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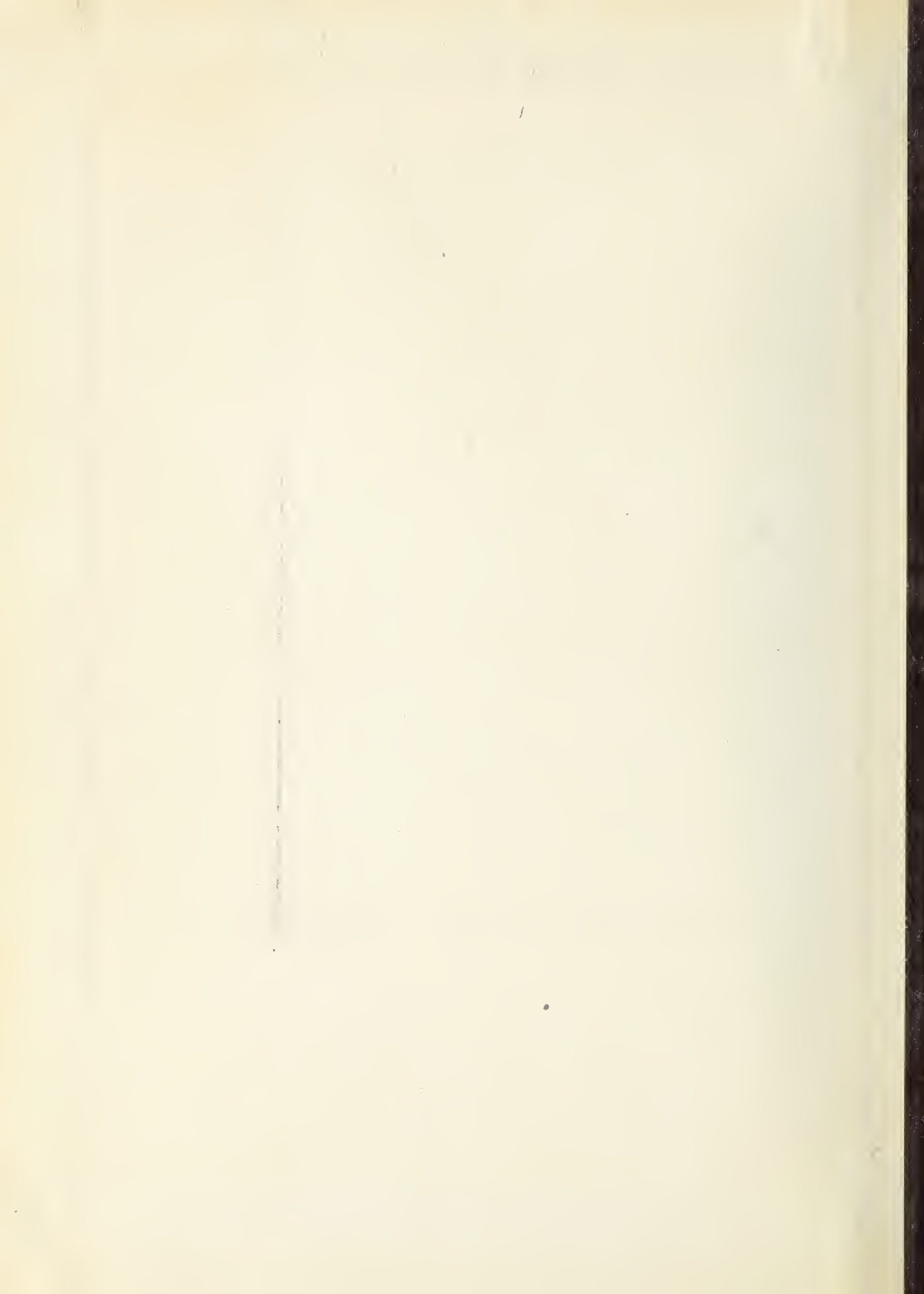
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U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

FIELD INSPECTORS'
CHECK LIST FOR BUILDING
CONSTRUCTION

Report of Subcommittee on Structure
Central Housing Committee on
Research, Design, and Construction

BUILDING MATERIALS AND STRUCTURES REPORT BMS81

National Bureau of Standards

54760



U. S. DEPARTMENT OF COMMERCE

Jesse H. Jones, Secretary

NATIONAL BUREAU OF STANDARDS

Lyman J. Briggs, Director

Building Materials and Structures Report BMS81

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FOREWORD

As an authoritative guide for the inspection of materials and workmanship in building construction, this Check List has been prepared by a representative committee of Federal agencies engaged in activities relating to the design and erection of buildings. It is based, to a large extent, upon the experience of the members of the committee collaborating in its preparation and is intended to assist a field inspector in the performance of his duties and to insure that no important step is overlooked as construction progresses.

The list is in no sense a specification outline. In arrangement it follows normal construction procedures and interlocking operations in regular order rather than by individual trades and should be a helpful daily reminder to the general field inspector.

LYMAN J. BRIGGS, *Director.*

The program of Research on Building Materials and Structures carried on by the National Bureau of Standards was undertaken with the assistance of the Central Housing Committee, an informal organization of governmental agencies concerned with housing construction and finance, which is cooperating in the investigations through a committee of principal technicians.

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The Forest Products Laboratory of the Forest Service is cooperating with both committees on investigations of wood constructions.

[For list of BMS reports and directions for purchasing, see unnumbered pages at end.]



CONTENTS

	Page
Foreword.....	ii
I. Introduction.....	1
II. Preliminary stage.....	5
1. Preparatory steps.....	5
2. Schedule of progress.....	6
3. Examination of site.....	7
4. Layout.....	7
5. Storage of materials and equipment.....	8
6. Inspection of work.....	8
7. File records.....	9
8. Sample constructions and advance tests.....	9
III. Foundation stage.....	11
1. Soil load tests, specified or additional.....	11
2. Site preparation.....	11
3. Earthwork.....	12
4. Utilities.....	13
5. Footings, foundation walls, piers.....	13
6. Backfilling.....	15
IV. Structural-framing stage.....	17
1. General preparations.....	17
2. Superstructure framing.....	17
3. Utilities.....	18
4. Concluding check up of stage IV.....	18
V. Intermediate stage.....	19
1. General requirements.....	19
2. Thermal insulation.....	20
3. Sheet-metal work.....	20
4. Weatherproofing.....	21
5. Roofing.....	21
6. Plumbing.....	23
7. Heating.....	25
8. Air conditioning.....	28
9. Electrical work.....	29
10. Miscellaneous metal work.....	29
11. Metal windows.....	30
12. Lathing.....	30
13. Plaster and stucco.....	31
14. Sash and doors.....	32
15. Weatherstripping.....	32
16. Glazing.....	33
17. Millwork.....	33
18. Finish flooring.....	34
19. Screening.....	36

	Page
VI. Finishing stage.....	37
1. Hardware.....	37
2. Painting and decorating.....	38
3. Lighting fixtures.....	40
4. Masonry.....	41
5. Concluding check up of Stage VI.....	41
VII. Final records.....	43
1. Guaranties.....	43
2. Reports of final inspections.....	43
3. Instructions.....	43
4. Recommendations of contractor or manufacturer.....	43
5. Settlement.....	43
6. Changes.....	43
7. File copies.....	44
8. Waivers of lien.....	44
9. Contractors' affidavits.....	44
10. Utility approvals.....	44
11. Occupancy certificate.....	44
Appendix A—Concrete.....	45
1. Records for concrete work, daily or periodic.....	45
2. Forms for concrete.....	46
3. Reinforcement.....	47
4. Materials.....	47
5. Mixing at job.....	48
6. Ready-mixed concrete (centrally mixed, truck-mixed, "shrink-mixed").....	49
7. Mixing efficiency.....	49
8. Discharging operation.....	50
9. Placing of concrete.....	50
10. Vibrating of concrete, internal.....	50
11. Construction joints.....	51
12. Surface of concrete in place.....	51
13. Cold-weather construction.....	52
14. Hot-weather construction.....	52
15. Finishing of surfaces made without forms.....	53
16. Curing.....	53
17. Removal of forms.....	53
18. Correction of defects.....	54
Appendix B—Masonry.....	57
1. Records for masonry work, daily or periodic.....	57
2. Construction.....	57
3. Finished surfaces.....	59
4. Chimneys.....	60
Appendix C—Waterproofing, dampproofing, and calking.....	61
1. Materials for waterproofing, dampproofing, and calking.....	61
2. Workmanship.....	61

Contents

VII

	Page
Appendix D—Structural steel.....	63
1. Materials for structural steel work.....	63
2. Fabrication and erection.....	63
3. Prefabricated units.....	64
Appendix E—Carpentry.....	65
1. Materials for framing.....	65
2. Lumber.....	65
3. Framing.....	65
4. Sheathing.....	67
5. Siding.....	67



Field Inspectors' Check List for Building Construction

Report of Subcommittee on Structure

of the

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Construction

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I. INTRODUCTION

The purpose of a field inspection during the construction of a building is to make sure that the materials and workmanship provided by the contractor comply with or are equivalent to the requirements of the contract documents. These documents usually include general conditions, specifications, and drawings.

