Section 10.3

CONCRETE CONSTRUCTION

10.3.1 Purpose

The purpose of this section is to ensure that CEI and Materials staff are aware of the inspection and monitoring responsibilities required to ensure quality cast-in-place concrete construction. This procedure is primarily intended to be used by CEI staff experienced in bridge construction.

10.3.2 Authority

Section 20.23(3)(a), Florida Statutes

Section 334.048(3), Florida Statutes

10.3.3 References

Section 336.045, Florida Statutes

Florida Department of Transportation, ***Standard Specifications for Road and Bridge Construction***

10.3.4 Bridge Decks

10.3.4.1 General

To verify the total thickness and the thickness of the concrete cover over the top mat of reinforcing steel in bridge decks, thickness measurements shall be made in the plastic concrete directly behind the final pass of the screed. A minimum of two measurements - the first representing the concrete thickness over the top mat of reinforcing steel and the second representing the thickness of the deck concrete - shall be made for each five hundred square feet of bridge deck. Measurement locations shall be spaced randomly to represent all areas of the bridge deck.

10.3.4.2 Measurements - Total Deck Thickness

Measurements for deck thickness must be taken from the top of the deck to the top of forms in the portion of the deck between beam flanges or bays, in order to avoid including beam buildups in the measurement. For corrugated stay-in-place forms, total deck thickness measurements shall be taken from the upper surface of the corrugation. The use of aluminum probing/measuring devices is prohibited.

10.3.4.3 Measurements - Concrete Cover Thickness

Measure the thickness of the concrete cover over the top mat of reinforcing steel by inserting a metal plate edgewise into the plastic concrete to the top mat of reinforcing steel. Orient the plate so that it is transverse to the topmost reinforcing bars. The plate should be in contact with at least two transverse reinforcing bars to ensure an accurate measurement.

10.3.4.4 Documentation

Record thickness measurements in a permanent hardbound or electronic field notebook to be submitted with the final estimate records. The notebook shall contain the information that follows. Include in the notebook, all items necessary to provide clarity. Each bridge shall be listed separately. Information regarding the thickness measurements shall include the following under the appropriate span number:

- Financial identification number
- Contract number
- Bridge number and name (if applicable)
- Deck placement location (Station to Station)
- Offset distance right or left of centerline or profile grade line
- Date
- Time period (from AM/PM to AM/PM)
- Inspector's name
- The average thickness of concrete cover over the top mat of reinforcing steel with the average deck thickness computed for each deck concrete placement

District Construction Engineers or assigned designees are requested to monitor these records and assure compliance with specified plan dimensions. These measurements are made to provide the basis for making

corrections to deficient placements and corrections to construction techniques prior to subsequent deck placements.

10.3.5 Mass Concrete

10.3.5.1 Background

During the curing process mass concrete elements generate high temperatures at their cores relative to those at their exterior surfaces. The term mass concrete refers to a designation given to concrete elements wherein control of concrete temperatures during the curing process is vital to an element's strength and durability while in service. The classification of an element as "mass concrete" typically is thought of as being due solely to volumetric and dimensional aspects of the element. While it is true that mass concrete is most often a concern for larger concrete elements, to assume that only such elements require mass concrete control provisions is incorrect as there are other aspects to be considered beyond just an element's geometry.

Per the Specifications, concrete temperatures must not exceed180°F at the core and temperature differentials between the core and exterior must be under 35°F. If these temperature limits are exceeded, there is the potential for crack formation or the development of delayed ettringite formation (DEF), a mineral byproduct of the curing process which can lead to reduced concrete strengths and/or cracking in the future.

To prevent temperature levels from exceeding the limits in the Specification, the Contractor must take action to utilize a suitable concrete mix design as well as properly insulate exterior surfaces of the concrete and where required, actively cool the core of the concrete component. These provisions must be detailed in the ***Mass Concrete Control Plan (MCCP)***, a signed and sealed submittal developed by the Contractor's Specialty Engineer that also includes calculations of predicted temperatures during curing. The MCCP must be submitted and approved by the Department before construction of any mass concrete component can begin. The Contractor must demonstrate per the MCCP that temperature differentials and maximum core temperatures are being properly monitored by temperature monitoring devices within the concrete, to be read at 6-hour intervals or less.

10.3.5.2 Submittal and Acceptance of the Mass Concrete Control Plan

(A) Resident Level Responsibilities

The Contractor will be required to submit a ***MCCP*** to the Project Administrator at least 14 days prior to the first mass concrete placement.

The Project Administrator will review the Contractor's proposed ***MCCP*** for compliance with the requirements as set forth in the ***Specifications***.

Within two working days of receipt of any ***MCCP***, the Project Administrator will forward the ***MCCP*** along with his comments to the District Structural Materials Engineer or District Manager-Concrete Production and the State Structural Materials Engineer for their review.

The Project Administrator will notify the Contractor of either ***MCCP*** acceptance or rejection within ten working days of ***MCCP*** submittal by the Contractor. The Project Administrator may also request any additional information required and necessary ***MCCP*** re-submittals from the Contractor. Additional information required may extend the review and acceptance time. A ***MCCP*** re-submittal may require as much as an additional ten working days for review and acceptance which will be determined by the State Materials Office Reviewer.

Project Administrator: Mass concrete must not be placed before the Contractor has received the Department's full approval of the ***MCCP***.

(B) District Level Responsibilities

The District Structural Materials Engineer or District Manager-Concrete Production will review all ***MCCPs*** upon notification from the Project Administrator. The District Structural Materials Engineer or District Manager-Concrete Production will transmit his comments to the State Structural Materials Engineer within five working days of receipt of the ***MCCP***.

(C) Central Office Level Responsibilities

The State Structural Materials Engineer will timely review the ***MCCP***, including comments from the Project Administrator and the District Structural Materials Engineer or District Manager-Concrete Production, documenting either ***MCCP*** acceptance or rejection with any qualifying notes or reasons for rejection, and notify the Project Administrator and the District Structural Materials Engineer or District Manager-Concrete Production accordingly. Reviews will be made so as to permit notification to the Contractor by the Project Administrator within ten working days from ***MCCP*** submittal. Any additional information required from the Contractor will be requested through the Project Administrator. Requirements for additional information may extend the time necessary for review. A ***MCCP*** re-submittal may require an additional ten working days for review and acceptance.

