

ADDENDUM NUMBER TWO

for

DARLA MOORE SCHOOL OF BUSINESS CONSTRUCTION – BP-2 STRUCTURE
UNIVERSITY OF SOUTH CAROLINA
STATE PROJECT NUMBER H27-6069-AC-2

DATE OF ISSUE: January 20, 2012

TO: ALL BIDDERS OF RECORD

This Addendum is issued pursuant to the Conditions of the Contract and is hereby made part of the Contract Documents. The addendum serves to clarify, revise, and supersede information in the Project Manual, the Drawings, and previously issued Addenda. The Bidder shall acknowledge receipt of this Addendum in the appropriate space on the Bid Form. Failure to do so may subject the Bidder to disqualification. A list of attachments, if any, is part of this document.

BIDDER SHALL ACKNOWLEDGE RECEIPT OF ADDENDUM IN THE SPACE PROVIDED ON THE BID FORM. FAILURE TO DO SO MAY CONSTITUTE AN INFORMALITY IN THE BID.

This addendum consists of 6 pages and the following attachments:

SE-330	Lump Sum Bid Form (Revised)
A-SK-021:	Slab Edge Revision at Stair 07 – Level 0
A-SK-022:	Slab Edge Revision at Stair 08 – Level 0
A-SK-023:	Slab Edge Revision at Stair 07 & 08 – Level 1
A-SK-024:	Slab Edge Revision at Café – Floor Sink Drains – Level 2
A-SK-025:	Slab Edge Revision at Control Room 101A – Level 1
A-SK-026:	Slab Edge Revision at Planters – Level 2
A-SK-027:	Floor Boxes in Slab
S-SK-019:	Foundation Plan – Level 0.5 Tunnel and Auditorium
S-SK-020:	Framing Plan – Level 1 – Zone C
S-SK-021:	Foundation Sections and Details
S-SK-022:	Foundation Sections and Details
S-SK-023:	Foundation Sections and Details
S-SK-024:	Foundation Sections and Details
S-SK-025:	Framing Sections and Details
S-SK-026:	Framing Plan – Level 2 – Zone C
S-SK-027:	Framing Plan – Level 1 – Zone F
S-SK-028:	Framing Plan – Level 1 – Zone C

A. CHANGES TO BIDDING REQUIREMENTS:

<u>Item No.</u>	<u>Description</u>
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- | | |
|----|--|
| 1. | Delete the SE-330 Bid Form included in the project manual and replace with the attached revised SE-330 Bid Form. |
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B. GENERAL:

<u>Item No.</u>	<u>Description</u>
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- | | |
|----|--|
| 1. | Refer to specification section 01 10 00 Summary, paragraph 1.3: The intent of phasing requirements is to insure that the overall project schedule is maintained throughout the course of work of all bid packages. The BP-2 Contractor shall be required to prioritize completion of all structural work from Grid "S" to "L", including slab on deck, to allow the BP-3 Contractor to commence installation of exterior enclosure components at the eastern portion of the structure while completion of the BP-2 Contractor's structural work continues beyond Grid "L". |
| 2. | Slab-block outs for floor boxes: Revise item no. 22 section C of Addendum no. 1. Refer to A-SK-027. The BP- 2 Contractor will frame and block-out slab openings after coordination with the BP-3 Contractor prior to slab pour. The BP-2 Contractor will be required to remove block-outs and provide temporary protection at box locations per OSHA requirements. Refer to structural drawing S4101 for typical framing details related to floor openings. |
| 3. | Electrical Sleeves: Provide a quantity of sixty-four; six-inch diameter sleeves each 2'-0" long for installation in cast-in-place concrete walls provided in Bid Package 2. (The sleeves are intended to support electrical and communication system services that will be required under Bid Package 3). The exact location of these sleeves shall be coordinated with the final Bid Package 3 Construction Documents, and Bid Package 3 Contractor. |
| 4. | Mechanical and Plumbing Sleeves: Provide the quantity of sleeve seal systems noted below for installation in cast-in-place concrete walls provided in Bid Package 2. (The sleeves systems are intended to support mechanical and plumbing system services that will be required under Bid Package 3). The exact location of these sleeves and sleeve seal systems shall be coordinated with the final Bid Package 3 Construction Documents, and Bid Package 3 Contractor. |

Sleeve Seal Systems	
Qty	Description
1	58" Dia. FRP Duct
4	4" Conduit for refrigerant piping
2	6" Heating Hot Water + 3" thick insulation
2	6" Chilled Water + 3" thick insulation
1	8" Steam line + 5" thick insulation
2	10" Chilled Hot Water + 3" thick insulation
1	2" Natural Gas Line
2	8" Water mains
1	4" Condensate return line + 5" thick insulation

Sleeves	
Qty	Description
6	3" Sanitary/RD/RSD Pipe
12	4" Sanitary/RD/RSD Pipe
8	6" Sanitary/RD/RSD Pipe
6	8" Sanitary/RD/RSD Pipe
2	12" Sanitary/RD/RSD Pipe
6	15" Sanitary/RD/RSD Pipe
1	8" Steam line + 5" thick insulation
1	4" Condensate return line + 5" thick insulation

C. CHANGES TO TECHNICAL SPECIFICATIONS AND DRAWINGS:

SPECIFICATIONS

<u>Item No.</u>	<u>Description</u>
1.	Specification Section 03 33 00 – Architectural Concrete: Include integral waterproofing admixture in the design mix for architectural concrete. Refer to highlighted updates on section 1.4, 1.5E, 1.5C, 1.5F, 1.5H, 2.1E.4, 2.1K.1, 2.1K.2, 2.1K.3, 3.7D.3, 3.7E, 3.9D.

DRAWINGS

<u>Item No.</u>	<u>Description</u>
1.	Plan Sheet A1600, A1600C: Refer to attached sketch A-SK-021 – Level 0 slab edge plans. Revised slab edge at Performance Hall 101 & Stair 07/08.
2.	Plan Sheet A1600, A1600C: Refer to attached sketch A-SK-022 – Level 0 slab edge plans. Revised slab edge at Stair 08.
3.	Plan Sheet A1610, A1610C: Refer to attached sketch A-SK-023 – Level 1 slab edge plans. Revised slab edge at Stair 07 & 08.
4.	Plan Sheet A1620, A1620C, A1620D: Refer to attached sketch A-SK-024 – Level 2 slab edge plans. Revise slab edge plan at Café – floor sink drains.
5.	Plan Sheet A1610, A1610C: Refer to attached sketch A-SK-025 – Level 1 slab edge plans. Slab edge revision at Control Room 101A and Follow Spot platform 101B.
6.	Plan Sheet A1620, A1620E: Refer to attached sketch A-SK-026 – Level 2 slab edge plan. Provide twenty six (26) additional slab openings for floor drains at planter area. Final location of drain penetrations shall be coordinated with final Bid Package 3 construction documents and BP3 Contractor. Provide 6" concrete curb as shown in detail 02/A-SK-026.
7.	A-SK-027: Refer to Section B General, Item 1.
8.	Note sheet S0101: Structural note 13 under Structural Steel has been removed with subsequent notes renumbered to maintain sequence. Structural note 13 under Structural Steel has been revised by removing the following sentence, "THE CAMBER OF STEEL MEMBERS SHALL BE VERIFIED IN THE SHOP AND THE FIELD PER THE SPECIFICATIONS". This note has been renumbered to 12 per above.
9.	Plan sheet S1100C: Revised top of footing elevation from 10'-8" to 15'-4" at grid J-10.

10. Plan sheet S1100F: Revised top of footing elevation from 10'-8" to 15'-4" at grid J-3.
11. Plan sheet S1100.1A: Revised shape of stairs-on-grade at auditorium. Refer to S-SK-019.
12. Plan sheet S1110C: Revised shape of stairs-on-grade at auditorium. Refer to S-SK-020. Added thickened slab underneath BP3 masonry that supports BP3 follow spot platform. Refer to S-SK-028.
13. Plan sheet S1120F: Revised shape of masonry wall and footing at auditorium. Refer to S-SK-027.
14. Plan sheet S1120A: Revised topping slab elevations from +20'-8" to +20'- 7 1/4".
15. Plan sheet S1120B: Revised topping slab elevations from +20'-8" to +20'- 7 1/4".
16. Plan sheet S1120C: Revised topping slab elevations from +20'-8" to +20'- 7 1/4". Revised shape of topping slab at Cafeteria. Refer to S-SK-026.
17. Plan sheet S1120D: Revised topping slab elevations from +20'-8" to +20'- 7 1/4". Revised shape of topping slab at Cafeteria. Refer to S-SK-026.
18. Detail sheet S2106: Revised detail 01 associated with curved auditorium stairs-on-grade. Refer to S-SK-021. Revised detail 02 associated with curved auditorium stairs-on-grade. Refer to S-SK-022. Revised detail 03 associated with curved auditorium stairs-on-grade. Refer to S-SK-023. Revised detail 04 associated with curved auditorium stairs-on-grade. Refer S-SK-024.
19. Detail sheet S4105: New detail 16 associated with curved auditorium stairs-on-grade. Refer to S-SK-025.
20. Framing plan and detail sheet S6110: Add notation to details 03, 05, and 10 to indicate that palmetto planter masonry and related reinforcing/anchorage are a part of bid package 3.
21. Slab Edge Plans Level 2 through Level 4 (A1620 through A1640D): Remove general note #2. Revise general note #3 to read: "Provide floor openings as shown in the documents. The exact location shall be coordinated with the final Bid Package 3 construction documents and Bid Package 3 Contractor". Revise general note #5 to read: "Refer to sheet A1620E for floor drain detail. Exact location of floor drain penetrations shall be coordinated with the final Bid Package 3 construction documents and Bid Package 3 Contractor". Revise general note #9 to read: "Skylight curbs shall be provided by Bid Package 2 Contractor". Revise general note #10 to read: "Planter curbs shall be provided by Bid Package 2 Contractor".