The field inspector should obtain copies of all contract documents, reference specifications, codes, permits, insurance certificates; data relating to contractors and subcontractors, inspection laboratories; catalogs, approved samples, reports of tests, reference matter; and other pertinent information so far as it is available.

Before field operations become too extensive or too active, the contract documents should be carefully examined by the field inspector and this Check List amplified or condensed to conform to their provisions.

Specification requirements for large or important projects will be detailed and specific; for smaller or less important jobs they may be less exacting. The extent of deviation from rigid inspection to be allowed must be determined by existing conditions. The type and purpose of the structure should be given reasonable consideration in the application of the requirements of the contract documents.

The chief inspector should have an adequate staff of clerks and assistants. On large projects, work involving mechanical trades should have the benefit of specially qualified inspectors; for concrete and masonry the inspectors should be experienced in the field-testing of materials and be competent to interpret laboratory-test reports.

In undertaking a particular project, the extent to which the field inspector's duties include the approval of samples, inspections in mills and shops, and the following of laboratory or plant tests should be clearly designated by the administrative office, thus avoiding doubt and confusion as to the distribution of duties and authority between the field inspector and the administrative office.

Before actual construction begins, the field inspector should call for a survey of the site showing the location of utility and service lines and for an independent check of the lay-out of the building, including subsoil conditions, bearing pressures, and allowable soil load. Removal of existing structures should precede the awarding of a general contract.

This Check List outlines items suggested for periodic inspection. Its continual use during building operations should assure the inspection of each item as put in place and guarantee compliance with the contract and conformance to good construction practice. It is assumed that the inspector is familiar with the terms used and therefore that they require no definition.

The arrangement of the list was selected for the convenience of the field inspector and to insure that the various steps will be checked in their proper sequence. To amplify

specific items in the Check List and to avoid unnecessary repetition, the work of certain trades has been treated more fully in the appendixes.

A system for regular follow-up should be established by means of schedules, progress charts, photographs of progress, and calendar memoranda.

The committee expresses its appreciation to Francis F. Gillen of the National Park Service for the general idea of a check list and for aid in its development; to Edward J. Schell of the National Bureau of Standards and Burt M. Thorud of the United States Housing Authority for assistance in the technical preparation; and to Louise D. Card of the National Bureau of Standards for the editorial organization of the material.

II. PRELIMINARY STAGE

1. Preparatory Steps

- (a) Secure copies of
 - (1) Contract documents:
 - General conditions
 - Specifications
 - Drawings
 - (2) Reference specifications
 - (3) Codes
 - (4) Permits
 - (5) Insurance certificates
 - (6) Contractor's contracts
- (b) Discuss entire project with
 - (1) Architect:
 - Design
 - Effects desired
 - (2) Contractor:
 - Job conditions
- (c) Determine
 - (1) Basis of contract:
 - Lump sum [see II-7 (a) (3), File Records]
 - Cost plus a percentage
 - Cost plus a fixed fee
 - Guaranteed upset cost including fixed fee
 - (2) Interpretation of contract:
 - Authority and/or procedure for:
 - Changes
 - Additions
 - Rejection of:
 - Materials
 - Work
 - Work in place
 - Dismissal of incompetent workmen

1. Preparatory Steps—Continued

- (c) Determine—Continued
 - (2) Interpretation of contract—Continued
 - Authority and/or procedure for—Con.
 - Claims:
 - Delay
 - Damages
 - Accidents
 - Termination of contracts:
 - Bonus or penalty
 - (3) Unit prices:
 - Materials
 - Labor
 - (4) Quality of:
 - Material
 - Work
- (d) Verify selection of
 - (1) Testing laboratories
 - (2) Subcontractors
- (e) List
 - (1) Omissions, discrepancies
 - (2) Requirements, special or unusual
 - (3) Materials:
 - Samples
 - Certificates, manufacturer's
 - Guaranties, manufacturer's
 - Tests, laboratory, plant, and field:
 - Inspections
 - Reports
 - (4) Follow-up schedule for shop drawings:
 - Submitted
 - Approved

2. Schedule of Progress

[Note.—Hereafter the word "check" is to be understood to precede each item.]

- (a) Full-sized details, architect's
- (b) Inspections and approvals of materials and work
 - prior to concealment
 - (1) Dates for
 - (2) Notification to architect

3. Examination of Site

- (a) Preliminary items ¹
 - (1) Detailed surveys
 - (2) Subsoil conditions
 - (3) Removal of existing structures
- (b) Protection of
 - (1) Existing construction
 - (2) Adjacent construction:
 - Shoring
 - Needling
 - Underpinning
 - (3) Trees or shrubs
 - (4) Utilities and service lines
 - (5) Sidewalks
- (c) Opening of streets
- (d) Water supply
- (e) Location of
 - (1) Structure on lot
 - (2) Storage of materials
 - (3) Field office

4. Layout

- (a) Grades and property lines
- (b) Utility lines
 - (1) Existing
 - (2) Proposed
- (c) Angles and dimensions of structure
- (d) Protective measures (as demanded by state or municipal laws, ordinances, or regulations) for
 - (1) Workmen (safe equipment, scaffolding, ladders)
 - (2) Public (barriers, lights)
 - (3) Work (covering)
- (e) Facilities for close inspection
- (f) Settling tests, periodic
- (g) Location of sample walls
 - (1) Masonry
 - (2) Stone
 - (3) Other

¹ Items usually preceding the awarding of general contract before field inspector assumes duties.

5. Storage of Materials and Equipment

- (a) Placement on premises to afford
 - (1) Protection from:
 - Elements
 - Vandalism
 - (2) Inspection accessibility
- (b) Contractor's organization
 - (1) Tools and equipment
 - (2) Hazard precautions for:
 - Workmen
 - Public
 - Work

6. Inspection of Work

- (a) Reference data
 - (1) Specifications and methods, manufacturer's
 - (2) Shop drawings, fabricator's
 - (3) Full-sized details, architect's
 - (4) Reports of:
 - Inspections, mill or plant
 - Tests, laboratory or field
- (b) Materials, building units, prefabricated constructions
 - (1) Kinds, grades, quality
 - (2) Sizes, shapes, weights
 - (3) Workmanship and conformance to details
 - (4) Absorption and moisture content
 - (5) Physical condition
 - (6) Paint or priming, shop-coat
- (c) Periodic lists
 - (1) Items not finished:
 - For adjustment
 - For withheld-payment
 - (2) Removals:
 - Work in place (for correction)
 - Rejected materials
- (d) Notifications to contractor
 - (1) Materials, unacceptable
 - (2) Workmanship, unacceptable

7. File Records

- (a) Reports of progress: daily, weekly, monthly (summary to determine)
 - (1) Degree of completion of work
 - (2) Proportionate cost of completed structural elements
 - (3) Breakdown schedule for lump-sum contract:
 - Work categories
 - Contractor's administrative expense
 - (4) Delivery and acceptance:
 - Materials
 - Building units
 - Prefabricated constructions
 - (5) Work in place:
 - Operation of temporary heating
 - Wetting of materials or surfaces
 - Curing methods
 - Protection or covering after placement
 - Shoring
 - Forming
 - Workmanship
- (b) Photographs of progress
 - (1) Weekly
 - (2) Monthly

8. Sample Constructions and Advance Tests

- (a) Time allowance for preparation, inspection, and approval
 - (1) Mixes of concrete
 - (2) Masonry:
 - Units
 - Mortars
 - (3) Walls, sample
 - (4) Compounds:
 - Waterproofing
 - Dampproofing
 - Calking
 - (5) Paints, priming