10.3.5.3 Implementation of Accepted Mass Concrete Control Plans

(A) Resident Level Responsibilities

The Project Administrator shall verify that the following Contractor actions are performed in compliance with the ***Specifications*** and the approved ***MCCP***:

(a) Mass concrete components are instrumented for measuring and recording temperature readings according to the approved ***MCCP***.

(b) The Mass Concrete Specialty Engineer, or his designee, has inspected the installation and has confirmed that it has been installed properly and functions according to the approved ***MCCP*** in accordance with the ***Specifications***.

(c) Temperature readings are obtained at intervals required by the ***Specifications.*** Temperature readings for a given element may be terminated only when all monitoring points within the element depict decreasing core temperatures and temperature differentials are in accordance with the ***Specifications***. The Project Administrator shall verify that temperature readings are not discontinued until decreasing temperature differentials have been definitively confirmed. One or two temperature readings below the previous reading may not necessarily indicate that the maximum temperature differential has been reached. Temperature control mechanisms are to be left in place until core

temperatures are within 50°F of ambient temperature.

(d) Temperature readings are analyzed in a timely manner. The Contractor takes immediate action as directed by the Specialty Engineer if mass components exceed either the allowable temperature differential or core temperature during the monitoring period.

(e) The ***MCCP*** will be revoked when temperature control provisions have failed to prevent the temperature differential or the maximum core temperature from being exceeded. Revisions to the ***MCCP*** must be submitted to the Department for approval before any other mass placements can proceed.

(f) In addition, for any noncompliant mass element an ***Engineering Analysis Scope*** must be submitted by the Contractor that describes the proposed approach in correcting the noncompliant element. If the ***Scope*** is approved, an ***Engineering Analysis Report (EAR)*** may be submitted by the Contractor's Engineer of Record containing the engineering analysis and recommended corrective actions to the noncompliant element.

Concrete temperatures and temperature differentials will vary with local ambient temperatures, heats of hydration produced by different cements, cement contents, cementitious material combinations, element geometry and other factors. The Contractor may request approval for reduced monitoring. The ***Specifications*** set forth the requirements necessary for reduced monitoring to be approved. The Project Administrator may allow reduced monitoring based on these requirements and previous successful implementations of the ***MCCP*** and compliance with the ***Specifications***.

The Project Administrator will require all mass concrete temperature monitoring records for the project files within three days of the completion of temperature monitoring. The Project Administrator will forward all mass concrete temperature monitoring records to the District Structural Materials Engineer or District Manager-Concrete Production. The Project Administrator will review all mass concrete temperature monitoring records to ensure compliance with project ***Specifications***.
Although established models are used to prepare ***MCCPs***, maximum allowed temperature differentials may, at times, be exceeded when the Contractor

has an accepted ***MCCP*** and has adhered to the ***MCCP*** requirements. In such instances, the Project Administrator will ensure that:

(a) The Contractor takes immediate action to limit further increase of temperature differentials or maximum core temperatures for that element.

(b) The Contractor's submitted revisions to the ***MCCP*** address maintaining temperature differentials or core temperatures within the limit allowed by the specifications for future Mass Concrete placements.

When the maximum allowed mass concrete temperature and/or temperature differential is exceeded, the Project Administrator will transmit the Contractor's revised ***MCCP*** and the subsequent ***Engineering Analysis Scope*** to the District Structural Materials Engineer or District Manager-Concrete Production for review and acceptance.

(B) District Level Responsibilities

The District Structural Materials Engineer or District Manager-Concrete Production will review and keep all mass concrete temperature monitoring records so he may advise the Project Administrator on mass concrete temperature control. These records shall include all temperature readings taken during curing. These records shall be transmitted to the District Structural Materials Engineer or District Manager-Concrete Production as soon as possible after collection. The District Structural Materials Engineer or District Manager-Concrete Production monitors the readings in order to determine if a Quality Assurance review is needed or if modification to the ***MCCP*** is necessary.

When the Contractor has an accepted ***MCCP*** and mass concrete temperature differentials or core temperature limits are exceeded, the District Structural Materials Engineer or District Manager-Concrete Production will review the Contractor's proposed revisions to the ***MCCP*** and the ***Engineering Analysis Scope*** for the noncomplying element. If the ***Scope*** is approved, the Contractor's Engineer of Record may submit an ***EAR.*** The District Structural Materials Engineer or District Manager-Concrete Production will review the ***EAR*** and make a recommendation of acceptance

or rejection of the noncomplying mass element to the Project Administrator. The District Structural Materials Engineer or District Manager-Concrete Production will notify the Project Administrator of the Department's acceptance or rejection of the Contractor's proposed revisions to the ***MCCP*** with any qualifying requirements or reasons for rejection.

10.3.6 Crack Inspection

(A) Resident Level Responsibilities

10.3.6.1 Crack Inspection

Concrete components must have all visible surfaces inspected for cracks on the following three cycles:

(1) As soon as concrete surfaces are fully visible after casting

(2) Between 7 and 31 days after the component has been burdened with all dead loads, except for loads from components cast or mounted to the deck, and before Class 5 finish has been applied, if required in the Plans.

(3) A minimum of 7 complete days after the bridge is fully open to the public for unrestricted use. Inspection of decks may be an exception to this cycle of inspection since close observation of all surfaces may not be justified if traffic disruption and/or maintenance of traffic costs are excessive as judged by the Project Administrator.

Unless there is a strong suspicion that cracks exist in the faces of buried components, inspection cycle 2 and 3 are not required for these components or for any other component faces that are permanently hidden from view. For underwater components per ***CPAM 10.6***, inspection cycle 2 is not required unless there is strong suspicion of cracks whereas inspection cycle 3 is always required.