D. BIDDERS RFI'S:

1. Is the structural package intended to include all imbeds and misc. metals (bollards, hoist beams, stair nosing, etc...)?

Response: Embeds detailed on the sheets will be required for the erection of the frame. Any embeds defined on plans should be provided. It is the intent for the hoist beams to be included in the package. Embeds for stair nosing per detail 09/A4291 and bollards per A4191 are part of the structural package.

2. Please clarify which masonry is included in BP2. There are notes next to details stating that the specified masonry is in BP3. Other masonry details do not have that note. There are further masonry details shown as NIC which appear to be integral with concrete which we believe to be part of BP2.

Response: All masonry is part of BP3 package. Coordination with BP3 contractor is required at Level 1 along planter walls due to sequencing of reinforcing and fire-proofing.

3. Notes indicate to provide D2L anchors where indicated in sections and details. "Stick welding" of reinforcing is not permitted." Plan page S4101 typical details 03 and 08 states to provide "1/2" dia. deformed bar anchors @ 18" welded to the bent plate". Which is correct?

Response: The D2L (deformed bar) anchors are to be automatically welded with a stud and ferrule. The note reinforces that standard bar may not be stick welded to the plate.

4. Spec section 03 30 00 part 3.14 mentions use of a liquid floor treatment. Can you please clarify if this treatment is in BP2? If so, what is it and where is it applied?

Response: Liquid floor treatment is part of BP2. Refer to section 03 30 00 part 2.9 for product requirements. Attached is a list of areas/rooms where this will be applied (where SC-1 for sealed concrete is noted as floor finish).

5. In reference to the small lecture room and the larger performance hall in the lower level of the building, the structural drawings and the architectural drawings differ on how many rows of seating there will be. Compare pages S1100.1A to A1600C and S1100F to A1600F. Please clarify.

Response: The number of seating rows is the same between structural and architectural drawings. In the structural drawings on sheets S1110C and S1110F, there is an "X" within the lower levels of the auditorium indicating that the remainder of the seating rows is shown below on S1100.1A. There is also a note on S1110C and S1110F stating "SEE S1100.1" for continuation of the auditorium seats. Counting the total number of rows shown on the structural drawings will give the same total number being shown in the architectural drawings.

END OF ADDENDUM

SE-330 – LUMP SUM BID BID FORM

Bidders shall submit bids on only Bid Form SE-330.

BID SUBMITTED BY: _____

(Bidder's Name)

BID SUBMITTED TO: University of South Carolina

(Owner's Name)

FOR PROJECT: NAME Darla Moore School of Business Construction - Bid Package 2: Structure

PROJECT NUMBER H27-6069-AC-2

OFFER

§ 1. In response to the Invitation for Construction Bids and in compliance with the Instructions to Bidders for the above-named Project, the undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into a Contract with the Owner on the terms included in the Bidding Documents, and to perform all Work as specified or indicated in the Bidding Documents, for the prices and within the time frames indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

§ 2. Pursuant to Section 11-32-3030(1) of the SC Code of Laws, as amended, Bidder has submitted Bid Security as follows in the amount and form required by the Bidding Documents:

☐ Bid Bond with Power of Attorney ☐ Electronic Bid Bond ☐ Cashier's Check

(Bidder check one)

§ 3. Bidder acknowledges the receipt of the following Addenda to the Bidding Documents and has incorporated the effects of said Addenda into this Bid:

ADDENDUM No: _____

§ 4. Bidder accepts all terms and conditions of the Invitation for Bids, including, without limitation, those dealing with the disposition of Bid Security. Bidder agrees that this Bid, including all Bid Alternates, if any, may not be revoked or withdrawn after the opening of bids, and shall remain open for acceptance for a period of 60 Days following the Bid Date, or for such longer period of time that Bidder may agree to in writing upon request of the Owner.

§ 5. Bidder herewith offers to provide all labor, materials, equipment, tools of trades and labor, accessories, appliances, warranties and guarantees, and to pay all royalties, fees, permits, licenses and applicable taxes necessary to complete the following items of construction work:

§ 6.1 BASE BID WORK *(as indicated in the Bidding Documents and generally described as follows):* All Civil work as shown on bid documents,

_____, which sum is hereafter called the Base Bid.

(Bidder - insert Base Bid Amount on line above)

SE-330 – LUMP SUM BID BID FORM

§ 8. LIST OF MANUFACTURERS, MATERIAL SUPPLIERS, AND SUBCONTRACTORS OTHER THAN SUBCONTRACTORS LISTED IN SECTION 7 ABOVE (FOR INFORMATION ONLY): Pursuant to instructions in the Invitation for Bids, if any, Bidder will provide to Owner upon the Owner's request and within 24 hours of such request, a listing of manufacturers, material suppliers, and subcontractors, other than those listed in Section 7 above, that Bidder intends to use on the project. Bidder acknowledges and agrees that this list is provided for purposes of determining responsibility and not pursuant to the subcontractor listing requirements of SC Code Ann § 11-35-3020(b)(i).

§ 9. TIME OF CONTRACT PERFORMANCE AND LIQUIDATED DAMAGES

a. **CONTRACT TIME:** Bidder agrees that the Date of Commencement of the Work shall be established in a Notice to Proceed to be issued by the Owner. Bidder agrees to substantially complete the Work associated with this project within 280 calendar days from the Date of Commencement, subject to adjustments as provided in the Contract Documents.

b. **LIQUIDATED DAMAGES:** Bidder further agrees that from the compensation to be paid, the Owner shall retain as Liquidated Damages the sum of \$2,500.00 for each calendar day the actual construction time required to achieve Substantial Completion exceeds the specified or adjusted time for Substantial Completion as provided in the Contract Documents. This sum is intended by the parties as the predetermined measure of compensation for actual damages, not as a penalty for nonperformance.

§ 10. AGREEMENTS

- a. Bidder agrees that this bid is subject to the requirements of the law of the State of South Carolina.
- b. Bidder agrees that at any time prior to the issuance of the Notice to Proceed for this Project, this Project may be canceled for the convenience of, and without cost to, the State.
- c. Bidder agrees that neither the State of South Carolina nor any of its agencies, employees or agents shall be responsible for any bid preparation costs, or any costs or charges of any type, should all bids be rejected or the Project canceled for any reason prior to the issuance of the Notice to Proceed.

§ 11. ELECTRONIC BID BOND

By signing below, the Principal is affirming that the identified electronic bid bond has been executed and that the Principal and Surety are firmly bound unto the State of South Carolina under the terms and conditions of the AIA Document A310, Bid Bond, included in the Bidding Documents.

Electronic Bid Bond Number: _____

Signature and Title: _____

**SE-330 – LUMP SUM BID
BID FORM****BIDDER'S TAXPAYER IDENTIFICATION**

FEDERAL EMPLOYER'S IDENTIFICATION NUMBER: _____

OR

SOCIAL SECURITY NUMBER: _____

CONTRACTOR'S CLASSIFICATIONS AND SUBCLASSIFICATIONS WITH LIMITATIONS*Classification(s) & Limits:* _____*Subclassification(s) & Limits:* _____*SC Contractor's License Number(s):* _____

BY SIGNING THIS BID, THE PERSON SIGNING REAFFIRMS ALL REPRESENTATIONS AND CERTIFICATIONS MADE BY BOTH THE PERSON SIGNING AND THE BIDDER, INCLUDING WITHOUT LIMITATION, THOSE APPEARING IN ARTICLE 2 OF THE INSTRUCTIONS TO BIDDER. THE INVITATION FOR BIDS, AS DEFINED IN THE INSTRUCTIONS TO BIDDERS, IS EXPRESSLY INCORPORATE BY REFERENCE.

SIGNATURE**BIDDER'S LEGAL NAME:** _____**ADDRESS:** _____
_____**BY:** _____
(Signature)**DATE:** _____**TITLE:** _____**TELEPHONE:** _____**EMAIL:** _____

SECTION 03 33 00 -ARCHITECTURAL CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Cast-in-place architectural concrete including form facings, reinforcement accessories, concrete materials, concrete mixture design, placement procedures, and finishes.
 - 2. Work includes concrete materials, mix design, formwork, reinforcement, placement and finishing procedures in addition to the structural requirements of cast-in-place concrete indicated in The Cast-in-Place Concrete, Reinforcement & Formwork Sections.
- B. Work of this Section includes all labor, materials, equipment and services necessary to complete the architectural cast-in-place concrete as shown on the drawings and/or as specified herein.

1.3 DEFINITIONS

- A. Cast-in-Place Architectural Concrete: Formed concrete that is exposed to view on surfaces of completed structure or building and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.
- B. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
- C. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of cast-in-place architectural concrete.
- D. Reveal: Projection of coarse aggregate from matrix or mortar after completion of exposure operations.

1.4 PRE-INSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place architectural concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Cast-in-place architectural concrete subcontractor.
 - e. **Review of mix design and mix test results.**

2. Review concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction joints, forms and form-removal limitations, reinforcement accessory installation, concrete repair procedures, and protection of cast-in-place architectural concrete.