III. FOUNDATION STAGE

1. Soil Load Tests, Specified or Additional

- (a) Test area
 - (1) Size (approximate average proposed footing)
- (b) Test apparatus
 - (1) Capacity
 - (2) Sensitivity
 - (3) Bracing
 - (4) Settlement measuring devices
 - (5) Bearing plates
- (c) Test procedure
 - (1) Load increments
 - (2) Settlement
 - (3) Duration
 - (4) Rebound
- (d) Recording and analysis
 - (1) Time-settlement chart
 - (2) Tabulated results (interpretation)

2. Site Preparation

- (a) Salvage
 - (1) Buildings or parts
 - (2) Trees and shrubs
 - (3) Topsoil for storage
- (b) Clearing
 - (1) Old foundations:
 - Break up
 - Removal
- (c) Protection of
 - (1) Public:
 - Barriers
 - Lights
 - Other methods (when blasting, tree cutting, etc.)
 - (2) Existing utilities and structures
 - (3) Pavements
 - (4) Trees and shrubs:
 - Boxing or well

3. Earthwork

- (a) Permit
- (b) Layout
 - (1) Batter board:
Set-back
- (c) Excavation
 - (1) Test borings or test pits
 - (2) Cesspools or cisterns
 - (3) Strata
 - (4) Footing depths:
 - Earth
 - Rock
 - Not requiring forms
 - (5) Undersoil for storage
- (d) Drainage
 - (1) Temporary
 - (2) Permanent
- (e) Trenches
 - (1) Frost-line
 - (2) Original bed
 - (3) Protection (bracing)
- (f) Blasting safeguards for
 - (1) Life
 - (2) Property
- (g) Existing structures, foundations, utilities:
 - Shoring
 - Needling
 - Underpinning
- (h) Outside face of walls
 - (1) Clearances for inspection
- (i) Grades
 - (1) Specified
 - (2) Extras, earth and rock:
 - Estimates
 - Authorization
 - Quantity
- (j) Fills
 - (1) Backfill
 - (2) Grading
 - (3) Tamping

4. Utilities

- (a) Excavations for service lines
- (b) Boxing or sleeves for pipe lines
 - (1) Location
- (c) Drainage
 - (1) Lines, grades
 - (2) Soil pipe
 - (3) Tile installation

5. Footings, Foundation Walls, Piers

See Appendix:

A—Concrete

B—Masonry

C—Waterproofing, dampproofing, and calking

- (a) Piling
 - (1) Wood:
 - Species
 - Size
 - Treatment
 - (2) Concrete:
 - Precast:
 - Mix
 - Tests
 - Curing
 - Handling
 - Cast-in-place:
 - Shell design and condition
 - Mixes and slumps
 - (3) Driving equipment:
 - Type
 - Penetration per blow
 - (4) Driving procedure:
 - Location and plumbness:
 - Tolerances
 - Protection of underground utilities
 - Excavation to cutoff levels
 - Test piles
 - Uniformity and continuity
 - Subsurface obstructions
 - Redriving

5. Footings, Foundation Walls, Piers—Continued

(a) Piling—Continued

- (4) Driving procedure—Continued
 - Use of follower
 - Mandrel for driving steel shells
 - Jetting
- (5) Records:
 - Ground-water levels
 - Pile location and penetration
 - Driving noncontinuity
 - Bearing capacities
- (6) Rejections:
 - Damage
 - Nonconformance
- (7) Replacements:
 - Redesign of pile caps
 - Rearrangement of pile groups
 - Shells for cast-in-place piles:
 - Watertight condition
- (8) Withdrawn-piling spaces:
 - Fill
- (9) Cutoffs:
 - Levels
 - Splices
 - Cast-in-place:
 - Volume of concrete to fill shell
 - Treated wood:
 - Immediate coating after cutting off

(b) Concrete

- (1) Footings
- (2) Formed spaces:
 - Installation:
 - Inserts
 - Anchors
 - Bulkheads
 - Sleeves
 - Steel for reinforcement
 - Removal of debris
 - Wetting of sandy bottom

5. Footings, Foundation Walls, Piers—Continued

- (c) Reinforcing
 - (1) Footings over pipe lines and utility trenches
 - (2) Walls around temporary openings
 - (3) Lower-level walls and piers:
 - Splicing
 - Anchoring
- (d) Municipal approval

6. Backfilling

- (a) Prior to backfilling
 - (1) Subsurface masonry
 - (2) Drain tile
- (b) Material for backfill
 - (1) Drainage characteristics
- (c) Track for heavy equipment
- (d) Trees
 - (1) Breathing space
 - (2) Drainage
- (e) Topsoil protection

IV. STRUCTURAL - FRAMING STAGE

1. General Preparations

Review section II, Preliminary Stage, preparatory to superstructure framing.

- (a) Prior to starting work
 - (1) Approvals and instructions:
 - Construction program and equipment
 - Shop drawings
 - Sample materials
 - Concrete mixes
 - Masonry mortars
 - Sample walls (masonry, stone, stucco)
 - (2) Full-sized details
 - (3) Quality of:
 - Brick
 - Tile
 - Concrete blocks
 - Facing stone
- (b) Removal of rejected materials

2. Superstructure Framing

See Appendix:

A—Concrete

B—Masonry

C—Waterproofing, dampproofing, calking

D—Structural-steel

E—Carpentry

- (a) Framing
 - (1) Plumb, lines, levels
 - (2) Temporary bracing

3. Utilities

- (a) Provision for services
 - (1) Heating lines to central plant
 - (2) Electricity, gas
 - (3) Telephone
 - (4) Openings through framework for:
 - Plumbing
 - Electricity, gas
 - Other lines
 - (5) Pipe sleeves
- (b) Pipe lines and connections for fixtures
[See V-6 (b), Piping]
 - (1) Roughing in
 - (2) Erection
 - (3) Interferences
- (c) Framing members
 - (1) Cutting
 - (2) Patching
- (d) Chases for pipe lines in masonry walls
- (e) Anchors for hanging fixtures and radiators in
 - (1) Solid-masonry walls
 - (2) Hollow-unit walls

4. Concluding Check Up of Stage IV

- (a) Prior to covering
 - (1) Work in place
 - (2) Correction of faulty work
- (b) Removal of debris and rubbish
- (c) Municipal approval

V. INTERMEDIATE STAGE

1. General Requirements

Review section II, Preliminary Stage, preparatory to proceeding.

- (a) Ventilation to prevent condensation of moisture before covering
 - (1) Walls
 - (2) Floors
 - (3) Roof
- (b) Heating during installation of work in damp or freezing weather
- (c) Removal from ground within building walls of
 - (1) Waste lumber and concrete forms
 - (2) Surface water or snow
- (d) Protection of work in place from damage by
 - (1) Other trades
 - (2) Fire
 - (3) Other agents
- (e) Storage on floors
 - (1) Prevention of:
 - Overloading
 - Interference with curing
- (f) Surfaces to be covered
 - (1) Cleaning
- (g) Pipes and conduits prior to concealment
 - (1) Location
 - (2) Testing of
- (h) Backing-up members for fixtures
 - (1) Referencing
- (i) Metals in contact
 - (1) Electrolytic action

2. Thermal Insulation

- (a) Materials
 - (1) Dry
 - (2) Undamaged
- (b) Moisture barrier
 - (1) Material
 - (2) Placement on inside of insulating layer
- (c) Wall and ceiling
 - (1) Board insulation:
 - Alinement
 - Expansion space
 - Fastening
 - (2) Fill insulation:
 - Side wall:
 - Space full to top
 - Ceiling:
 - Evenness of distribution
 - (3) Batt and blanket insulation
 - Fastening
 - Joints

3. Sheet-Metal Work

- (a) Standing seams
 - (1) Effects of temperature changes (expansion and contraction)
- (b) Other seams
 - (1) Tinning
- (c) Painting
 - (1) Surfaces prior to painting:
 - Removal of:
 - Grease
 - Flux
 - Foreign matter
 - (2) Undersurfaces (except copper) prior to concealment:
 - Coating
- (d) Electrolytic action
- (e) Gutters and downspouts
 - (1) Straightness and pitch
 - (2) Tightness
 - (3) Bracket fastenings