Concrete cracks are often only a few mils (1/1000 inch) wide and can be very hard to find. To aid in finding these cracks, use of the following equipment and methods should be considered:

- A magnifying glass
- Artificial light
- Spraying the concrete surface with water or observing it after it has

rained and is still damp

10.3.6.2 Documenting Observations

Document and maintain a record of each crack inspection indicating dates of inspection for all cast-in-place concrete elements, including those not exhibiting cracks at the time of inspection. Document all concrete cracks including width, length, depth (if possible), termination points, and location of cracks relative to a fixed reference point. A pocket microscope must be used to measure cracks 25 mils wide or less. Cracks that are less than 4 mils wide (hairline cracks) require less rigorous documentation as explained below. For bridge decks, perform all final deck crack measurements, after profile grinding and before transverse grooving. With concurrence of the District Materials Office, request that selected cracks be cored by the Contractor when an accurate measurement of crack depth cannot be determined by use of a mechanical probe. Consult with the District Materials Office and/or the State Materials Office for guidance and approval of location, depth and size of cores so that the most information will be gathered with the least effort and damage to the concrete. Documented cracks shall be monitored at an appropriate interval such as once a month as determined by the Project Administrator with input from the Engineer of Record (EOR) and State Construction Structures Engineer to determine if they are dormant or are active and continuing to grow. The date that cracks were first observed, and if known, what caused them shall be documented. Immediately report all cracks to the Project Administrator so that their status can be addressed appropriately.

Detailed sketches or “Crack Maps” shall be prepared to scale in order to document the width, length, depth and location of all cracks discovered as specified above, including the name of the Inspector, date, weather conditions and other pertinent circumstances under which the cracks were discovered. Hairline cracks may be drawn in their approximate location on the Crack Map with a reference dimension from the edge of a component face to one end of the crack. For hairline cracks, location of both termination points, crack length, and depth are not required. If cracks are found, the CEI Inspector must notify the Project Administrator and/or Senior Project Engineer to determine what action should be taken to address the cracking.

All crack maps, inspection documentation and related documents must be entered into the Electronic Document Management System (EDMS) before the project is complete.

10.3.6.3 Disposition of Cracks

Follow the correct crack disposition administrative process as described in the ***Crack Inspection and Repair Flow Chart, Attachment 10.3.6***, for structural and nonstructural cracks. The Senior Project Engineer or Project Administrator shall determine if the cracks are structural or nonstructural. See ***Specification 400-21*** for a definition of structural and nonstructural cracks. If technical assistance is needed to do this, consult the Construction Project Manager, EOR and District Structures Design Engineer for Category 1 bridges or the State Construction Structures Engineer for Complex Superstructure Members of Category 2 bridges. Cracks in the top slab of culverts that will be covered by embankment do not require repair as long as the EOR and District Structures Design Engineer agree that repair is unnecessary. For Category 2 bridges, the State Construction Structures Engineer will make the final determination of structural or nonstructural if the CEI staff is unable to do so.

If cracks are determined to be nonstructural, then the specific corrective action required of the Contractor is listed in Table 1 or 2 of ***Specification 400-21***. However, to select the correct table listing, ***Specification 400-21*** requires the Project Administrator to determine a number of parameters including a representative surface area that a group of cracks falls within for measuring the significance of the cracks. The ***Specification*** refers to this surface area, measured in square feet, as a LOT.

Within a LOT, the greater the surface area is of all the cracks added together, the greater is the significance of the cracking as well as the corresponding action required to repair the cracks. The Project Administrator will have to use judgment in determining the area of a LOT and ***Section 10.3.6.4*** provides guidance for how best to do this. However, when a crack is too isolated to be grouped with other cracks to form a LOT (see LOT definition in ***10.3.6.4***) then by using the respective table in ***Specification 400-21***, a repair can be determined by first computing the average crack width (see Key of Abbreviations and Footnotes, Footnote (1), in ***Specification 400-21*** for how to compute the average crack width).

Once the average crack width is known, then select the appropriate table row for Crack Width Range that the average crack width falls within. Where this range horizontally intersects the appropriate table column for the Cracking Significance Range that is labeled "Isolated," will be the table entry for the required repair. When a LOT consists of more than one crack, the Project Administrator will determine the cracking significance and required repair for each crack by using ***Tables 1 or 2***. This shall be done by first selecting the applicable Elevation Range then select the applicable Crack Width Range that the crack width of each individual crack falls within. Next, using the selected Crack Width Range, select the corresponding Cracking Significance Range in accordance with ***Specification 400-21.3.1***, to identify the required repair method.

For structural cracks, the Contractor must submit an Engineering Analysis Scope, signed and sealed by the Contractor's Engineer of Record, to determine the strength and durability of the Contractor's proposed repair. Once the Scope is approved an Engineering Analysis Report (EAR) may be submitted. If the project is a Category 1 bridge or a miscellaneous structure, the District Structures Design Office will review the Contractor's proposed repair as depicted in the EAR. If the project is a Category 2 bridge, the State Construction Office will review the Contractor's proposed repair as depicted in the EAR. The ultimate decision to accept or reject the Contractor's proposed repair rests with the District Construction Engineer who shall take into consideration the recommendations of the State Construction Structures Engineer or District Structures Design Engineer.

For all concrete cracking, it is the CEI's responsibility to utilize independent engineering judgment regarding LOT selection, significance and proposed disposition of all cracked concrete.

10.3.6.4 LOT Size Determination

(a) Deck Surfaces - Determine LOT size as Follows (see ***Attachment 10.3.6-1, LOT Size Determination Examples***, for example drawings):

- Measure the "Longitudinal Crack Range ($\mathbf{L_{cr}}$)" and the "Transverse Crack Range ($\mathbf{T_{cr}}$)" when two or more cracks exist.

Where: **L_{cr}** is the longitudinal distance from the first crack to the last crack in the LOT as measured by a tape in direct contact with the concrete surface and on an alignment parallel to the centerline of construction. Since cracks usually have an irregular alignment that is not a straight line, the distance from the first to last crack should start at the point on the first crack that represents the farthest possible point out and end at a point on the last crack that is the farthest out. This results in the maximum value of distance between the first and last crack.

T_{cr} is the transverse distance from first to last crack in the LOT as measured by a tape in direct contact with the concrete surface and on an alignment that is 90 degrees to the centerline of construction.

- Multiply **L_{cr}** times **T_{cr}** to get the "Preliminary Area" (**A_p**) of the LOT.
- If **A_p** is less than or equal to 100 square feet (ft^2) then use 100 ft^2 for the "Final Area" (**A_L**) of the LOT.
- If **A_p** is greater than 100 ft^2 but less than 400 ft^2 then use **A_p** for **A_L**.
- If **A_p** is greater than 400 ft^2 then create 2 LOTs.
- If **A_p** is greater than 800 ft^2 then create 3 LOT's and so on.