1.5 SUBMITTALS

- A. General: Do not proceed with the construction of the cast-in-place architectural concrete in the project, including fabrication of the formwork, until all samples, product data, mock-up and shop drawings have been approved by the Architect.
- B. Form work Shop Drawings:
 1. Submit drawings showing the layout and details of formwork for the work, including the mockups. Shop drawings shall show the following:
 - a. Layout of all form joints, crack control joints, construction & expansion joints, tie locations and exposed embedments.
 - b. Details of shop assembly of formwork and field assembly of construction and control joints, reveals, recesses, embedments, ties, back-up, clean out panels.
 - c. The means to be used to seal all joints, including back-up bracing, dry ties and brackets.
 - d. The means to be used to maintain alignment, including back-up bracing, etc.
 - e. Cover of all concrete over reinforcing steel.
 - f. Location of clear placing passages through the steel reinforcing for placing trunks and tremmies.
- C. Placing: Submit layout or description of each placement showing sequence and projected time between deposits.
- D. Product Data / Qualifications: Submit manufacturer's name and technical information for each of the following products and qualifications as listed below. Submit information for each specific use of each product to meet the architectural and structural performance of each type of material..
 1. Cement.
 2. Aggregates, each type.
 3. Admixtures, each type.
 4. Form surface material, each type
 5. Foam gaskets.
 6. Form release coating
 7. Reinforcing accessories
 8. Form ties and tie plugs
 9. Curing compound.
 10. Clean solution
 11. Water repellent/Anti-graffiti sealer
 12. Inserts and embedments, each type
- E. Concrete mix supplier certification
 1. **Product Data: Submit Hydrophobic Concrete Admixture Manufacturer's printed data and instructions for proprietary products and equipment.**
- C. **Quality Assurance/Control Submittals will include:**
 1. **Test Reports: Upon request, provide test reports from recognized test facilities of material properties and standards compliance.**
 2. **Certificates: Submit Hydrophobic Concrete Admixture Manufacturer's certification that the products meet or exceed the specified requirements.**

3. **Supplier: Field Reports: Include reports of concrete suppliers, field quality-control observations, measurements, and tests.**
 - F. **Hydrophobic Concrete Admixture Manufacturer Qualifications: Hydrophobic Concrete Admixture Manufacturer will have a minimum of 5 years of experience on projects of similar scope.**
 - G. Qualifications for Concrete Carpenter, Laborer, Reinforcing Steel Foremen and designated Quality Control Technician.
 - H. Concrete mixes for review by the architect and Engineer.
 1. **Submit certified laboratory test report for the following performance criteria of the integral waterproofing admixture:**
 - a. **Admixture produces 100% impermeable concrete, at the end of one year test period, under a water pressure of at least 20 psi.**
 - b. **Admixture increases the compressive strength of concrete where applicable and a recommended by Engineer**
- 1.7 SAMPLES
- A. Cement: 3 to 6 oz. samples of dry cement / cementitious materials. Submit a sample with the approved design mix and submit a sample for each delivery of each cement type to the batch plant during construction. Samples shall be labeled as to the date of delivery, mill producing the cement, lot number, and bin or silo to which delivered. Submit for each type of concrete to meet the architectural and structural requirements for each type.
 1. Formwork contact materials, each type, 12 inches square
 2. Reveal form strips, each size, 12 inches long
 3. Foam gaskets, 12 inches long
 4. Form ties, one each type
 5. Reinforcing supports, tie wire, one each type
 - B. Concrete Samples for color determination if required
 - C. Submit samples as follows for the cast-in-place architectural concrete:
 1. Concrete color samples: 12"x12"x2-1/2", cast vertical, using specified plastic coated form material on both side. Submit as required to attain approval of the Architect.
 - a. Submit sample panels using mix material criteria specified herein. Cement replacement to be maximum allowed or less for color and strength. Color as selected by architect.
 2. Finish samples as follows:
 - a. Samples shall match the texture of the surface in phase I in the designated area referenced in item c. above.
 - b. Cast samples in a form box with tightly sealed edges. Use gaskets and thread rod connectors to seal and maintain tight joints .

- D. Final Concrete Samples: Final samples of approved color mix and finish treatment for record: Three 24"x24"x2-1/2" cast vertically for record set. Cast each panel simulating techniques to be used in production to reduce the surface air voids and achieve the specified criteria. Finish with the treatment approved in samples for color determination. For sample form box see drawing at end of section
1. Submit as required to attain approval of the Architect.
 2. Sample Panel for formed Concrete:
 - a. Submit the proposed fine, coarse and cement materials for review and comment.
 - b. Submit design mixes using the proposed materials to be used in sample panels that will provide the best match of the material and proportions of the existing bush-hammered concrete.
 - c. After review and comment by the architect, and after joint discussions with parties concerned, submit samples of other material, or combination of materials, as required to obtain approval of the Architect.
- E. Accelerated Curing Procedure for Samples:
1. In the event samples require accelerated curing to speed the submittal process use the following:
 2. Remove the form as soon as the panels are self-stable.
 3. Submerge in a bath of warm water (between 100 and 120 degrees F) for 24 hours.
 4. Remove and dry using dehydrating equipment or air drying. When reasonably dry the color should be within color limits of slow cured concrete.
- F. Mock-up for Formed Concrete Work :Before casting architectural concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
1. After all samples, product data, and the shop drawings for the Mock-up are approved by the Architect, construct a mock-up of the work in a location approved by the Architect, as described below and with the requirements of the consultant drawings Contract Documents.
 2. Mock-up shall consist of the following:
 - a. Foundation of a size and reinforcement adequate to support the work.
 - b. Walls as indicated and shall include: "L" shaped wall, 14'-0" x 6'-0" x 16'-0" high, cast in four placements with plastic faced panels on all formed surfaces.
 - c. One horizontal construction joint with a reveal.
 - d. One vertical construction joint at a wall corner.
 - e. One vertical crack inducing joint at a butt form panel joint.
 - f. Form panel and tie layout as shown on the drawing. Opposite side to reflect construction and control joints on side shown. See mock-up drawing at the end of this section.
 - g. Reinforce as in a similar detail on the approved shop drawings and add necessary reinforcing and/or supports to maintain stability.
 - h. Use approved form face material, reinforcement and accessories and assemble formwork as intended for the building construction.
 - i. Place concrete in the wall with methods to be used for typical long wall in building, including anticipated time delays between deposit lifts.

- j. Finish exposed hardened smooth surfaces of the walls with specified finishes when directed by the Architect and with the Architect, present. Finish as directed by the architect

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "NRMCA Quality Control Manual - Section 03, Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- C. Source Limitations for Cast-in-Place Architectural Concrete: Obtain each color, size, type, and variety of concrete material and concrete mixture from single manufacturer with resources to provide cast-in-place architectural concrete of consistent quality in appearance and physical properties.
- D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5 and Section 6, "Architectural Concrete."
 - 2. ACI 303.1, "Specification for Cast-in-Place Architectural Concrete."
- E. Concrete Testing Service: Owner will engage a qualified independent testing agency to perform material evaluation tests.

1.8 PERFORMANCE REQUIREMENTS

- A. Responsibility for the design of Cast-in-Place Architectural Concrete in conformance with the requirements of the drawings and specifications and performed using the highest standards of quality for visual and durable concrete rests with the Concrete Contractor.
- B. Design of the mix and form work shall be performed by Concrete Contractor's registered professional Engineer, registered to the State of South Carolina, and submittals for the same shall be sealed by said Engineer.
- C. Performance Criteria: All cast-in-place architectural concrete formwork shall be performed so that no evidence of the following will be evident when the concrete is subject to imposed loads, temperature and weather conditions:
 - 1. Damage of any kind.
 - 2. Cracking, other than at control joints, due to improper forming and placing.
 - 3. Out of alignment or incorrect profiles.

4. Surface voids not completely covered by a circle 1 1/16 inches in dia. (10 cent coin) or more than 25 surface voids larger than 1/8 inch, in longest dimension, in any area 1 ft. square.
 5. Voids, sand pockets or discoloration due to fluid loss through the formwork.
 6. Rock pockets and honeycombs.
 7. Discoloration caused from staining and from improper placing of the concrete.
- D. If any of the above-mentioned deficiencies occur, the Architect may order the affected concrete replaced or repaired with acceptable concrete material and procedures. Repair only when directed by the Architect. Corrected deficiencies must meet with Architect approval.

PART 2 - PRODUCT

2.1 CONCRETE MATERIALS

- A. Each concrete material shall be the product of a single plant and raw material source throughout project.
- B. Cement: ASTM C-150, Type I or Type II
1. Cement shall be white portland cement.
 2. Cement shall be consistent in color presentation throughout the duration of the project.
- C. Coarse Aggregate: ASTM C-33.
1. Hard crushed stone or rock, maximum size 3/4". If the aggregate has particles finer than passing a #20 sieve, the particles shall be white or light gray or tan in color and the fine particles shall be less than 0.05% by weight.
 2. Provide aggregates from a single source throughout the project.
- D. Fine Aggregate: ASTM C-33.
1. Hard, natural sand. If aggregate has particles finer than passing a #20 sieve, the particles shall be white or light gray or tan in color and the fine particles shall be less than 0.05% by weight.
 2. Provide aggregates from a single source throughout the project.
- E. Admixtures:
1. All admixtures must be certified to be compatible with the cement, aggregates, and all other constituent materials in the mix and shall contain less than 0.05% of Calcium Chloride.
 2. Water Reducing Admixture: ASTM C494, Type F and G
 - a. Regular Concrete: High Range (HRWR):
 - b. BASF: "Rheobuild 1000"
 - c. Euclid Chemicals: "EUCON 37", "EUCON 537"
 - d. Or Equal
 3. Self-Consolidating Concrete: Shall include polycarboxylic-ether based Hyperplasticiser material as the High Range Water Reducing Admixture
 - a. BASF: "Glenium Series"
 - b. Euclid Chemicals: "Plastol Series"