4. Weatherproofing

- (a) Flashing of
 - (1) Roof
 - (2) Parapet walls
 - (3) Windows
 - (4) Doors

5. Roofing

- (a) Built-up
 - (1) Condition of deck
 - (2) Insulation:
Placing
 - (3) Felt:
Placing
 - (4) Pitch or asphalt:
Application:
Temperature
Consistency
Amount in each mopping
 - (5) Surfacing material:
Condition
Quantity per square
- (b) Tile
 - (1) Condition of deck
 - (2) Underlay material
 - (3) Lapping
 - (4) Fastenings
- (c) Slate
 - (1) Condition of deck
 - (2) Underlay material
 - (3) Lapping
 - (4) Staggering of joints
 - (5) Nails and nailing
 - (6) Bedding in slater's cement adjacent to:
Valleys
Ridges
Chimneys
Dormers

5. Roofing—Continued

- (d) Cement-asbestos shingles
 - (1) Condition of deck
 - (2) Underlay material
 - (3) Starter course at eaves
 - (4) Exposure
 - (5) Headlap and sidelap (Dutch lap and hexagonal methods)
 - (6) Nails and fastenings
- (e) Wood shingles
 - (1) Grade
 - (2) Staining
 - (3) Exposure
 - (4) Double first course at eaves
 - (5) Staggering of joints
 - (6) Nailing
- (f) Asphalt-prepared roofing
 - (1) Asphalt shingles:
 - Condition of deck
 - Underlay material
 - Edging at eaves and rake
 - Starting strip or double course at eaves
 - Exposure
 - Nailing
 - (2) Asphalt-prepared roll roofing:
 - Condition of deck
 - Edging at eaves and rake
 - Starter strip at eaves
 - Vertical and horizontal seams:
 - Lap
 - Nailing
- (g) Metal roofing
 - (1) Surface treatment
 - (2) Expansion joints
 - (3) Nailing and fastening

6. Plumbing

See other stages for introduction of utilities and piping to avoid interferences. Equipment and installation to be checked by special plumbing inspector or coordinating mechanical engineer.

(a) General**(1) Materials:**

Manufacturer's certificates

Laboratory test reports

(b) Piping

[See IV-3 (b) Pipe lines and connections for fixtures]

(1) Prior to concealment:

Clearance

Alinement

Pitch

Head room

Expansion due to temperature changes

(c) Welding**(1) Qualifications of welding operators****(2) Joints****(d) Supports****(1) Risers****(2) Pipe hangers:**

Design

Spacing

Anchors

Rustproofing

(3) Tanks**(4) Generators****(e) Cleanouts****(1) Accessibility****(f) Pipe covering****(1) Protection by:**

Air circulation

Sizing or priming

6. Plumbing—Continued

- (g) Radiators
 - (1) Connections:
 Supply and return
 - (2) Location
 - (3) Settings:
 Strains on cast-iron fittings
- (h) Plumbing fixtures
 - (1) Clearances
- (i) Fittings
 - (1) Stop-valve connections:
 Sill cocks or hose bibs
 - (2) Risers and fixtures:
 Air chambers at top
 - (3) Drainage piping:
 Long sweep for changes in direction
 - (4) Scale pockets
 - (5) Drip points:
 Threaded caps
- (j) Pressure-reducing valves, pumps, equipment with moving parts
 - (1) Strainers on inlet side
- (k) Traps and vents
 - (1) Building drain
 - (2) Fixture traps:
 Water seals
 Continuous-waste-and-vent
 - (3) Vents:
 Back
 Group
- (l) Workmanship
 - (1) Qualifications of plumbers
 - (2) Screwed pipe:
 Reaming
- (m) Bell and spigot joints
 - (1) Calking
 - (2) Leading
- (n) Conduits
 - (1) Trapping
 - (2) Drain provision:
 Sump and drain pumps

6. Plumbing—Continued

- (n) Conduits—Continued
 - (3) Plugging of ends
- (o) Municipal approval

7. Heating

See other stages for introduction of utilities and piping to avoid interferences. Equipment and installation to be checked by special heating inspector or coordinating mechanical engineer.

- (a) General
 - (1) Materials:
 - Manufacturer's certificates
 - Laboratory test reports
- (b) Boiler or furnace settings
 - (1) Baffles:
 - Freedom from cracks and leaks
 - (2) Firebrick and silicon-carbon blocks:
 - Dipping in high-temperature or fire clay mortar
 - (3) Brick or tile:
 - Whole
 - Unwarped
 - Freedom from cracks
 - (4) Allowances for expansion
 - (5) Curing
 - (6) Tightness
 - (7) Clearance for stoker mechanism
- (c) Boilers
 - (1) Prior to operation:
 - Free of water, openings sealed
 - or
 - Completely filled with water
 - (2) Plates over top row of boiler tubes:
 - Anchorage for prevention of buckling
 - (3) Insulating brick above plates:
 - Prevention of gas leakage by staggering of joints

7. Heating—Continued

(c) Boilers—Continued

(4) Peepholes:

Accessibility

Maximum view

(5) Air passages and dampers in air-cooled settings:

Removal of foreign matter

(d) Stokers

(1) Movable parts:

Operation

Lubrication

(e) Guards or pipe coverings

(1) Prevention of damage by valve-operating chains

(f) Supports under piping to reciprocal pump

(1) Elimination of vibration

(g) Coal scales

(1) Calibration by local department of weights and measures

(h) Cleanout facilities

(1) Size

(2) Accessibility

(i) Gages and thermometers

(1) Visibility

(j) Steam plant

(1) Cleaning:

Under steam pressure

(2) Operation of vacuum pumps and trap elements:

Delay until completion of pressure cleaning

(3) Preliminary operation of boilers:

Prior to municipal inspection:

Compliance with codes and specifications

Adjustments by factory representative

Tightness of joints and connections

Noiseless functioning

7. Heating—Continued

- (j) Steam plant—Continued
 - (3) Preliminary operation of boilers—Con.
Prior to acceptance:
 - Traps
 - Strainers
 - Sediment pockets
 - Mud drums
 - Removal of accumulations from interior of settings and hoppers
 - Municipal approval
- (k) Oil burners
 - (1) Electric wiring
 - (2) Bonnetstat or boiler thermostat
 - (3) Stackstat
 - (4) House thermostat
 - (5) Oil tank:
 - Capacity
 - Location
 - (6) Filler pipe and cap
 - (7) Supply pipe
 - (8) Oil lift pump
 - (9) Combustion chamber
- (l) Warm-air furnaces
 - (1) Flue
 - (2) Flue lining
 - (3) Thimble
 - (4) Firepot and firebrick
 - (5) Grate and shaker mechanism
 - (6) Ducts and grilles:
 - Supply and return
 - (7) Smoke pipe:
 - Damper
 - Damper control
 - (8) Humidifier
 - (9) Circulating fan:
 - Connections
 - Electric wiring
 - Belts

8. Air Conditioning

See other stages for introduction of utilities and piping to avoid interferences. Equipment and installation to be checked by special air-conditioning inspector or coordinating mechanical engineer.

- (a) General
 - (1) Materials:
 - Manufacturer's certificates
 - Laboratory test reports
 - (2) Cooling load of structure
- (b) Units
 - (1) Size
 - (2) Manufacturer's catalog rating
- (c) Compressors
 - (1) Size
 - (2) Manufacturer's catalog rating
- (d) Compressor motor
 - (1) Horsepower
- (e) Fan motor
 - (1) Horsepower
- (f) Wire
 - (1) Size
- (g) Duct
 - (1) Size
 - (2) Thickness of material
- (h) Grilles
 - (1) Location
 - (2) Supply and return
- (i) Thermostat or hygostat
 - (1) Location
- (j) Dampers
 - (1) Controls:
 - Type
- (k) Refrigerating machine
 - (1) Controls:
 - Type
- (l) Service guaranty

9. Electrical Work

See other stages for introduction of utilities and piping to avoid interferences. Equipment and installation to be checked by special electrical inspector or coordinating mechanical engineer.