(b) Surfaces Other Than Decks (footings, columns, caps, walls, etc.) – A LOT must be contained within a single concrete face of a member (side, top, or bottom). Determine LOT size as Follows (see ***Attachment 10.3.6-1*** for example drawings):

- For vertical or predominantly vertical faces (sides of footings, columns and caps, etc), measure the Crack Range of the height dimension (**H_{cr}**) and the Crack Range of the width dimension (**W_{cr}**) when two or more cracks exist.

Where: **H_{cr}** is the distance from the first crack to the last crack as measured by a tape in direct contact with the concrete

surface, including curved surfaces, and on an alignment that is vertical.

W_{cr} is the distance from the first crack to the last crack as measured by a tape in direct contact with the concrete surface, including curved surfaces, on a width alignment that is level.

- Multiply **H_{cr}** times **W_{cr}** to get the **A_p** of the LOT.
- If **A_p** is less than or equal to 25 ft^2 then use 25 ft^2 for the **A_L** of the LOT.
- If **A_p** is greater than 25 ft^2 but less than or equal to 100 ft^2 then use **A_p** for **A_L**.
- If **A_p** is greater than 100 ft^2 then create 2 LOTs.
- If **A_p** is greater than 200 ft^2 then create 3 LOTs and so on.
- For horizontal and predominately horizontal faces (tops and bottoms of footings and caps, etc.), measure the Crack Range of the longitudinal (parallel to the centerline of construction for the bridge) dimension (**L_{cr}**) and the Crack Range of the transverse (90 degrees to centerline of construction) dimension (**T_{cr}**) when two or more cracks exist.

  Where: **L_{cr}** is distance from the first crack to the last crack as measured by a tape in direct contact with the concrete surface, including curved surfaces, and on an alignment that is longitudinal.

  T_{cr} is the distance from the first crack to the last crack as measured by a tape in contact with the concrete surface, including curved surfaces, and on an alignment that is transverse.

Determine LOT size for horizontal surfaces as specified for vertical surfaces above, using **L_{cr}** and **T_{cr}** instead of **H_{cr}** and **W_{cr}**.

10.3.7 Notifying the District Materials Office of Concrete Placements, Pre-operations Meetings, Reduced Concrete Sampling Frequencies and the Occurrence of Lumps and Balls

(A) Resident Level Responsibilities

10.3.7.1 Concrete Placements

The Project Administrator shall notify the District Structural Materials Engineer or District Manager-Concrete Production of the anticipated date and time of a placement whenever there is a cast-in-place (CIP) concrete placement that requires Construction Training and Qualification Program (CTQP) Qualified Concrete Field Technicians to perform field sampling and testing of concrete. Provide notification at least 48 hours prior to the beginning of the concrete placement whenever possible. Include in the notification names of technicians performing Verification Testing (VT) on behalf of the Department and if possible names of technicians in the Contractor's Quality Control Plan (CQCP) as listed in the Departments Materials Acceptance and Certification System (MAC) that will be performing field sampling and testing of the concrete.

10.3.7.2 Pre-operations Meetings

The Project Administrator shall notify the District Structural Materials Engineer or District Manager-Concrete Production or designee at least 5 days prior to pre-operations meetings at which Department, CEI, Contractor, Concrete Producer and other involved personnel discuss a planned first-time placement of a significant CIP concrete component for any project (bridge, roadway, drainage, etc.). The Project Administrator should encourage the Contractor to invite a representative of the concrete producer to attend the pre-operations meeting.

10.3.7.3 Reduced Concrete Sampling Frequencies

Specification 346-9.2.1, allows the Contractor to reduce the frequency of concrete acceptance testing from every 50 cubic yards to every 100 cubic yards when a series of consecutive strength tests meet given criteria per the ***Specifications***. The number of consecutive strength tests required for reduced frequency varies depending upon the class of concrete being used.

Requests for reduced sampling frequency must be approved by the Engineer and are allowed if mix designs are the same and produced at the same production facility on a given Contract.

Prior to the first concrete placement of the project, the Project Administrator shall make the Contractor aware of this specification provision. When the Contractor requests a reduced sampling frequency, the Project Administrator shall obtain District Materials Office approval of the request prior to responding to the Contractor.

Once approval is given and the Contractor commences sampling at the reduced frequency, the Project Administrator shall monitor the Contractor's sampling and testing performance in order to verify that the specification criteria are being consistently met. If specification criteria are not being met with reduced sampling frequency, a return to the 50 cubic yard frequency will be instituted.

10.3.7.4 Occurrence of Lumps and Balls

When concrete is delivered to the project containing lumps and balls, which require removal prior to placement, the Project Administrator shall notify the District Materials Office as soon as possible. Conveyance equipment used during concrete placements with slump targets of 6 inches or greater are required to have grates installed for capturing lumps and balls.