- c. Viscosity Enhancing Admixture
 - d. Or Equal:
- 4. **Integral waterproofing Admixture: ASTM C494, Type C and E**
 - a. **Hycrete: "W1000" (Basis of Design)**
 - b. **IPANEX: Ipanex**
 - c. **Kryton International: Krystol (KIM)**
 - d. **Or Equal**
- F. Admixture shall be manufactured by a company certified to conform to the requirements of the quality, environmental and occupational health & safety standards ISO 9002, iso 14001 and OHSAS 18001.
 - 1. Acceptable admixtures are:
 - a. BASF: "Rheomac VMA"
 - b. Euclid Chemicals: "Eucon ABS" or "Eucon WO"
 - c. Sika: "Sika Stabilizer VMA"
 - d. Or Equal
- G. Cement Replacement/Color Admixture: use one of the following (as determined by samples)
 - 1. White or light gray Blast Furnace Granulated Slag: "Newcem" Grade 80, 100 or 120 by LaFarge Corp.
 - 2. Fly Ash containing more than 0.5% carbon or Silica Fume are not permitted in Architectural Concrete.
- H Air Entraining Admixture: ASTM C260.
- I. Admixtures for retardation and acceleration may be used if shown that there is no adverse effect on architectural requirements and are approved for use. Admixtures shall be certified in writing by the manufacturer to be in compliance with ASTM C-494.
- J Color Admixtures: If a color admixture is required to meet the color matching requirements the admixture shall be powder (P) or Liquid (L) admixture. Powder admixture shall be manufactured specifically for this project, prepackaged in units for treatment of one cubic yard per unit, shall have integral dispersal agents and plasticizers and packaged in a degradable bag when added to the mix. The full amount of admixture shall be manufactured in one production run. Powder shall be "Cromix-P", group-3 by L.M. Scofield Co. Liquid color admixture shall be Cromix-L by BASF//Master Builders or approved equa
- K. PRELIMINARY DESIGN MIX (Or equal approved material meeting requirements)
 - 1. **The concrete ready mix supplier must contact the Hydrophobic Concrete Admixture Manufacturer before designing and testing any new mix designs, to receive guidance on achieving proper water absorption characteristics. The concrete ready mix supplier must also report the test results to the Hydrophobic Concrete Admixture Manufacturer. All values must be within the specification limits.**

- a. **All concrete materials used for testing must be same as concrete materials used for construction.**
 - b. **Test result requirements for Hydrophobic Concrete in addition to engineer's performance requirements: Corrected 30 minute water absorption, age at test 7 days (BS 1881-122): Not greater than 1.0%**
 - c. **Waterproofing System: All concrete in the locations listed in section 1.02 will be waterproofed by the addition of Hydrophobic Concrete Admixture and additional ingredients including:**
- 2 Hydrophobic Concrete Admixture at the rate of one U.S. gallon per cubic yard of concrete (5 liters per cubic meter).**
3. Superplasticizer at the manufacturer's recommended rate and appropriate for the placement requirements of the project.
- a. Cement: White Portland Cement
 - b. Slag: Newcem by LaFarge Corp
 - c. Fine Aggregate: Shalersville Natural Sand
 - d. Coarse Aggregate: #8 Marbleshead Limestone
 - e. HRWR: PS 1466
 - f. VMA: VMA 362 by BASF/Master Builders
 - g. Air Entrainment: Micro-Air by to match control samples approved by Architect
 - h. **Hydrophobic Concrete Admixture**
3. **Water: Potable conforming to ACI 301, Chapter 2, Paragraph 203**
- a. **Water-Cement Ratio: 0.42 maximum. Water content of Hydrophobic Concrete Admixture and other admixtures to be included in the water-to-cementitious ratio.**

2.2 FORM WORK MATERIALS

- A. General: Comply with Division 03 Section "Cast-in-Place Concrete" for formwork and other form-facing material requirements.
- B. Form-Facing Panels for As - Cast and Exposed Finishes: Steel, glass-fiber-reinforced plastic, ABS plastic or other approved non-absorptive panel materials that will provide continuous, true, and smooth architectural concrete surfaces. Furnish in largest practicable sizes to minimize number of joints to resist plastic concrete loads without detrimental deformation.
 - 1. Units of face design, texture, arrangement, and configuration to match design reference sample. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent surface treatments of concrete.
 - 2. Product: Fitzgerald Form liners: Pattern 14303 1.5 Depth 2" O.C or equal of approved pattern.
- C. Strips: Metal, rigid plastic, with sides beveled and back kerfed; nonstaining; in longest practicable lengths.
- D. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, 3/4 by 3/4 inch, minimum; nonstaining; in longest practicable lengths.

- E. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800, "Specification 810.1, Expanded Cellular Glazing Tape"; minimum 1/4 inch thick.
- F. Form Joint Sealant: Elastomeric sealant complying with ASTM C 920, Type M or Type S, Grade NS, that adheres to form joint substrates.
- G. Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood.
- I. Surface Retarder: Chemical liquid set retarder, for application on form-facing materials, capable of temporarily delaying final hardening of newly placed concrete surface to depth of reveal specified.
- J. Form Ties: Factory-fabricated, glass-fiber-reinforced plastic internally disconnecting or] removable ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish glass-fiber-reinforced plastic ties, not less than 1/2 inch in diameter, of color matching Architect's approved samples.
- K. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.
- L. All material shall be supplied in sizes to cover surface areas between joint lines shown on approved shop drawings.
- M. Form Ties: Shall be manufactured specifically for use as concrete ties and shall be designed to seal tightly to the form face material without fluid loss. Ties shall be of sufficient strength to resist fluid concrete placing pressures at the longest span of support used in project.
- N. Tie Hole plugs shall be precast disks to fit the tie hole void at the recess diameter. Recess dimension of the plug shall be as designated by the architect.

2.3 JOINT SEALING MATERIAL:

- A. Foam gaskets for sealing field erected corner form joints shall be highly compressible foam rubber or neoprene tape, paper backed, with pressure sensitive adhesive on one side, and shall be of sufficient width and thickness for specific use. Tape shall be as manufactured by Frost King, Patterson, NJ, or equal.
- B. Sealant for sealing permanent shop or bench fabricated unrevealed joints shall be silicone caulking. Sealant shall be "Silpruf" as manufactured by General Electric; "Silicone caulk" by DAP Corp., or equal.
- C. Reveal Form Strips:
 - 1. Rigid Polyethylene: (white slick plastic) milled smooth on all contact drafted surfaces.
 - 2. Contact surfaces shall not have projections, saw marks or deformities.
- D. Form Release Coating: Colorless, non-staining and having no deleterious effects on the concrete, manufactured specifically for non-absorbent surfaces and for reducing surface voids. Release Coating shall be "Cretelese 880" by Cresset Chemical Co., Weston, OH.; "L&M Release" by L&M Construction Chemicals, Inc. Omaha, NE. or equal.

2.4 REINFORCING AND ACCESSORIES

- A. General: Comply with Division 03 Section "Cast-in-Place Concrete" for steel reinforcement and other requirements for reinforcement accessories.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire fabric in place; manufacture according to CRSI's "Manual of Standard Practice."
 - 1. Where legs of wire bar supports contact forms, use CRSI Class 1, gray, plastic-protected bar supports or as approved by Architect.
- C. Accessories in contact with vertical form surfaces shall be high density plastic "wheels" with feet in contact with the form maximum of 1/8"x3/8". Center hole engaging reinforcing shall hold the wheel tight to the bar and maintain the dimension required under placing conditions. Multi-leg string spacers will not be permitted.
- D. Tie wire used to secure reinforcing steel adjacent to architectural form surfaces shall be non-corrosive or plastic coated wire.

General: Comply with Division 03 Section "Cast-in-Place Concrete" for steel reinforcement and other requirements for reinforcement accessories.

2.5 MISCELLANEOUS MATERIALS

- A. Curing Material: VOC compliant (350 g/l), colorless, diffusive, blend of Sodium, Potassium and Meta Silicate and be able to retain water in concrete with minimal loss during high temperatures and without rapid loss of moisture. Shall not contain wax, resin or acid. Material shall be "L&M Cure" by L&M Construction Chemicals, Inc. Omaha, NE; "SealTight Med-Cure" by, W .R. Meadows, Inc., Hampshire, IL, "Super Diamond Clear VOX" or "Super Aqua Clear VOX" by the Euclid Company or approved equal.
- B. Concrete Clean/Etch Solution: Shall be commercial concrete cleaner containing solvents, chloride acids and stain removers, with no more than 1.5% acid content.
- C. Water Repellent sealer: shall be a low molecular, minimum 95% solid, Clear, Silane sealer. Sealer shall be Oleophobic where surfaces are accessible to public.
- D. Sealant for Reveals: Shall be a one component, low modulus, non-sag, elastomeric, non-sag silicone sealant meeting the Federal Specification -TT-S-001534A.
- E. Patching Additive: Shall be a liquid, acrylic-polymer bonding agent specifically made to be integrally mixed with mortar.
- F. Waterstop for Vertical & Horizontal Construction Joints: shall be a Bentonite impregnated foam neoprene strip with paper backed, pressure sensitive, adhesive material.
- G. Gasket adhesive remover shall completely remove any adhesive residue and shall not discolor concrete surface.
- H. Sawcutting Material for Joints: shall be equipment specifically designed for cutting crisp edges in newly cast concrete (less than 12 hours old). The cutting machine shall be a high speed type

(10,000 rpm min), self propelling without forcing the speed. The blade shall be minimum 4 inch diameter specifically made for the greenest concrete. Blades shall be designed to cut 1/8" wide joints.

2.6 REPAIR MATERIALS

- A. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- B. Epoxy Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements.
 - 1. Types I and II, non-load bearing - Types IV and V, load bearing , for bonding hardened or freshly mixed concrete to hardened concrete.