(a) General**(1) Materials:**

Manufacturer's certificates

Laboratory test reports

(b) Wiring and fixtures**(1) Feeder and subfeeder cables:**

Color coding

(2) Switches and receptacles:

Installation:

Anchorage

Alinement

Plumbness

Operation

(3) Electrical outlet boxes:

Size

Setting

Clearance

(4) Motors and control equipment:

Installation

Operation

Sound insulation and isolation

(5) Fuses:

Size

Spares

(6) Outlets:

Polarity

(7) Municipal or other approval**10. Miscellaneous Metal Work****(a) Metal items****(1) Anchorage for attachment****(b) Recesses for****(1) Letter box****(2) Mail chute**

10. Miscellaneous Metal Work—Continued

- (c) Pipe-rail posts
 - (1) Calking into sleeves
- (d) Metal bucks
 - (1) Bracing
 - (2) Alinement
 - (3) Protection, especially on main travel aisles
- (e) Stairs
 - (1) Stringers
 - (2) Treads and risers
 - (3) Bearing at supports
 - (4) Levels of top and bottom treads
 - (5) Fillers in tread pans for protection of nosings
- (f) Connections
 - (1) Tightness
 - (2) Lock or set of nuts on bolts
- (g) Painting
 - (1) Prior to erection:
 Inaccessible parts
 - (2) Shop-paint abrasions
- (h) Milled surfaces in contact
 - (1) Oiling

11. Metal Windows

- (a) Setting
- (b) Calking
- (c) Priming
- (d) Attachment of trim
- (e) Adjustment of friction hinges
- (f) Prior to final plastering or painting
 - (1) Curtain or shade mounting
 - (2) Drilling of jambs

12. Lathing

- (a) Metal-lath application
 - (1) Angles
 - (2) Ribs
 - (3) Joints at sides and heads of openings
 - (4) Corner beads

12. Lathing—Continued

(a) Metal-lath application—Continued

(5) Covering:

Narrow spaces between openings
Internal corners
Joints between wood and masonry
Pipe and conduit chases
Beams
Lintels
Archways
Cornices

(b) Wood-lath application

(1) Spacing

(2) End joints:

Solid bearing
Staggering

13. Plaster and Stucco

(a) Preparation

(1) Grounds:

Thickness:

Nailing strength for trim

Support for hanging fixtures

(2) Lime prior to mixing:

Slaking

Soaking

(3) Masonry surfaces:

Scoring

Cleaning

Wetting

(4) Wood lath:

Wetting

(5) Gypsum and insulating lath:

Dry

(b) Application

(1) Mix

(2) Color and texture

(3) Alinement and levels

(c) Curing

(1) Wetting

(2) Drying

13. Plaster and Stucco—Continued

- (d) Patching
 - (1) Cleaning of exposed lath
 - (2) Raking of cracks to form clean key
 - (3) Wetting of edges
- (e) Finishing of stucco surfaces
 - (1) Cement wash for water-cement paint
 - (2) Lead-and-oil mixture for oil paint

14. Sash and Doors

- (a) Priming
 - (1) Prior to or immediately after delivery:
 - Frames
 - Sash
 - Recesses for glazing
- (b) Hanging
 - (1) Hardware in place
 - (2) Clearance at head and jambs
 - (3) Operation
- (c) Staff beads
 - (1) Alinement
 - (2) Calking:
 - Allowance for
- (d) Refitting after installation of weatherstripping
 - (1) Snug-easy operation

15. Weatherstripping

- (a) Quality
 - (1) Temper of spring metal
 - (2) Cut:
 - Cross-grain
- (b) Installation
 - (1) Application after fitting of wood members
 - (2) Joints:
 - Tight
 - Smooth
 - (3) Fastening
 - (4) Seal
 - (5) Operation of units
- (c) Thresholds
 - (1) Calking

16. Glazing

(a) Glass

(1) Type:

Ordinary:

Sticker

Special, ray transmitting or resisting:

Manufacturer's certificate of compliance

or

Laboratory test report

(2) Quality:

Flawless

Flat (not sprung into place)

(3) Size:

Tolerances for openings

(4) Installation:

Mechanical fastenings

(b) Putty or mastic

(1) Quality:

Elasticity

Adhesion

Hardening

(2) Application:

Bed and face

Bevels

(3) Recesses for glazing:

Priming

(c) Replacement of broken or scratched glass

(d) Cleaning

17. Millwork

(a) Trim

(1) Priming or back priming (same bases as final finish)

(2) Storage:

Dry

17. Millwork—Continued

(a) Trim—Continued

(3) Installation:

Cutting:

Mitering

Splicing (permitted only in running trim):

Halving

Application after plaster dries:

Running trim:

Plumb

Level

Straight

End joints:

Over solid bearings

Thresholds:

Full length

Nailing:

Size

Amount

Manner

Set

(b) Stationary cabinets

(1) Anchoring

(2) Scribing

(c) Drawers, doors, sliding boards

(1) Operation

(2) Elimination of warp and check

(d) Finish surfaces

(1) Removal of tool marks and abrasions

18. Finish Flooring

(a) Wood

(1) Storage:

Dry

(2) Installation:

Baseboards:

Clearance for expansion

Joints:

Tight fit

18. Finish Flooring—Continued

(a) Wood—Continued

(3) Nailing:

Bearings

End joints (unless matched)

Avoidance of tongue damage

(4) Protection after laying:

Covering until waxed or finished

(b) Linoleum, rubber, felt-base, or asphalt, in sheet or tile form

Moisture and temperature equilibrium normal for location to be established before proceeding with the installation.

(1) Subfloor surface:

Dryness

Rigidity

Levelness

Cleaning

(2) Installation:

Manufacturer's instructions

Underlay over strip-wood floor:

Type

Adhesives:

Type

Application

Removal of trapped air

(3) Protection after laying:

Covering until waxed or finished

(c) Ceramic tile

(1) Type

(2) Setting bed:

Rigidity

Levelness

(3) Joints:

Uniformity

(4) Surface:

Evenness

18. Finish Flooring—Continued

- (d) Concrete
 - (1) Mix
 - (2) Placing:
 - Compactness
 - (3) Surface:
 - Evenness
 - Finish
- (e) Stone
 - (1) Type
 - (2) Setting bed:
 - Rigidity
 - Levelness
 - (3) Joints
 - (4) Surface:
 - Evenness

19. Screening

- (a) Installation
 - (1) Screen cloth:
 - Tightness
 - Fastening
 - (2) Frames:
 - Wood:
 - Fit
 - Operation
 - Metal:
 - Electrolytic action
 - (3) Openings and removable screens:
 - Identification tags
- (b) Cleaning
- (c) Paint splashes
 - (1) Removal

VI. FINISHING STAGE

1. Hardware

(a) Materials

- (1) Approved samples:
 - Identifying tags
 - Classifying and filing
- (2) Bolts, nuts, screws, other hardware:
 - Removal of sharp edges and projections

(b) Workmanship

- (1) Installation:
 - Qualifications of mechanics
- (2) Operating parts:
 - Adjustment and functioning
 - Clearance for door closers
 - Latches and locks
- (3) Keys:
 - Fitting
 - Marking
 - Provision of adequate supply
- (4) Door stops:
 - Clearances
 - Resistance to impact
- (5) Fastenings:
 - Nuts:
 - Lockwashers
 - Upset thread on bolt
 - Screws:
 - Bite into wood
 - Prevention of hammer driving
- (6) Surface plates and items on sash, doors, etc.:
 - Fitting
 - Protection

2. Painting and Decorating

(a) Materials

(1) Contractor's written statement:

Brand

Composition

Manufacturer's certificate of compliance

Approvals

(2) Tests:

Composition

Conformance with standard panels:

Color

Texture

Hiding power

Cleanability

(3) Linseed-oil, enamel, and other paints:

Ready-mixed:

Containers:

Original

Unopened

Labeling:

Manufacturer's name

Brand

Composition

Mixed-on-job:

Competency of workmen

Uniformity of color:

Size of batches

(4) Coatings for radiators and hot pipes:

Heat-resistance

(b) Surface preparation

(1) Removal of stains caused by:

Dampproofing

Calking compound

Plaster

(2) Nail heads:

Set

Puttying

Smoothing and sanding of dry putty

2. Painting and Decorating—Continued**(b) Surface preparation—Continued****(3) Priming (base material same as finish):**

Surfaces inaccessible after installation:

Trim, backs of

Frames, door and window

Double-hung-window jambs

Casings

Doors, top and bottom of

Baseboards

Drip caps

Staff beads

Roofing sheets, metal

Flashings, metal (except copper)

Radiators

Flooring for porches, wood

(4) Sizing, neutralizing, or special treatment:

Insulating board

Plaster

Concrete

Zinc-coated metal

(5) Protection, by removal or covering:

Finish hardware

Switch plates

Surfaces likely to be damaged by other trades

(c) Application**(1) Weather conditions:**

Suitability

(2) Varnishes and enamels:

Smoothness

(3) Lead-and-oil paints:

Thorough working out

Smears and spatters:

Removal

Successive coats:

Sanding

Buffing

Different shades (to facilitate inspection)

2. Painting and Decorating—Continued

(c) Application—Continued

(3) Lead-and-oil-paints—Continued

Successive coats—Continued

Time allowance for drying between coats

Uniform coverage for similar surfaces

Full coverage for partially concealed spaces:

