yes No
 Describe materials used in backfilling tunnels _____
 Describe method of protecting tunnel entrance from water intrusion _____
 Was jetting required to install piles Yes No Explain _____
 ESTIMATED MAXIMUM LIFT _____ INCHES: TO BE MUD PUMPED Yes No
Draw a sketch of the structure indicating the pile placement

CHANGES NEEDED: _____

Quality Controller's Signature _____

Superintendent's Signature _____