10.3.8 Observing Concrete Consistency

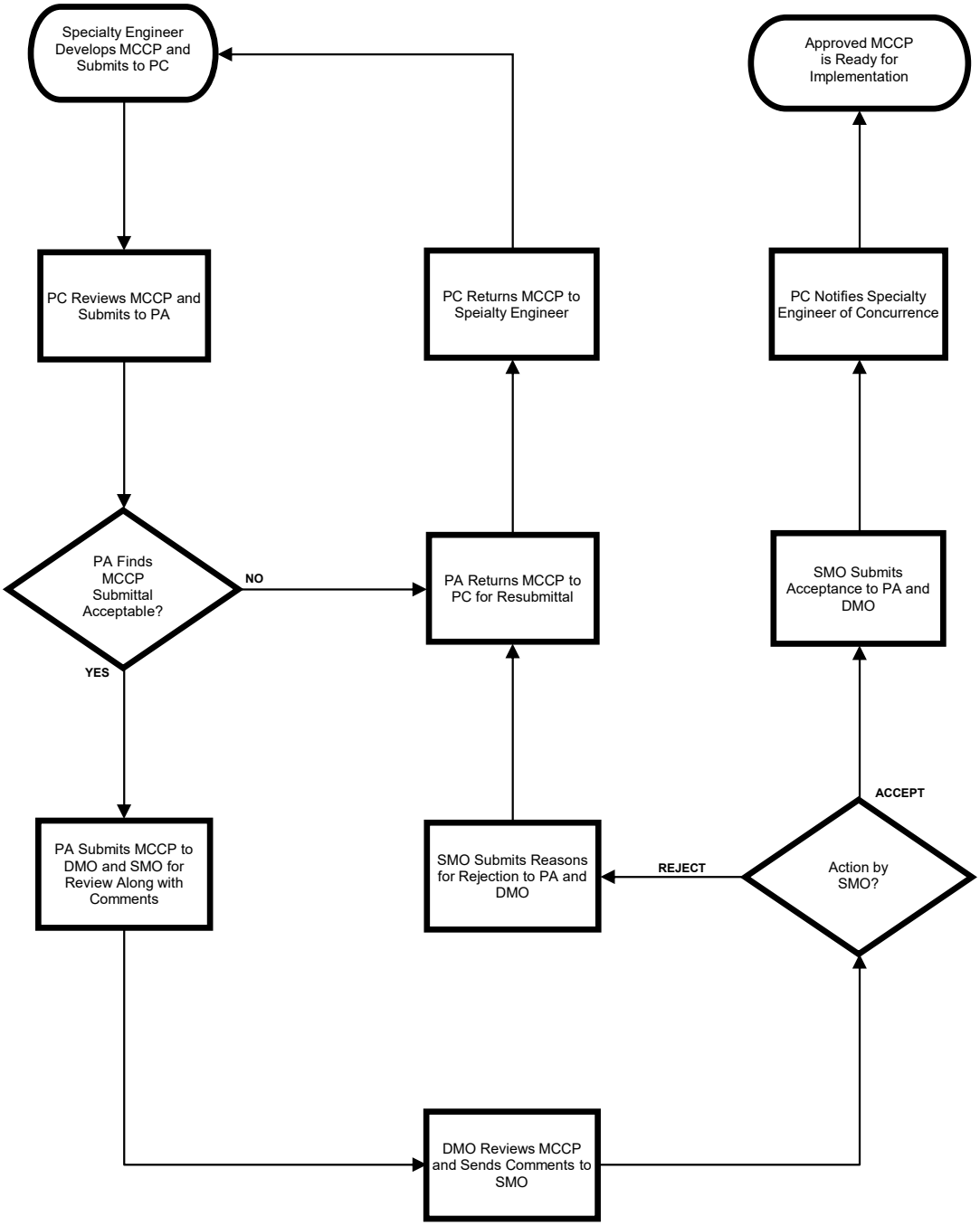
(A) Resident Level Responsibilities

A CTQP qualified Concrete Field Technician (CEI or Contractor) shall observe the consistency of the concrete as discharge begins for each truck arriving at the project site. The technician shall look for signs of excessive dryness or wetness and if in the technician's judgment, one of these conditions exists then discharge shall be stopped and a slump test shall be performed to verify that the concrete consistency is within the slump tolerance range. This shall also be done for loads that are scheduled for acceptance testing. If the slump test shows an out of tolerance condition then, per the specification, the load is considered as rejected. Placement of

concrete that has already commenced prior to a failing plastic properties test will be accepted at reduced pay.

Prior to the start of any concrete placement on the project, the PA shall consult with the Contractor as to which technicians (CEI, Contractor or both) will be assigned the responsibility for observing concrete consistency as required above. Once an agreement is reached, the PA shall verify that the assigned technician, whether CEI or Contractor, is present and observing the concrete consistency during the initial discharge of all concrete loads.

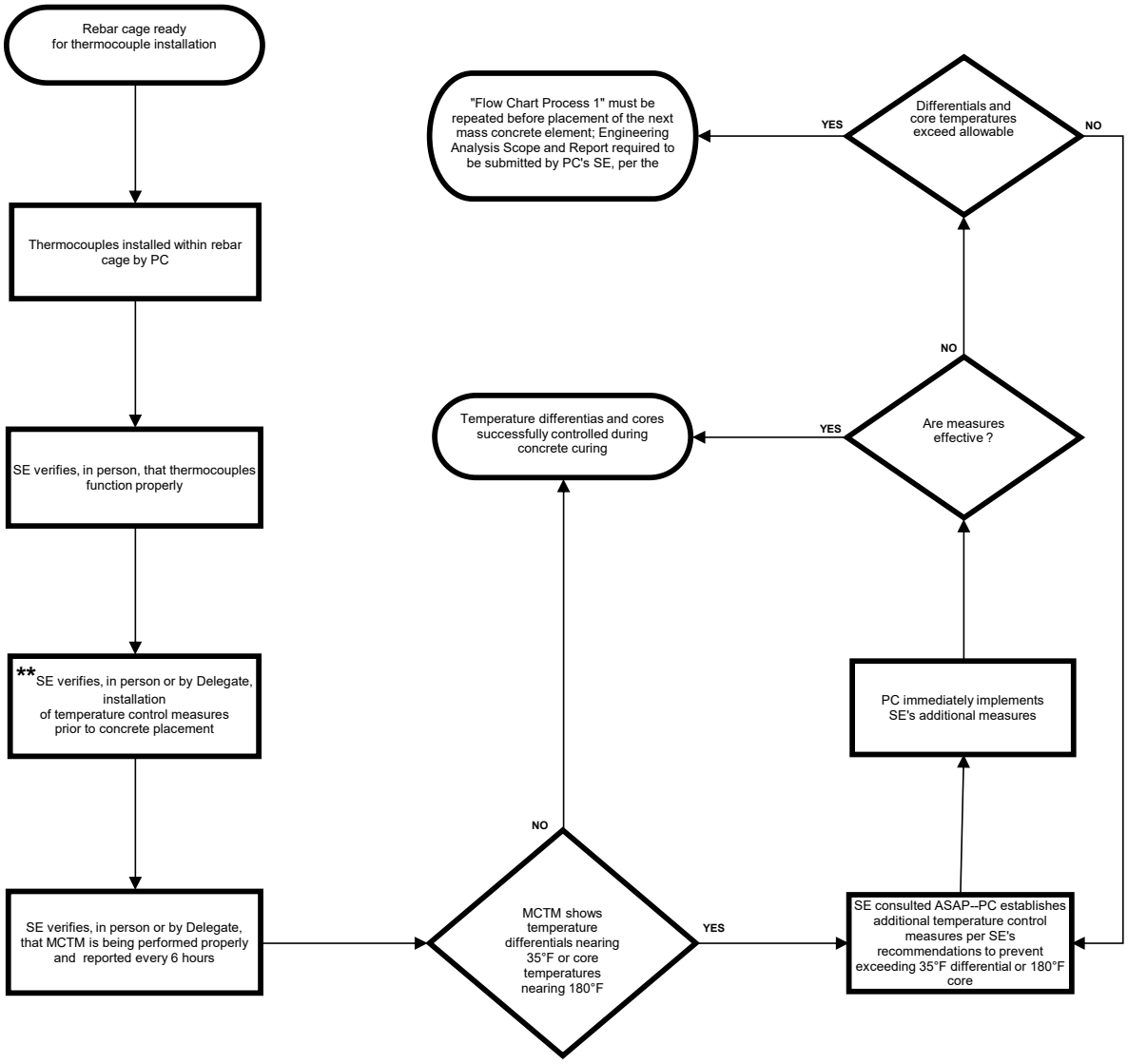
Attachment 10-3-5-1
CPAM SECTION 10.3 -- FLOW CHART PROCESS 1