Pipes and radiators:

Back

Top

Underside

Doors

Door bucks

Window stools

Wood rails and strips

Returns of trim

(4) Cement paints for masonry surfaces:

Wetting of surfaces to be painted

Scrubbing on with stiff bristle brush

Damp curing

(d) Protection from damage

(1) Work in place

(2) Wet paint

(e) Cleaning

(1) Final coat when thoroughly dry

3. Lighting Fixtures

(a) Wiring

(1) Switches

(2) Connections:

Soldering

Welding

(3) Municipal approval

(b) Bulbs

(1) Lighting

(2) Cleaning

(3) Protection from damage

4. Masonry

(a) Pointing

- (1) Holes and cracks:
Mortar filling (same composition as facing)
- (2) Defective mortar:
Cutting out
Solid refilling
- (3) Removal of:
Nails
Devices for forming weep holes
- (4) Tooling

(b) Cleaning

- (1) Protection of:
Metal
Stone
Other
- (2) Methods:
Sandblasting
Muriatic acid wash
Water wash
Abrasive stone
Wire brush
Steam

5. Concluding Check Up of Stage VI

(a) Cleaning of

- (1) Crawl and pipe spaces
- (2) Pipe chases
- (3) Attics
- (4) Vents in walls
- (5) Floors
- (6) Chimney bottoms
- (7) Accessible spaces
- (8) Decorated or finished surfaces
- (9) Glass, hardware, and fixtures

(b) Removal of debris

(c) Closing off of floor openings around piping

5. Concluding Check Up of Stage VI—Continued

- (d) Accessibility of crawl spaces
- (e) Replacement of broken glass
- (f) Operation of doors and windows
- (g) Removal of equipment

VII. FINAL RECORDS

Copies of the following records to be assembled and delivered to owner or manager of building.

1. Guaranties

- (a) Specified
- (b) Additional
 - (1) Correction of construction defects

2. Reports of Final Inspections

3. Instructions

- (a) Mechanical equipment
 - (1) Operation
 - (2) Maintenance

4. Recommendations of Contractor or Manufacturer

- (a) Periodic check up
 - (1) Materials
 - (2) Repairs
 - (3) Refinishing
 - (4) Replacement

5. Settlement

- (a) Frequent observations

6. Changes

- (a) Design
- (b) Actual

7. File Copies

- (a) Contracts
- (b) Specifications
- (c) Drawings
- (d) Test reports
- (e) Certificates
- (f) Job correspondence

8. Waivers of Lien**9. Contractors' Affidavits****10. Utility Approvals****11. Occupancy Certificate**

APPENDIX A—CONCRETE²

1. Records for Concrete Work, Daily or Periodic

- (a) Moisture content
 - (1) Aggregates
- (b) Test reports
 - (1) Mixes
 - (2) Cements
 - (3) Aggregates
 - (4) Steel
- (c) Samples and brands
 - (1) Approved
 - (2) Variations
- (d) Daily pour
 - (1) Location
 - (2) Amount
- (e) Forms
 - (1) Leakage of concrete
 - (2) Removal
- (f) Cracks
 - (1) Initial
 - (2) Progressive changes
- (g) Surface
 - (1) Finish
- (h) Walls
 - (1) Repairing of leaks:
 - Method
 - Effectiveness
- (i) Weather conditions
 - (1) Temperature:
 - Maximum
 - Minimum

² Refer to ACI Manual of Concrete Inspection, Report of Committee 611, issued by the American Concrete Institute, 7400 Second Boulevard, Detroit, Mich. (1941).

1. Records for Concrete Work, Daily or Periodic—Con.

(i) Weather conditions—Continued

(2) Rainfall

(3) Wind

2. Forms for Concrete

(a) Construction

(1) Location

(2) Alinement:

Provision for settlement

(3) Elevation

(4) Tightness

(5) Strength

(6) Bracing:

Ties and spacers:

Removal or cutting back

Prevention of mortar leakage

(b) Enclosures in concrete, placement of:

[Verify with subcontractors]

(1) Conduits

(2) Anchors

(3) Inserts

(4) Other

(c) Vibrated concrete

(1) Tightness at:

Panel joints

Corners

Connections

(d) Surfaces

(1) Wood:

Cleanness

Smoothness

Shrinkage:

Adjustment by wetting or drying

(2) Metal:

Abrasion (not abraded to bright metal)

Deterioration, prevention by:

Oiling and exposing to sun

or

Rubbing with liquid paraffin

3. Reinforcement

- (a) Accessories
- (b) Shop details
 - (1) Conformance
- (c) Surfaces
 - (1) Cleanness
 - (2) Freedom from rust scale
- (d) Bars
 - (1) Spacing
 - (2) Secure placement
- (e) Splices
 - (1) Length
 - (2) Spacing
 - (3) Firmness

4. Materials³

- (a) Storage
 - (1) Cement:
 - Dry
 - Protection from elements
 - Removal of absorbed moisture by air jetting
 - (2) Aggregates, fine and coarse:
 - Segregation of sizes
- (b) Measuring
 - (1) Cement:
 - Units of whole sacks unless weighed
 - (2) Aggregates:
 - Within tolerance of 1 to 2 percent
 - (3) Water:
 - Within tolerance of 1 percent (free moisture in aggregates = part of required water)
- (c) Batched aggregates or ready-mixed concrete
 - (1) Assembling and arrival:
 - Uniformity of batches

³ On projects where bin storage, hoppers, mechanical conveyors, etc., are used, refer to *Proposed Recommended Practice for Measuring, Mixing, and Placing Concrete*, Report of Committee 614, issued by the American Concrete Institute, 7400 Second Boulevard, Detroit, Mich. (1941).

5. Mixing at Job

- (a) Mixer
 - (1) Leaks
 - (2) Waste of material
 - (3) Mixing blades
 - (4) Discharge of concrete (1-inch slump)
 - (5) Starting and stopping under full load
 - (6) Removal of hardened concrete or mortar accumulation
- (b) Batch
 - (1) Size:
 - Guaranteed capacity of mixer
 - Reduction when combined with preceding batch
- (c) Mixing procedure
 - (1) Provision for easy flow of dry ingredients
 - (2) Continuous flow of water (maximum, 25 percent of mixing time)
- (d) Consistency control
 - (1) Maintenance of constant proportions:
 - Cement (for strength)
 - Water and fine aggregates (for workability)
 - (2) Adjustments in mix
- (e) Mixing time (measured after all solid materials have entered drum)
 - (1) For mixers of 1 cubic yard or less: ⁴
Minimum, 1 minute
 - (2) For mixers larger than 1 cubic yard:
15 seconds added for each additional $\frac{1}{2}$ cubic yard
- (f) Retempering
 - (1) Restoration of workability by carefully controlled addition of water to delayed batches complying with specified water-cement ratio

⁴ For mixes having less than 6 sacks of cement per cubic yard, mixed to dry consistencies or containing harsh aggregates; time increased 25 to 50 percent.

5. Mixing at Job—Continued

- (g) Sources of error in mixing
 - (1) Loading and discharging:
Overlap of batches
 - (2) Loss of material:
Transferring batches to skips of portable mixers
 - (3) "Hang-up":
Combining portion of one batch with another

6. Ready-Mixed Concrete (Centrally Mixed, Truck-Mixed, "Shrink-Mixed")

- (a) Consistency
 - (1) Expeditious delivery (for prevention of loss of slump)
 - (2) Adjustments after delivery:
 - If too dry:
Addition of water within specification limits
Addition of proportionate quantities water and cement
 - If too wet:
Addition of proportionate quantities of cement and aggregate
- (b) Truck mixing
 - (1) Mixer speed:
Manufacturer's recommendations (2 to 6 drum rpm)

7. Mixing Efficiency

- (a) Thoroughness⁵
 - (1) Sand-cement and water-cement ratio in any part of batch at end of mixing period (tolerance 10%)
 - (2) Coarse aggregate-mortar ratio (uniform by visual inspection)
 - (3) Mixing time (increased if necessary)

⁵ U. S. Bureau of Reclamation, *Concrete Manual* (1938); or Iowa State College, Bul. 113, *A Proposed System for the Analysis and Field Control of Fresh Concrete* (1933).