PART 3 - EXECUTION

3.1 CONCRETE MIXTURES

- A. Comply with the requirements of Section 03 30 00 for structural requirements and to architectural concrete requirements specified herein. Concrete shall be self-consolidating or regular concrete
As approved by Architect
- B. Basis of Design - Self Consolidating Concrete (SCC): Shall be as specified for regular concrete with a Hyper pasticiser HRWR plus the use of a Viscosity Modifying admixture. Concrete Contractor shall show by test panels and the mock-up (see part-1) that the mix and the placing methods have been developed to produce the required concrete quality.
- C (Alternate)- Regular concrete: Shall have the specified Cement, White Cement Replacement admixture in amounts allowed to meet strength and color requirements, a High Range Water Reducing Admixture and a Color admixture. Concrete exposed to weather conditions in the finished work shall have an Air Entraining Admixture.
- D. Mix shall be designed for minimum water content allowable for conditions (optimum slump prior to admixture: 2.0 inches or water/cement ratio of 0.40 or less).
 - 1. For Regular Concrete fluidity shall be attained by the addition of HRWR to a slump spread of $6\frac{1}{2} \pm 1$ " (4 ± 1 " at stairs and ramps).
 - 2. For Self Consolidating Concrete (SCC) fluidity shall be attained by the addition of HRWR+VMA, to a Slump Flow and a Visual Static Stability Index as recommended by the admixture manufacturer for the materials used. Slump flow and Static Stability shall be measured by test method MB-RCD-01, specified in ASTM C143.
- E Mix design shall indicate the optimum approximate duration of fluid stability for the mix for the maximum discharge time planned; the slump prior to the addition of the HRWRA and cementitious material

3.2 FORM WORK

- A. Fabrication:
 - 1. Comply with the requirements of Section 03 30 00 Cast-in-Place Concrete, and as specified herein.

2. Design formwork to permit easy removal. Prying against the concrete will not be permitted. Care shall be taken so as not to mar the concrete surface in cutting or removal of the forms.
 3. Design form work for a full liquid head of pressure. The forms shall be completely rigid and strong enough to withstand without deflection, movement or leakage from the placing pressures that result from rapid filling and vibration.
 4. Forms shall be fabricated so the concrete can be adequately placed, vibrated and finished to achieve the specified finishes.
 5. Layout form ties, form joints, reveals and exposed embedments as shown on the approved shop drawings.
- B. Install sealant in all fabricated butt joints of plastic overlay form panels to prevent fluid loss. At butting plywood panel edges place a bead of sealant (1/8" max) at back edge (away from contact face) of one panel prior to butting edge surfaces. Back fasten plastic face panels with screws to minimize the penetrations through the plastic faced panels, achieving a rigid gang form. Use one of the following:
1. Install a full backing sheet
 2. Install wood or metal clips at supports where face panel seams are located and in other locations to maintain panel stability
 3. Field erected joints shall be fabricated to seal tight and in line.

3.3 Reveals

- A. Back screw horizontal reveals. Release screws prior to stripping and leave reveal form in concrete to be removed later.
- B. Vertical reveals may be back screwed as in "a" above or fastened securely to form face to be stripped with the form panel.
- C. Face nailing is not acceptable.

3.4 Form Erection:

- A. Use only form units where face panels are in undamaged condition. Replace damaged panels as required to maintain surface in a condition to achieve the specified treatment.
1. Use screw type fastening devices to maintain alignment, and to tightly close joints at corners, end forms, square columns and at bulkheads. Apply pressure at joint to resist concrete placing pressure as close to the joint as possible.
 2. Construction joints and control joints shall be at locations indicated
 3. At the first placement of a vertical construction joint (at a bulkhead), support joint with intermediate wales and strong-backs where required to maintain a continuously tight joint resisting the liquid head of the concrete.
 4. At the second placement of a vertical and horizontal construction joint (formwork connection to in-place concrete), lap forms onto the in-place concrete of the previous placement. Place support members across joint and anchor to both sides of joint to achieve and maintain a tight seal at joint during placing. Support joint with intermediate wales and strong-backs where required to maintain A continuously tight joint resisting the liquid head of the concrete. In a flush joint (no-reveal) place a gasket at the interface between the concrete and form surface.
 5. At corner joints, assembled and disassembled in field, place a gasket in the form joint. Install gasket away from contact edge 1/16" to 1/8".
- C. All corners, including square columns and piers, shall be formed with a tight seal (see item above) and with back-up support secured with screw connectors at sufficient intervals to maintain the seal

under placing pressures. Install intermediate wales and strong-backs between tie rows as required to maintain joint seal. All square columns shall be yoked with wales and thread rods to apply pressure on corner joints.

D. Crack Control Joints (vertical surfaces):

1. Crack control devices shall be installed at all joints designated as crack control joints located as shown on the architectural and/structural drawings
2. Crack control joints shall be located at butt panel or revealed joint locations.
3. Reveals on exposed surfaces shall be of sizes shown. All revealed crack control joints shall have an internal crack inducing device installed between the back of the reveal and the reinforcing bars.
4. All control joints shall have a reveal on the unexposed surface directly opposite the face reveal or crack inducing device.
5. Reveals shall continue below grade at unexposed surfaces in lieu of the crack control device. Reveals shall be a minimum of 3/4" in depth. Reveals on unexposed surfaces shall be a shape at the contractor's option.

- a. Where allowed by the Structural Engineer, interrupt up to 50% of temperature reinforcing bars.

E. The internal crack control device shall interface and seal with the sealing system at intersecting floors and at the back of parapets to form a continuous seal of the building envelope. See details at the end of this section.

F Waterstops (vertical & horizontal) shall be as follows:

1. At construction joints exposed to weather install Bentonite waterstop strip at center of in-place concrete wall full height of wall. Do not install between reinforcing steel and form face.

G. Reveals on the exposed form surfaces shall be of the shape, width and depth shown on the approved shop drawings.

H. Ties:

1. Ties shall be located where shown on the drawings. Where placing loads are deemed excessive using locations shown tie layout shall be submitted for approval.
2. Drill tie holes in wood or plastic overlay form panels from contact face using brad point twist bit with edge cutters (scribes circle edge prior to surface cutting).

I. Coating of Forms:

1. Prior to use, all forms shall be coated with the specified form release coating in accordance with the manufacturer's written instructions.
2. Coat evenly and remove excess material from form surface with a damp absorbent cloth.
3. Surface applied with specified release agent shall not be oily to the touch.
4. Do not allow coating to come in contact with previously placed concrete or with reinforcing steel.

J. Formwork Tolerances:

1. Hydraulic pressures: Design forms to limit deflections of members supporting facing panels to L/400. Formwork shall be designed for full liquid head.

K. Finish Lines: Fabricate and position formwork to maintain hardened concrete finish lines within the following allowable variations.

1. From designed edge elevation in 10 ft. 1/4 inch (Total Variation)
2. From designed vertical plane in 10 ft. 1/4 inch (Total Variation)
3. Cross-Sectional Dimensions: Plus or Minus 1/4 inch (Total Variation)
4. Form surface to surface at any butt joint at formwork fabrication 1/32 inch
5. It is the intent of this specification that the formwork will be erected in such a manner that lines and surfaces are visually presentable without obvious defects. Where lines and planes require adjusting from one placement to another adjust the forms to realign in a visually acceptable manner.
6. Edges of plastic overlay form panels shall be square, flat and sealed. Seal all cut edges (end grain, including tie holes) with liquid polyurethane.

3.5 REINFORCEMENT

- A. Comply with the requirements of Cast-in-Place Concrete Reinforcement Section, and as specified herein.
- B. Support accessories are to be used at exposed vertical surfaces only when absolutely necessary to maintain cover. Place "wheel" supports at walls no closer than 6 ft. apart. It is the intention that the reinforcing will be erected and internally braced so that only supports at the top and bottom of the form will be required to maintain cover requirement.
- C. Reinforcing support units at horizontal surfaces shall be laid out a minimum of 3 feet apart in a symmetrical pattern along the form panel joint lines and used with carrier bars spanning between to support bars. Multi-legged supports are not permitted.
- D. Layout reinforcement to assure a clear passage from top to bottom of walls and spandrels at least 10 feet apart where placing regular concrete and as required for Self Consolidating concrete. Clear passage shall be free of bands, ties, conduit and other obstructions to allow easy insertion of the pump hose or placing trunks to the bottom of the form.
- E. Tie wire for reinforcing steel shall be tied in a manner so that wire ends will point away from the architectural formwork surface and not project into the clear cover area between the bars and the form surface.
- F. All reinforcing steel, including bands, shall be secured a minimum of 2" from the contact surface of the formwork prior to placing concrete.

3.6 MIXING AND TRANSPORTING CONCRETE

- A. All concrete for each placement or a minimum of two truckloads shall be on the site prior to starting the placement. The concrete shall be completely discharged into the forms within the time determined by the design mixes to be the optimum duration of fluid stability provided by the mix design. In no case will the concrete be placed after excessive stiffening of the concrete has occurred. Discharge two trucks into the pump or bucket at one time in a manner that will enable one truck to be half full and discharging while the other is finished and being replaced with another truck.

3.7 PLACING CONCRETE

- A. Before placing concrete in the forms, verify that all forms have met all requirements specified; that reinforcing steel, embedded materials are in place and securely anchored; that forms are absolutely clean; and that entire preparation has been approved by the Concrete Contractor's Concrete Quality Control Technician and has been reviewed by the Architect or Owner's Representative..
- B. Cleaning and Protecting Forms: Immediately prior to placing concrete, clean all form interiors free of foreign material and debris.
 - 1. Force debris out of forms prior to closing the last section with a jet stream of compressed air and/or water. Where form openings are not available, collect debris with vacuum cleaners and heavy duty magnets. Remove all wire clippings, sawdust and other debris from wall, beam and soffit bottoms.
 - 2. Protect cleaned forms if placing does not commence immediately, covering openings with tarpaulins.
 - 3. Do not allow direct sunlight to heat forms.
- C. Placing Concrete
 - 1. Concrete shall be cast in a continuous manner in a manner that no lift lines are evident. Place the concrete with one of the two following methods or an approved option.
 - 2. Place each vertical section in one or more lengths with construction joints at the corners.
 - 3. Place each vertical section using two or more pumps coordinated to attain a continuous placement in a timely manner avoiding delays between deposit layers.
- D. Depositing Concrete:
 - 1. Self Consolidating Concrete:
 - a. Deposit SCC by inserting the pump hose onto the form void at the center point of the placement to the bottom.
 - b. Keep the end of the hose into the wet mix throughout the placement.
 - c. At walls with openings above the base of the placement place the concrete to the bottom of the opening and then place one side to the midpoint of the opening, then the other side to the top of the opening. Then continue the placement full length of the form.
 - d. At walls with openings starting at the base of the placement fill the void between the openings to the top of the opening and then continue the placement full length of the form.
 - 2. Regular Concrete:
 - a. Concrete for walls, columns and spandrels more than 3 ft deep shall be placed with trunks, or pump hoses inserted onto the form cavity.
 - b. Deposit concrete as nearly as practical at its final position, but not farther than 5 ft. horizontally from the final position.
 - c. Do not drop concrete more than 12 inches.
 - d. Place concrete by inserting pump hose, or trunks into form to face of fresh concrete. Place an adequate number of trunks in wall and deep spandrel forms to enable a continuous placement without causing delays in moving trunks.
 - e. Deposit layers in wall or deep spandrel placements shall not exceed 30 inches in height. Top deposit layer of a placement shall not exceed 18 inches in height.