ACRONYM KEY

DMO ------ District Materials Office
MCCP -- Mass Concrete Temperature Control Plan
PA --- Project Administrator
PC --- Prime Contractor
SMO ---- State Materials Office

Attachment 10-3-5-2
CPAM SECTION 10.3 -- FLOW CHART PROCESS 2
CEI VERIFICATION * PROCESS FOR CONTRACTOR MASS CONCRETE TEMPERATURE MONITORING



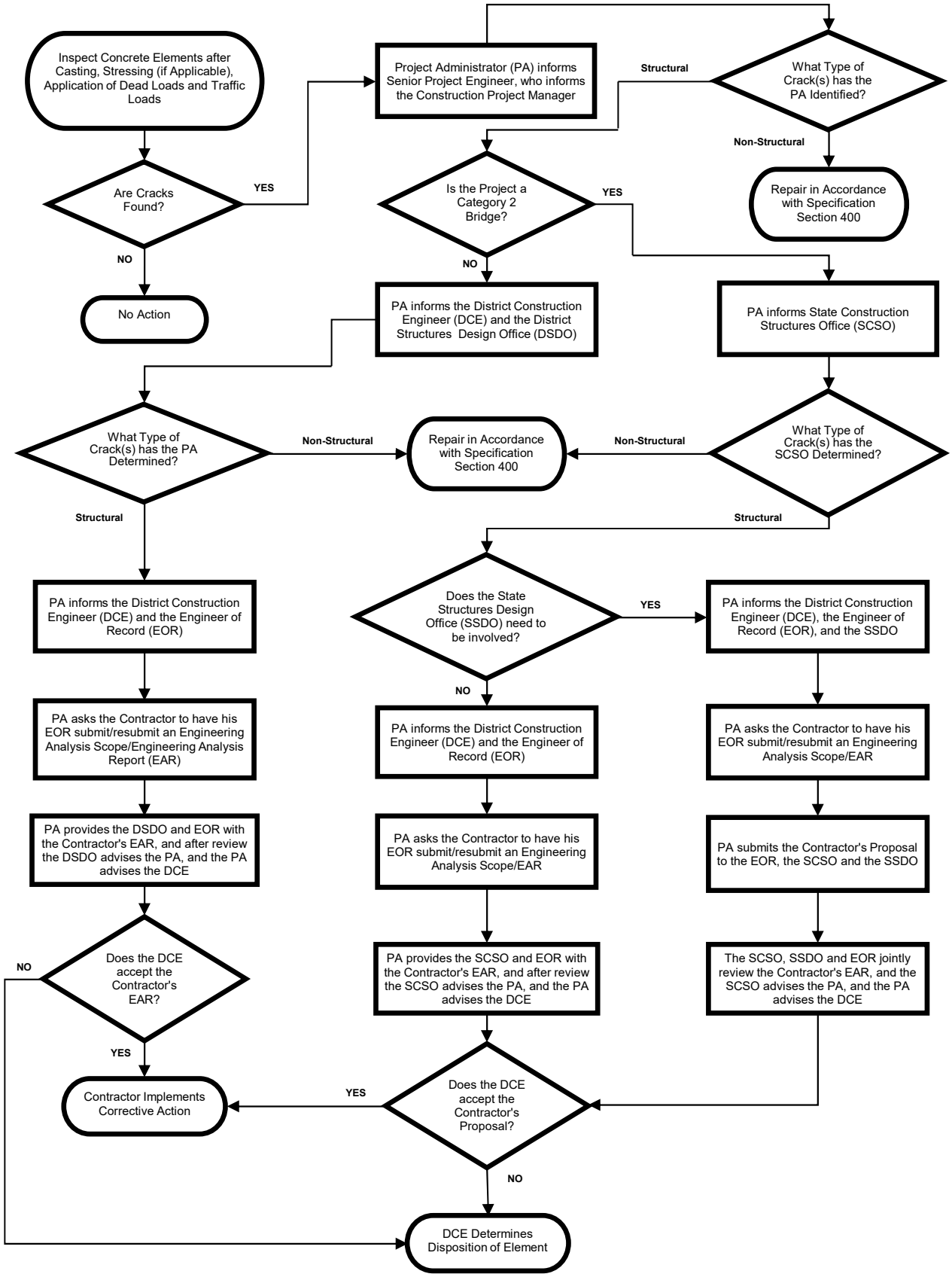
ACRONYM KEY

CEI ------- Construction Engineering and Inspection
MCTM --- Mass Concrete Temperature Monitoring
PC -------- Prime Contractor
SE -------- Specialty Engineer

* Each step in this process should be verified by CEI staff

**Examples of Temperature Control Measures include insulating blankets, external heat application and cooled mixing water