8. Discharging Operation

- (a) Continuous flow
- (b) Time allowance (in addition to mixing time)
- (c) Drop of concrete
 - (1) Vertical
- (d) Weights of aggregate per batch

9. Placing of Concrete

- (a) Equipment
 - (1) Type (for expeditious transportation)
 - (2) Arrangement
- (b) Methods
 - (1) Fill:
 - Uniformity
 - Denseness
 - (2) Separation:
 - Coarse aggregate from mortar:
 - Reduction to safe minimum
 - Established mixes:
 - Maintenance of constant proportions
 - (3) Deposit:
 - Layers:
 - Depth
 - Bond
 - Water gain
 - Rock pockets

10. Vibrating of Concrete, Internal

Vibrating, except for special sections such as thin slabs, improves concrete quality and durability and reduces shrinkage and subsidence, permitting use of concrete less wet than usual "medium" consistency. It is recommended for all large concrete projects and is well worth considering for small projects.⁶

- (a) Equipment
 - (1) Power
 - (2) Frequency

⁶ For detailed recommendations, refer to *Recommendations for Placing Concrete by Vibration*, Report of Committee 609, issued by the American Concrete Institute, 7400 Second Boulevard, Detroit, Mich. (1936).

10. Vibrating of Concrete, Internal—Continued

- (a) Equipment—Continued
 - (3) Efficiency
 - (4) Standby units and parts for continuous operation
- (b) Workmanship
 - (1) Operators:
 - Experience
 - Competency
 - (2) Vibration:
 - Short insertions of vibrators:
 - Systematic and narrow intervals
 - Avoidance of overvibration (particularly slumps of more than 4 inches)

11. Construction Joints

- (a) Location
 - (1) Horizontal or vertical
 - (2) In slabs and beams:
 - At points of minimum shear
- (b) Forms
 - (1) Tight placing (to avoid mortar disfigurement)

12. Surface of Concrete in Place

- (a) Bonding
 - (1) Laitance, surface film, mortar:
 - Removal by strong jetting of air and water, stiff wire brush scrubbing, or sandblasting
 - (2) Soft mortar (1 inch) preceding new concrete:
 - Proportions same as concrete
 - Application on cleaned and wetted surface
 - Scrubbing in with wire broom
- (b) Covering of exposed surfaces
 - (1) Wet burlap or saturated sand kept continuously moist

13. Cold-Weather Construction

- (a) Sections not classed as mass concrete
 - (1) Concrete placement:
 - At maximum temperature of 70° F
 - Uniform heating of:
 - Water
 - Aggregates
 - (2) Protection from prolonged freezing by:
 - Heating
 - Insulation
 - (3) Curing:
 - Normal rate of set:
 - Maintenance of temperature of concrete and surrounding air at 50° to 100° F
 - Avoidance of:
 - Overheating
 - Rapid setting
 - If frozen prior to set:
 - Maintenance of heating after thaw until set
- (b) Sections classed as mass concrete
 - (1) Concrete placement:
 - At minimum of 40° F where protected from freezing
 - Hydration heat loss:
 - Rate (slow)

14. Hot-Weather Construction

- (a) Placement at low temperature by
 - (1) Use of cold mixing water
 - (2) Sprinkling or cooling of aggregate
 - (3) Avoiding hot cement
 - (4) Placing at night
- (b) Cooling by
 - (1) Prompt whitewashing of black sealing compounds (to retard sun's rays)
 - (2) Covering with burlap
 - (3) Continuous sprinkling

15. Finishing of Surfaces Made Without Forms

- (a) Initial operation
 - (1) Screeding, floating, first troweling:
Limited working of concrete
- (b) Finishing operation
 - (1) Prolonging of intervals between each step
- (c) Surface water
 - (1) Removal of accumulation before use of finishing tool
- (d) Surface texture
 - (1) Obtaining of finish by one troweling

16. Curing

- (a) Application of specified curing immediately concrete is placed
- (b) Surface protection
 - (1) Prevention of drying out by:
Keeping continuously moist
Protection from drying winds and sun's rays
 - (2) Initial surface inspection:
Within 6 hours

17. Removal of Forms

- (a) Strength of concrete prior to removal of supporting forms
 - (1) Construction loads
 - (2) Reshoring at critical points
- (b) Prevention of damage
- (c) Surfaces immediately after form removal
 - (1) Elimination or prevention of:
Damage
Sand streaks
Rock pockets
Honeycombing
Other defects
- (d) Surfaces exposed during curing period
 - (1) Continuously moist

18. Correction of Defects

- (a) Cutting out of affected areas
 - (1) Depth:
At least 1 inch
 - (2) Sides:
Perpendicular
 - (3) Face:
Cleaned thoroughly
Roughened
- (b) Pockets or grooves
 - (1) Wetting:
To area of 12 inches
 - (2) Bonding:
 $\frac{1}{4}$ inch 1:1 cement-sand mortar
 - (3) Mortar:
Building up (same composition as concrete):
Coats $\frac{3}{8}$ inch thick
Patching:
Consistency, dry enough for:
Ready placement
Maintenance in place
Mixing:
Thorough
Allowance for standing (one hour with occasional stirring)
Remixing (without addition of water)
- (c) Color matching of adjoining surfaces
 - (1) Trial batches
 - (2) Addition of white portland cement
- (d) Deep areas
 - (1) Forming
 - (2) Surfaces:
Cleaning
Wetting
Application of bonding mortar
- (e) Tie holes passing through walls
 - (1) Filling with mortar from back face by:
Plunger-type gun
Other device

18. Correction of Defects—Continued

- (e) Tie holes passing through walls—Continued
 - (2) Stopping at exposed face by:
 - Burlap or canvas
 - (3) Surface holes in walls:
 - Solid filling
 - (4) Face:
 - Excess mortar struck off flush
- (f) Each coat
 - (1) Thorough compacting
 - (2) Prior to application of next coat:
 - Wood-floating or cross-scratching
 - Allowance for set (one or two days, continuously wet)
 - (3) Final coat:
 - Slight projection to offset initial shrinkage
 - Struck off flush
 - Patched
 - Maintained wet
- (g) Treatment for minor flaws:
 - (1) Preparation of surface:
 - Brushing and cleaning
 - Wetting to saturation
 - (2) Grout coating:
 - 1:1 cement and fine sand
 - Consistency (for application with stiff bristle brush)
 - (3) Complete filling of:
 - Indentations
 - Air bubbles
 - Pin holes
 - (4) Removal of excess grout and film by:
 - Steel troweling when partially set
 - Vigorous rubbing with burlap after some drying
- (h) Cleaning
 - (1) Removal of incrustations of mortar, fins, offsets, etc., by:
 - Rubbing with carborundum stone

18. Correction of Defects—Continued(h) **Cleaning—Continued**

- (1)
- Removal of incrustations of mortar, fins, offsets, etc., by—Continued**

Scouring with:

Steel wool

Fine steel brushes

Chipping off and patching

- (2)
- Surface of patch and adjoining areas:**
-
- Removal of stains and discolorations
-
- Making smooth and flush by:
-
- Rubbing
-
- Other approved methods

APPENDIX B—MASONRY

1. Records for Masonry Work, Daily or Periodic

- (a) Test reports
 - (1) Masonry units
 - (2) Mortars:
 - Materials
 - (3) Anchors
 - (4) Ties
- (b) Samples and brands
 - (1) Approved
 - (2) Variations
- (c) Daily construction
 - (1) Location
 - (2) Amount
- (d) Cracks
 - (1) Initial
 - (2) Progressive changes
- (e) Leakage
 - (1) Tests
 - (2) Repairs:
 - Method
 - Effectiveness
- (f) Weather conditions
 - (1) Temperature:
 - Maximum
 - Minimum
 - (2) Rainfall
 - (3) Wind

2. Construction

- (a) Workmanship
 - (1) Alinements
 - (2) Elevations
 - (3) Number of courses

2. Construction—Continued

- (a) Workmanship—Continued
 - (4) Moisture content of units:
 - Wetting of clay bricks
 - Drying of concrete brick and block
 - (5) Forming of weep holes
 - (6) Cavity spaces:
 - Freedom from mortar droppings
- (b) Anchors and inserts
 - (1) Correct location
 - (2) Solid placement
- (c) Mortar
 - (1) Plastic quality
 - (2) Use within 2 hours after mixing
 - (3) Frequent retempering
- (d) Joints
 - (1) Bedding
 - (2) Filling
 - (3) Uniform thickness
- (e) Tooling
 - (1) Thumbprint hardness
 - (2) Exposed surfaces of joints:
 - Smooth
 - Untorn
- (f) Pointing
 - (1) Raking of joints:
 - Plaster bond
 - Calking
 - (2) Repairing of exposed shrinkage cracks by:
 - Wetting walls
 - Raking cracks
 - Solid refilling
 - (3) Nail and other holes
- (g) Parging
 - (1) Uniform thickness
 - (2) Continuous application
 - (3) Parged units:
 - Undisturbed during parging
 - (4) Setting of dislodged units:
 - Relaid to line in fresh mortar