- f. Deposits of concrete in walls, beams or slab placements shall have a subsequent deposit place on top and/or adjacent to the fresh face and consolidated within 15 minutes. Plan construction joints and placements so that the placing sequence will follow this requirement.
3. **Notify integral waterproofing admixture manufacturer at least 3 working days in advance for each concrete placement that contains such admixture. Do not place concrete until manufacturer's representative has examined all joints and has given approval for placement.**

E. Admixtures - General

1. **Add all admixtures prior to mixing unless otherwise specified or directed.**
2. **Chemical admixtures shall be charged into the mixer as solutions and shall be measured by means of an approved mechanical dispensing device. The liquid shall be considered a part of the mixing water. Admixtures that cannot be added in solution may be weighed or may be measured by volume if so recommended by the manufacturer. The accuracy of measurement of any admixture shall be within ± 1.5 percent.**
3. **If two or more admixtures are used in the concrete, add them separately to avoid possible interaction that might interfere with the efficiency of either admixture or adversely affect the concrete. Do not charge admixtures into the mixer in such a manner that they will come in direct contact with the cement.**
4. **Integral w.p. admixtures shall be added at the site in presence of the Owner's Representative and the manufacturer's representative.**
5. **Contractor shall Pay for the services of the manufacturer's representative to instruct the Engineer for Controlled Inspection and the Contractor as to the proper use of the admixture, including the relation to construction joint procedures and techniques, to inspect the construction details, and to supervise the concrete placement. The manufacturer shall submit daily inspection reports to the Owner's Representative.**

E. Concrete Vibration:

1. Self Consolidating Concrete: Place concrete in such a manner that no vibration is necessary to consolidate the concrete and produce a surface with minimal and small surface voids.
2. Regular Concrete
 - a. All concrete shall be consolidated by internal vibration using two vibrators at each placement. One vibrator shall follow deposit location and consolidate concrete after deposit is leveled. Optimum diameter of vibrator head shall be 1" to 1½". Vibrators shall be placed into the concrete vertically at a consistent spacing that will thoroughly blend the deposits, remove entrapped air, and consolidate the concrete. Vibrator head shall be inserted rapidly and withdrawn slowly and evenly to remove maximum amount of entrapped air (optimum withdrawal speed approx 2" to 4" per second). Do not jiggle vibrator up and down during consolidation, use continuous and even insertion and withdrawal of vibrator.
1. After top out leveling in walls and spandrels, the concrete shall be allowed to set 10 to 15 minutes and then shall be given a final vibration of the top 20 inches. Immediately thereafter the top surface shall be finished as required.
2. Caution must be exercised in using vibrators to prevent injury to the form surface material or displacement of embedded items.

3. Keep one spare working vibrator on site at all times.
4. Vigorously tap form facing panels just below deposit area during consolidation with rubber mallets. Strike in an even and consistent pattern to break up large entrapped air bubbles at the contact form face.

3.8 CURING AND FORM REMOVAL

- A. Cure all concrete for a minimum of five days.
- B. Cure formed concrete surfaces using the following method:
 1. Immediately after stripping, fog the surface (fine mist nozzle on hose) and apply the specified curing compound.
 2. Cover forms and concrete while in curing period to protect from direct sunlight.
- C. Form Removal:
 1. Comply with the stripping requirements of Cast-in-Place Concrete Section, and as specified herein.
 2. Care shall be taken so as not to mar the concrete surfaces in removing the forms.

3.9 FINISHES FOR FORMED PLACEMENTS

- A. All exposed work shall be finished with the approved finishes determined from sample tests executed in Part 1 on the mock-up. Finishes shall be as specified herein where indicated on the drawings. Minor defects may require fins to be removed (i.e. top edges) or minor patching performed, however, it is the intent of this specification that the work will be performed in such a manner that only the specified treatment, water repellent application, and tie hole finishing will be required after stripping.
- B. General: Prior to treating, all surfaces shall receive the following preparation and cleanup.
 1. All surfaces to receive treatment shall be a minimum of 21 days old. All surfaces can be treated at end of project. Concrete Contractor shall coordinate with Construction Manager for related construction and surface treatments.
 2. Remove all stains using an appropriate non-abrasive stain remover for each type.
 3. During operations, protect all adjacent work. At completion of day's work, leave the area clean. At completion of work, remove all equipment, waste and excess material and leave area clean.
 4. Remove all fins larger than 1/16" without grinding or marring the concrete surface. This requirement does not apply to board form concrete at between the board fins.
- C. Surface Designations:
 1. Smooth out-of-form concrete with an Etch-Clean Treatment Finish
 - a. Surfaces designated on the drawings shall have a smooth out-of-form finish and be treated as follows:
 - b. Treat all vertical wall surfaces, horizontal soffit surfaces and exposed wall top surfaces.
 - c. Use specified cleaner solution full strength.
 - d. Apply cleaner in an even manner break to break and joint to joint of surface, allow to set for 3 to 5 minutes (time for the acid content to neutralize), and thoroughly flush with medium pressure fan nozzle spray (70 to 100 psi) in an even and consistent manner.
 - e. Treatment shall consist of up to three applications as determined on the mock-up.
 - f. Treatment shall produce a "matte" surface by just removing the surface of the cement skin.

- g. Intended treatment shall not expose any aggregate larger than that passing a #20 sieve.

D. Surface Applied Water Repellant Treatment:

1. Treat all vertical wall surfaces and exposed wall top surfaces.
2. All surfaces receiving treatment shall be dry as required by the manufacturer's instructions.
3. All surfaces receiving treatment shall be clean and free of stains and laitance.
4. To all surfaces apply one wet coat of the specified sealer as per manufacturer's instructions.
5. Sealer shall be applied as soon as conditions allow.
6. **Products:**
 - a. **XYPEX: Crystalline Systems**
 - b. **Thoro: Super Thorroseal**
 - c. **SealKrete: SealKrete**

E. Formed Square Corner Edge Treatment:

1. After concrete is hard, use a fine masons stone or fine grit sanding block on the edge to achieve an eased edge with a 1/16 inch radius. Take care not to scar the adjacent surface. This applies to two adjacent vertically formed corner surfaces and to a formed surface adjacent to a trowel finished top surface.

F. Tie Hole Treatment:

1. Plug all exposed-to-view tie holes with precast disks as follows.
2. Recess the plug face from the concrete surface as directed by the architect and as determined on the mock-up.
3. Apply structural silicone sealant to back and edge of disk and place into tie hole void. Take care not to allow sealant on the concrete face surfaces.

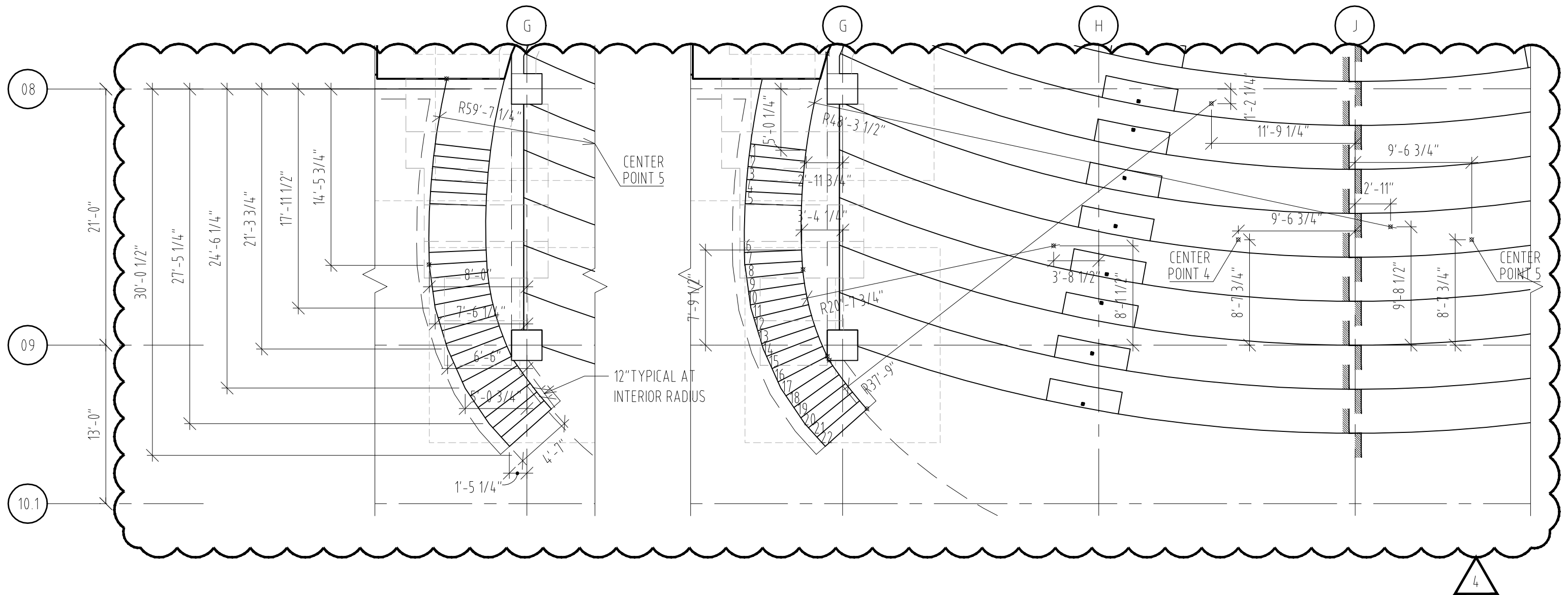
3.10 PATCHING:

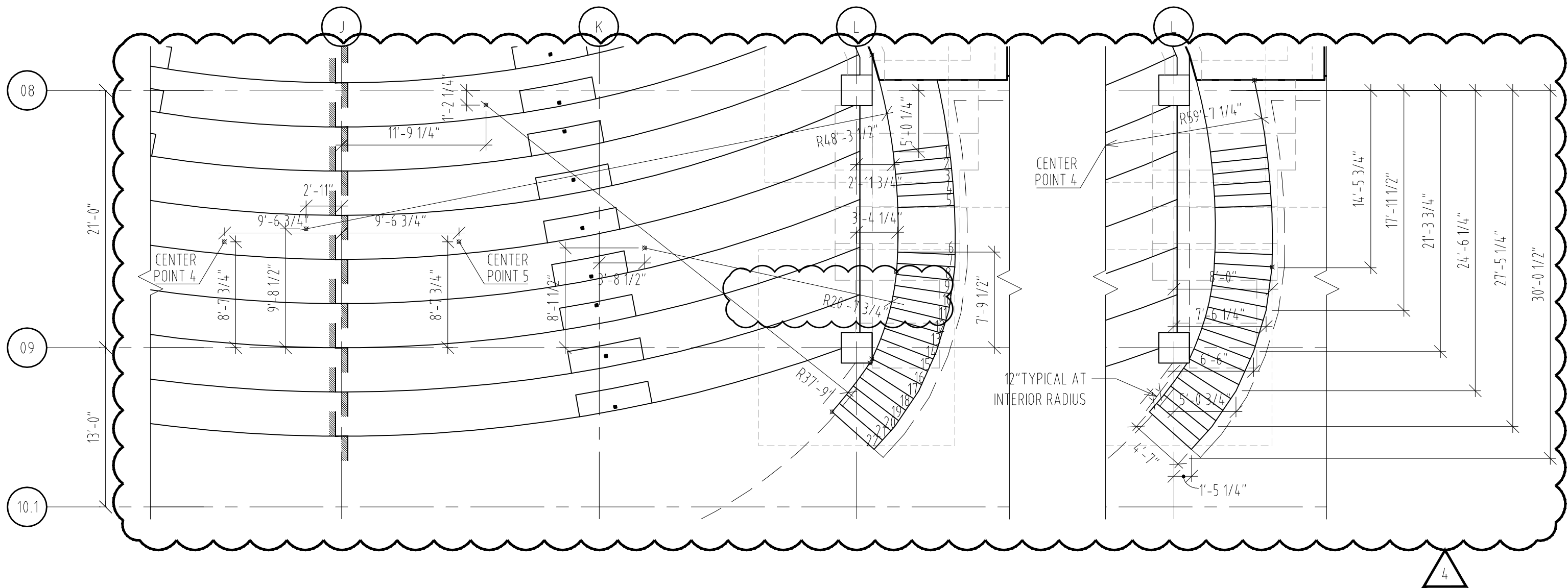
- A. Only areas designated by the Architect shall be patched. Where minor patching is required as approved by the Architect as a means of rendering the surface acceptable, it shall consist of patching with a texture matching technique and color matching mortar mix. Test patches shall be placed on the mock-up or other approved surface and approved by the Architect prior to commencing any patching of the work.
- B. Final patching mortar shall be one part cement and two fine parts sand. Optimum aggregate size shall be graded from 50 sieve to 16 sieve. Mixture shall be pliable, but not thin. Mixture shall be mixed with a liquid acrylic-polymer bonding additive.

3.11 PROTECTION

- A. Protect all Architectural Cast-in-Place Concrete surfaces from damage of any kind. Pay special attention to surfaces near work of other trades. All Architectural Concrete surfaces shall be free of damage at the time of acceptance. Allowing damage and patching at end of project is not acceptable. Cover surfaces with a self supporting stand-off panel system minimum 8' above floor surfaces and full height at surfaces where vulnerable to other trades access. Protection shall assure protection from paint, oils, rust, stains, impact, scarring or any other kind, including survey markings and graffiti.
- B. Submit protection plan, including materials to be used and a plan for administering continuous protection surveillance.