Attachment 10.3.6
CPAM SECTION 10.3 -- FLOW CHART
CRACK INSPECTION AND REPAIR

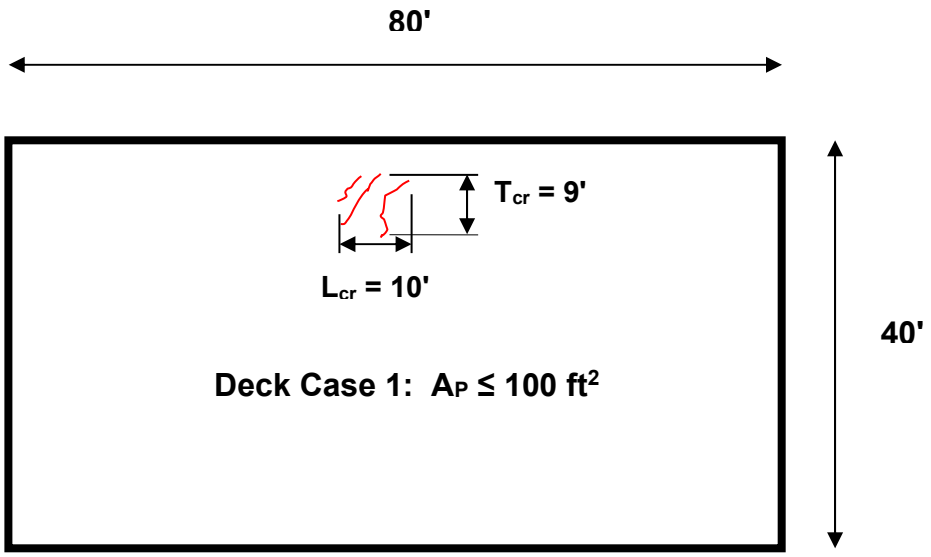


CPAM Attachment 10.3.6-1
LOT Size Determination Examples

ACRONYM KEY

A_L -- Final LOT Area (ft^2)
A_P -- Preliminary LOT Area (ft^2)
H_{cr} -- Distance from first crack to last Crack on a vertical height alignment within a LOT
L_{cr} -- Distance from first crack to last Crack on a longitudinal alignment within a LOT
T_{cr} -- Distance from first crack to last Crack on a transverse alignment within a LOT
W_{cr} -- Distance from first crack to last Crack on a level width alignment within a LOT