2. Construction—Continued

- (h) Bond between old and new work
 - (1) Covering of day's work:
 - Top of walls
 - (2) Joints:
 - Removal of exposed dried-out mortar
 - (3) Prior to placing fresh mortar:
 - Cleaning
 - Wetting
- (i) Flashings
 - (1) Position
 - (2) Joints (for drainage):
 - Tightness
 - Freedom from wrinkles, breaks, and tears
 - Lap
 - (3) Counterflashings:
 - Repointing (after completion of roof)
- (j) Steel lintels
 - (1) Exposed edges:
 - Depth of face-joint tooling
 - (2) Beds under lintel or beam bearings:
 - Spacing of joints
 - (3) Brick on lintels:
 - Full-bed bearing
- (k) Freezing-weather construction
 - (1) Protection by:
 - Heating of mortar materials

3. Finished Surfaces

- (a) Protection from damage (especially at corners, sills, belts)
 - (1) Stone:
 - Prohibition of Dugan patching
 - (2) Glazed brick or tile
 - (3) Terra cotta
- (b) Prevention of mortar stains
 - (1) Periodic disposal of masonry refuse

4. Chimneys

(a) Brick and tile

(1) Plumbness

(2) Taper

(3) Tile flue linings:

Laying:

One section ahead of surrounding
brick

Gas-tight

(4) Joints:

Completely filled

Flush on flue side

(5) Flues and air spaces:

Clear of mortar droppings and projec-
tions

(6) Reinforcing bands and iron:

Installation

(b) Fire-clay brick

(1) Laying:

Dipping in mortar

Joints:

Thickness

Tightness

Bonding mortars, fire-clay or air-setting
refractory:

Freedom from grit

Consistency

Plasticity

(c) Cleaning

(d) Pointing

APPENDIX C—WATERPROOFING, DAMPPROOFING AND CALKING

1. Materials for Waterproofing, Dampproofing, Calking

(a) Quality

- (1) Brand
- (2) Compounds in sealed containers
- (3) Weight
- (4) Asphalt content
- (5) Suitable thinners

(b) Tests

- (1) Calking in exposed joints:
 - Adhesion
 - Shrinkage
 - Ductility
 - Sag
 - Ability to take paint
 - Color when dry

2. Workmanship

(a) Coverage

- (1) Number of full coats
- (2) Avoidance of skimping
- (3) Flashings over spandrels and lintels:
 - Consistency of coatings
- (4) Window and door members:
 - Prevention of:
 - Oozing
 - Staining
- (5) Laps
- (6) Moppings
- (7) Flashings

2. Workmanship—Continued

(b) Calking

(1) Application:

Prior to attachment of staff beads

(2) Joints:

Dry

Raked out clean

Preparation according to manufacturer's directions

Oakum packing

Consistency of compounds

Filling

(3) Exposed surfaces:

Smoothness

Firmness (for painting)

(c) Protection of adjacent work from staining (especially by sprayed-on materials)

APPENDIX D—STRUCTURAL STEEL

1. Materials for Structural Steel Work

- (a) Grades and properties
 - (1) Approved certificates
 - (2) Mill reports
- (b) Sizes and shapes
 - (1) Specified or approved equivalent
 - (2) Tolerances
- (c) Handling and delivery
 - (1) Protection from damage

2. Fabrication and Erection ⁷

- (a) Equipment
 - (1) Bracing
 - (2) Location and set of:
 - Anchor bolts
 - Other inserts
 - (3) Prior to attaching steel:
 - Adjustments to fit inaccuracies
- (b) Welding
 - (1) Approval of:
 - Materials
 - Equipment
 - (2) Qualifications of welders
- (c) Riveting
 - (1) Hazard precautions
 - (2) Holes for rivets or bolts:
 - Location (not at strength joints)
 - Spacing
 - Alinement

⁷ In accordance with *Standard Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings*; revised 1937, reprinted 1939 in part IV of *Steel Construction*, issued by the American Institute of Steel Construction.

2. Fabrication and Erection—Continued

- (c) Riveting—Continued
 - (3) Holes for turned bolts:
 - Drilling:
 - Accurate match
 - Tight fit
 - Oiling before tightening bolts
 - (4) Rivets:
 - Driving heat
 - Heads:
 - Concentric
 - Tight fit
 - (5) Nuts on bolts:
 - Tight full grip
 - Locking
- (d) Surfaces not accessible after erection
 - (1) Painting
- (e) Milled surfaces in contact
 - (1) Oiling
- (f) Grout for pedestals
 - (1) Stiffness
 - (2) Ramming under bearings
- (g) Cuts in steel work for passage of pipes and conduits
 - (1) Location (only where authorized)

3. Prefabricated Units

- (a) Sheet steel or shapes for joists, studs, panels
 - (1) Installation:
 - Conformance with manufacturer's instructions
 - (2) Corrosion protection
- (b) Prior to field painting
 - (1) Cleaning
- (c) Field painting
 - (1) Shop-coat abrasions:
 - Touching up
 - (2) Each coat:
 - Full coverage

APPENDIX E — CARPENTRY

1. Materials for Framing

(a) Lumber

(1) Species

(2) Grade:

Certificate of inspection

(3) Preservatives for protection from:

Moisture

Termites

(b) Shims

(1) Unshrinkable material:

Metal

Slate

Cement

Grout

(c) Building paper

(1) Weight

(2) Impregnation

(3) Sizing

2. Lumber

(a) Protection from

(1) Moisture damage

(b) Exposed members to be painted

(1) Prior to or immediately after delivery:

Priming

3. Framing

(a) Sills and wall plates

(1) Anchoring

(2) Leveling

(3) Spiking

(4) Bolting to bearing plates

3. Framing—Continued

- (b) Posts and studs
 - (1) Plumb
 - (2) Square
- (c) Girders
 - (1) Size (for strength)
 - (2) Supports:
 - Load
 - Level bearing
- (d) Built-up members
 - (1) Spiking
 - (2) Bolting
 - (3) Joints:
 - Spacing (only over supports)
- (e) Joists and rafters
 - (1) Joists:
 - Span
 - Spacing (for stiffness)
 - Setting (with crown up)
 - Top (for level; adjustments by trimming at bottom)
 - Splicing (only over supports)
 - (2) Porch joists:
 - Pitch
 - (3) Rafters:
 - Accurate fit
 - Splicing to:
 - Plates
 - Ridges
 - (4) Hip and valley rafters:
 - Mitered fit (head and toe)
- (f) Bridging
 - (1) Nailing (prior to applying lath):
 - Lower ends loose (until subfloor in position)
 - Secure
- (g) Fire stops
 - (1) Installation:
 - At each floor level
 - Tight fit

3. Framing—Continued

- (h) Joints in double plates
 - (1) Staggering
- (i) Door and window frames
 - (1) Plumb
 - (2) Blocking
 - (3) Fastening or anchoring
 - (4) Staff beads:
 - Ease of removal for calking

4. Sheathing

- (a) Wall
 - (1) Joints:
 - Tight
 - Spacing of end joints
 - (2) Nailing
 - (3) Extension over:
 - Sill
 - Plates
- (b) Subfloor and roof
 - (1) Joints:
 - Tight
 - Centered over joists, rafters, and other supports
 - (2) Prevention of buckling
 - (3) Nailing
- (c) Paper over subflooring and sheathing
 - (1) Condition
 - (2) Lapping
 - (3) Tacking
 - (4) Fit (around openings)
- (d) Underfloor spaces (no basement)
 - (1) Ventilation

5. Siding

- (a) Workmanship
 - (1) Square end cuts
 - (2) Tight fit against:
 - Corner boards
 - Doors
 - Window casings

5. Siding—Continued

(a) Workmanship—Continued

- (3) Snug fit (to properly shed water) over:
 - Drip caps
 - Water tables
 - Sills
- (4) Blocked out to drip (if no water table)
- (5) Nailing:
 - Near ends
 - Slanted
 - Set for putty
- (6) Miters
- (7) Exterior edges:
 - Tight fit

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