DECKS

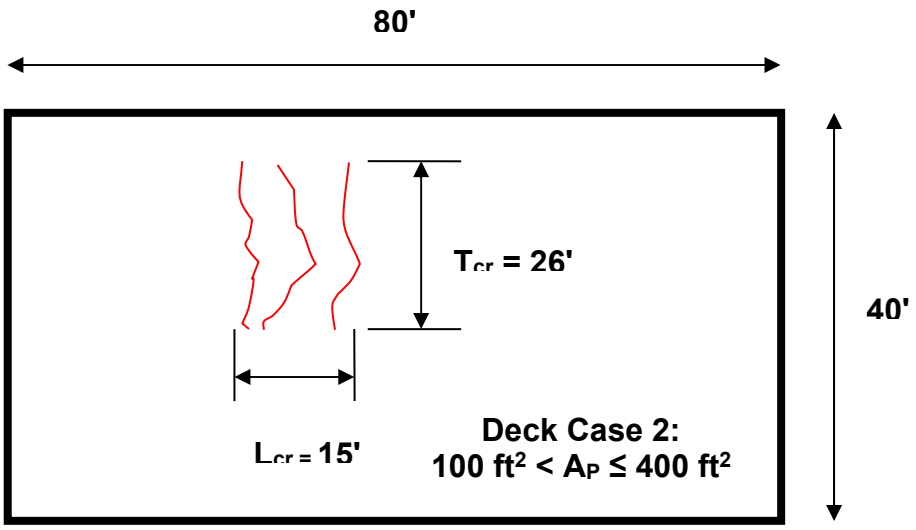


Bridge Deck Plan View

Lot Size Determination for Deck Case 1: $A_P \leq 100\ ft^2$

$A_P = L_{cr}$ X T_{cr} = 10' X 9' = 90 ft^2 < 100 ft^2,

Therefore A_L = 100 ft^2

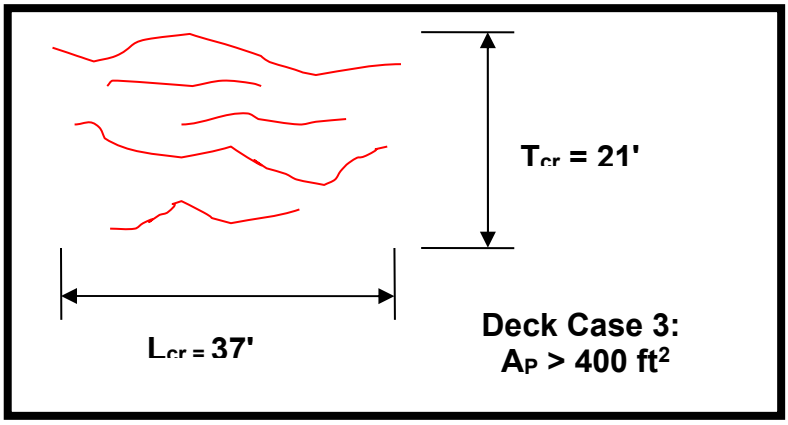


Bridge Deck Plan View

Lot Size Determination for Deck Case 2: 100 ft² < A_P ≤ 400 ft²

$A_P = L_{cr} \times T_{cr}$ = 15' X 26' = 390 ft² < 400 ft²,

Therefore, A_L = 390 ft²



Bridge Deck Plan View

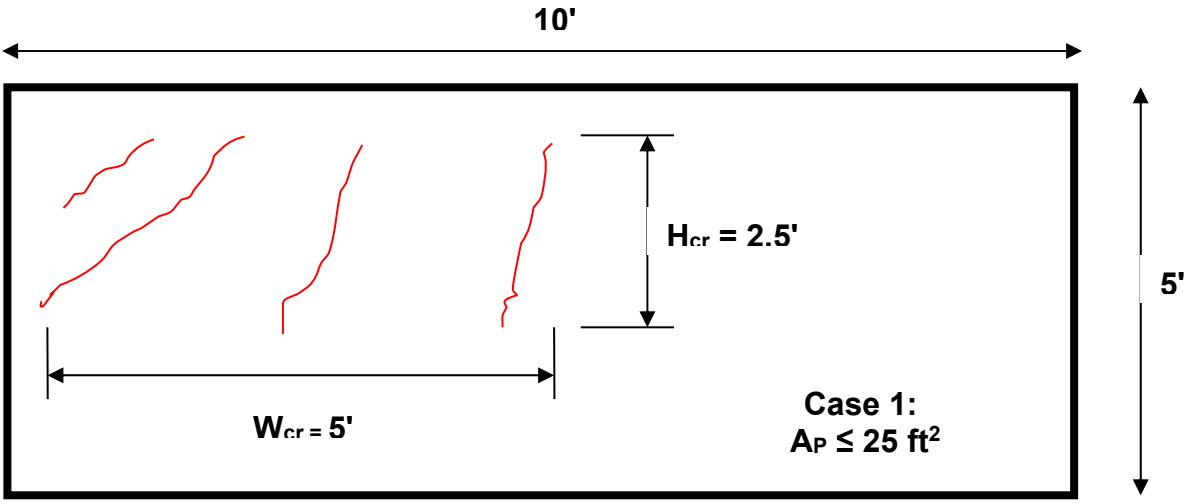
Lot Size Determination for Deck Case 3: A_P > 400 ft²

$A_P = L_{cr} \times T_{cr}$ = 37' X 21' = 777 ft² > 400 ft²,

Therefore, Use 2 LOT's each with A_L less than or equal to 400 ft²

FOOTINGS, COLUMNS, CAPS, ETC.

NOTE: LOT size may never exceed the area of a single component face

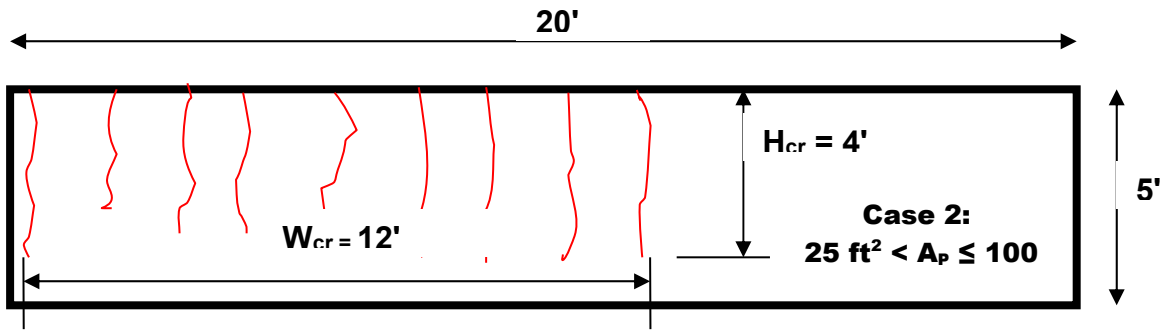


Vertical Face of a Footing, Column or Cap

Lot Size Determination for Case 1: $A_P \leq 25\ ft^2$

$A_P = H_{cr} \times W_{cr} = 2.5' \times 5' = 12.5\ ft^2 < 25\ ft^2$,

Therefore, $A_L = 25\ ft^2$

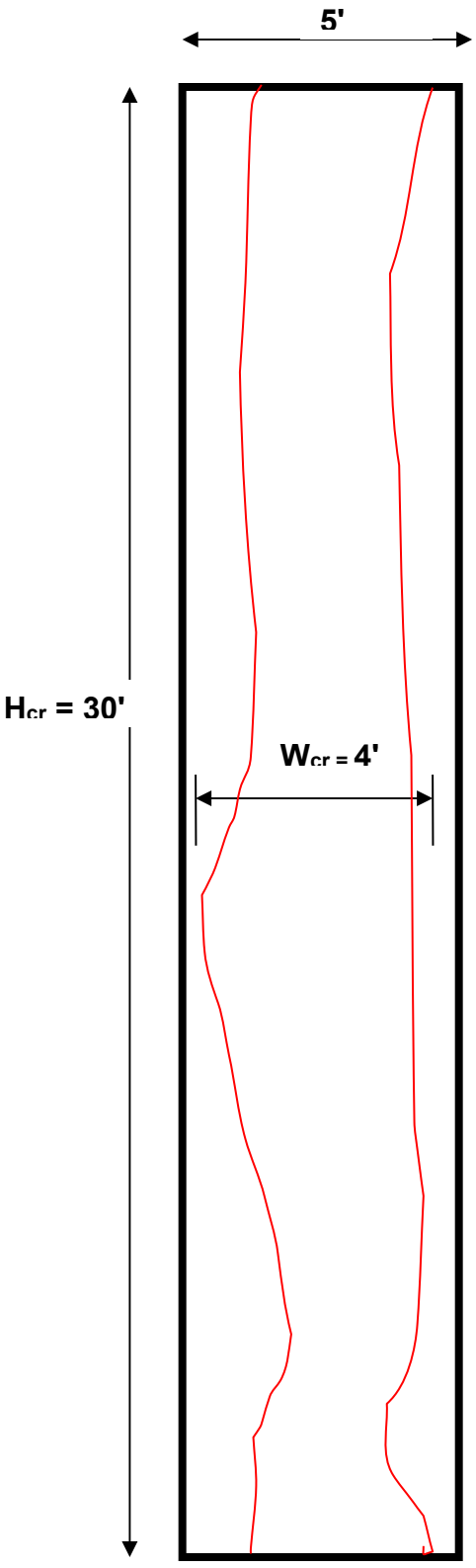


Vertical Face of a Footing, Column or Cap

Lot Size Determination for Case 2: $25\ ft^2 < A_P \leq 100\ ft^2$

$A_P = H_{cr} \times W_{cr} = 4' \times 12' = 48\ ft^2 < 100\ ft^2$,

Therefore, $A_L = 48\ ft^2$



Case 3:
A_P > 100 ft^2

Lot Size Determination for Case 3:
A_P > 100 ft^2

$A_P = H_{cr} \times W_{cr}$ = 30' X 4' = 120 ft^2 > 100 ft^2,

Therefore, Use 2 LOT's each with A_L less than or equal to 100 ft^2

NOTE: A_L for horizontal faces of footings, columns, caps, etc. is computed as shown here for vertical faces except that the dimensions are L_{cr} and T_{cr}

Vertical Face of a Footing, Column or Cap