END OF SECTION 03 33 00



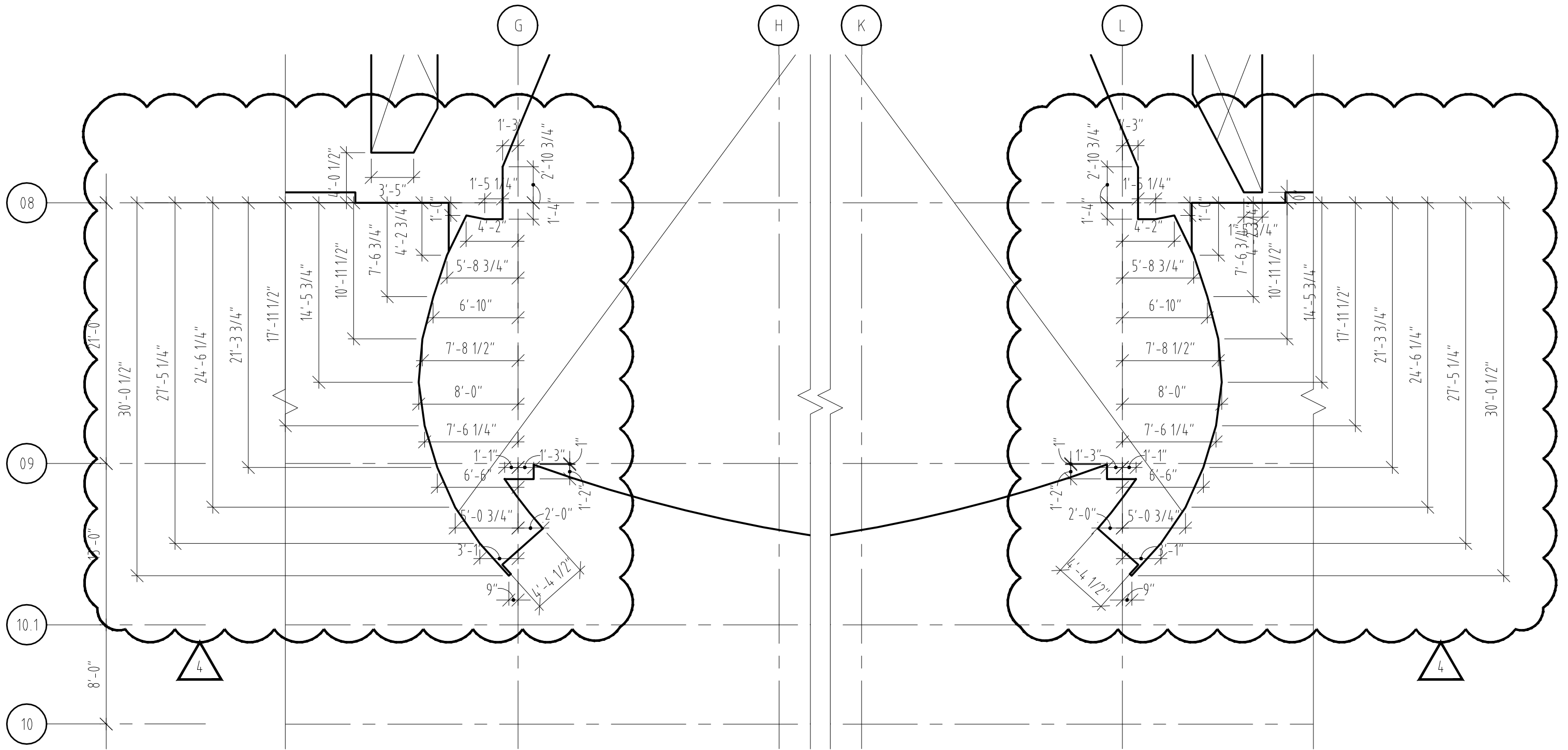


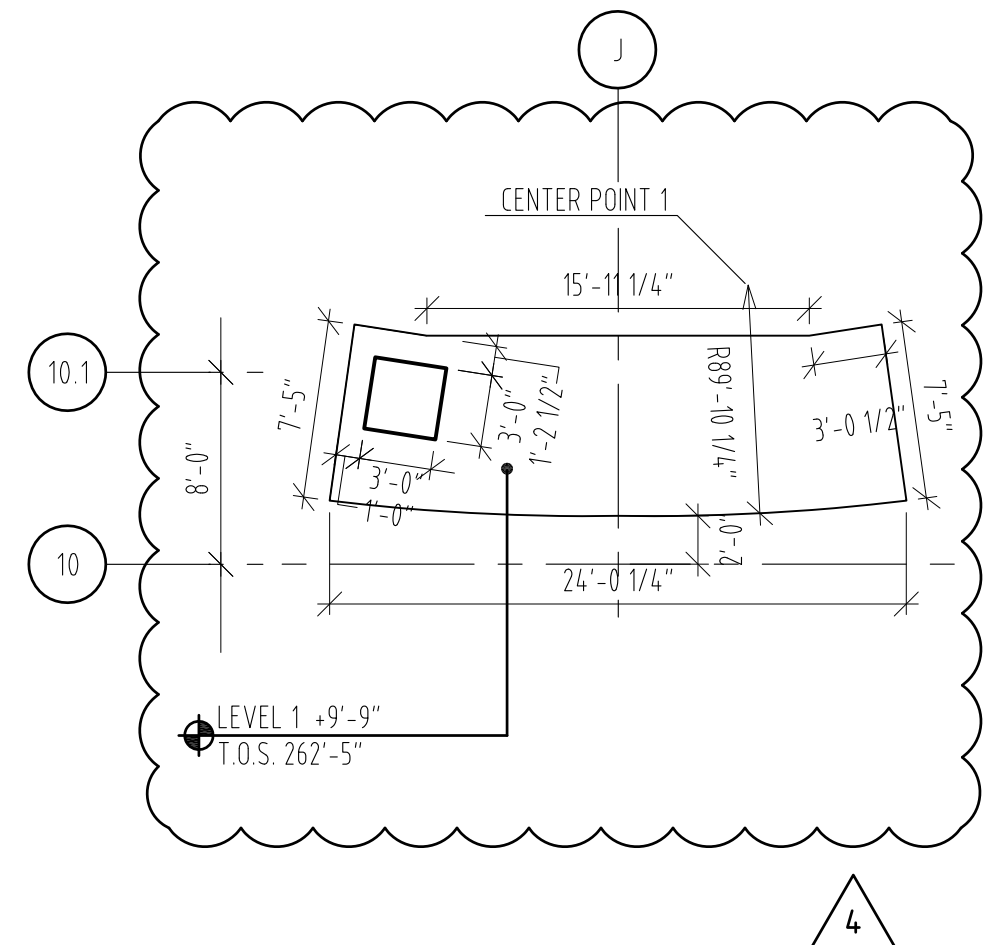
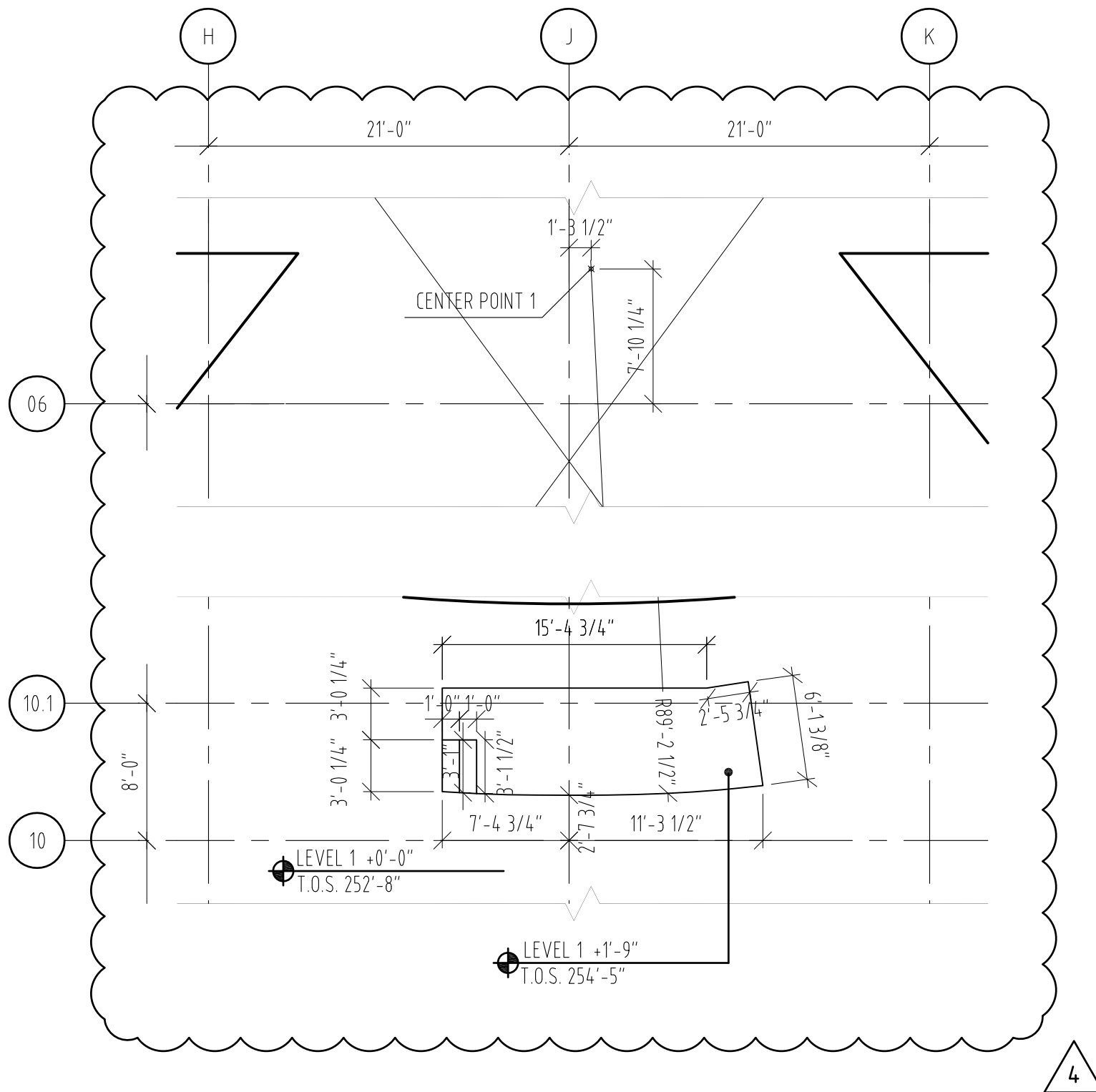
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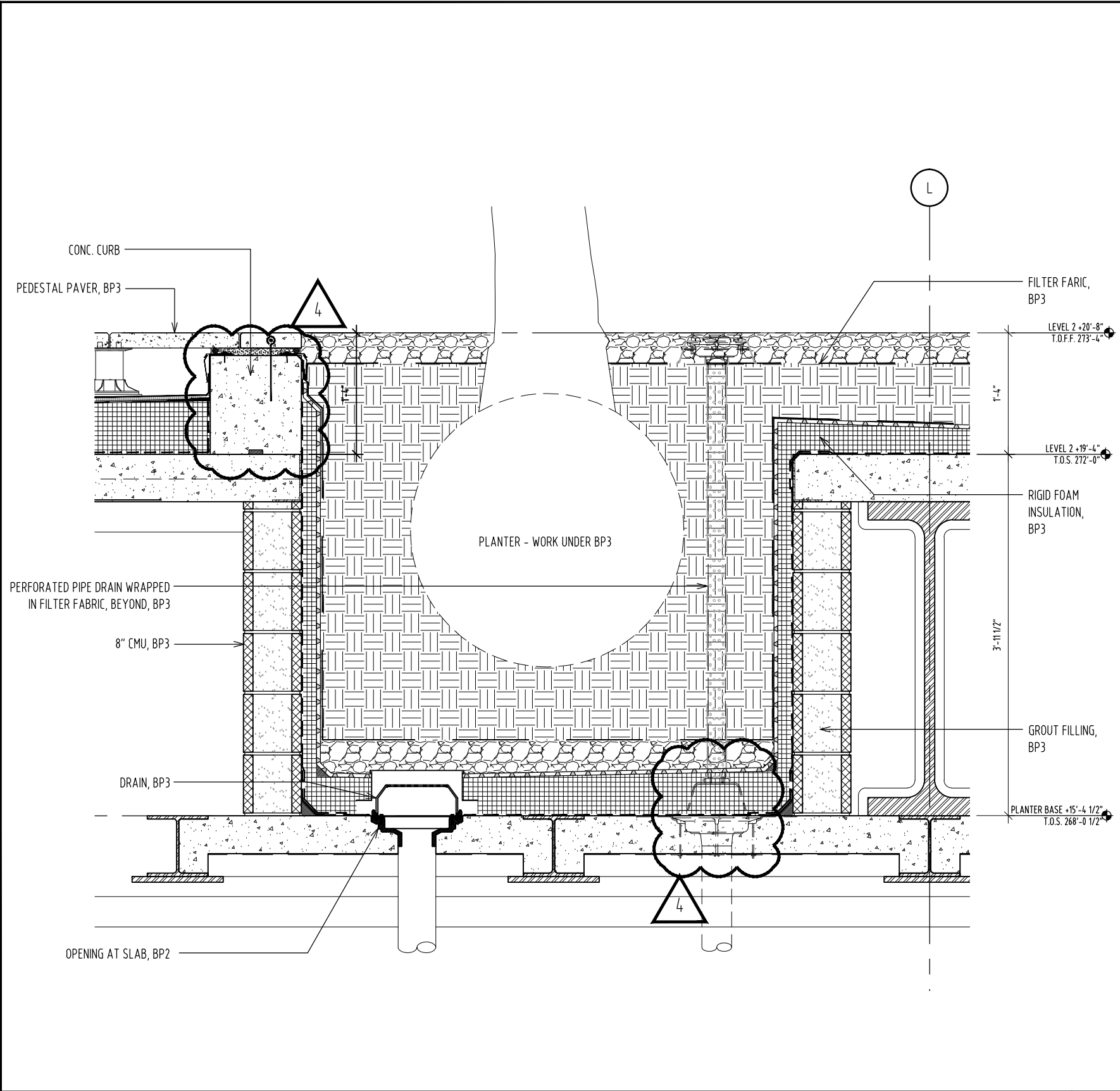
2012.01.20
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SLAB EDGE REVISION AT STAIR 08 - LEVEL 0
REF. DWG # A1600, A1600C
SHEET TITLE :

SCALE :
1/8" = 1'-0"
SHEET NUMBER :
A-SK-022

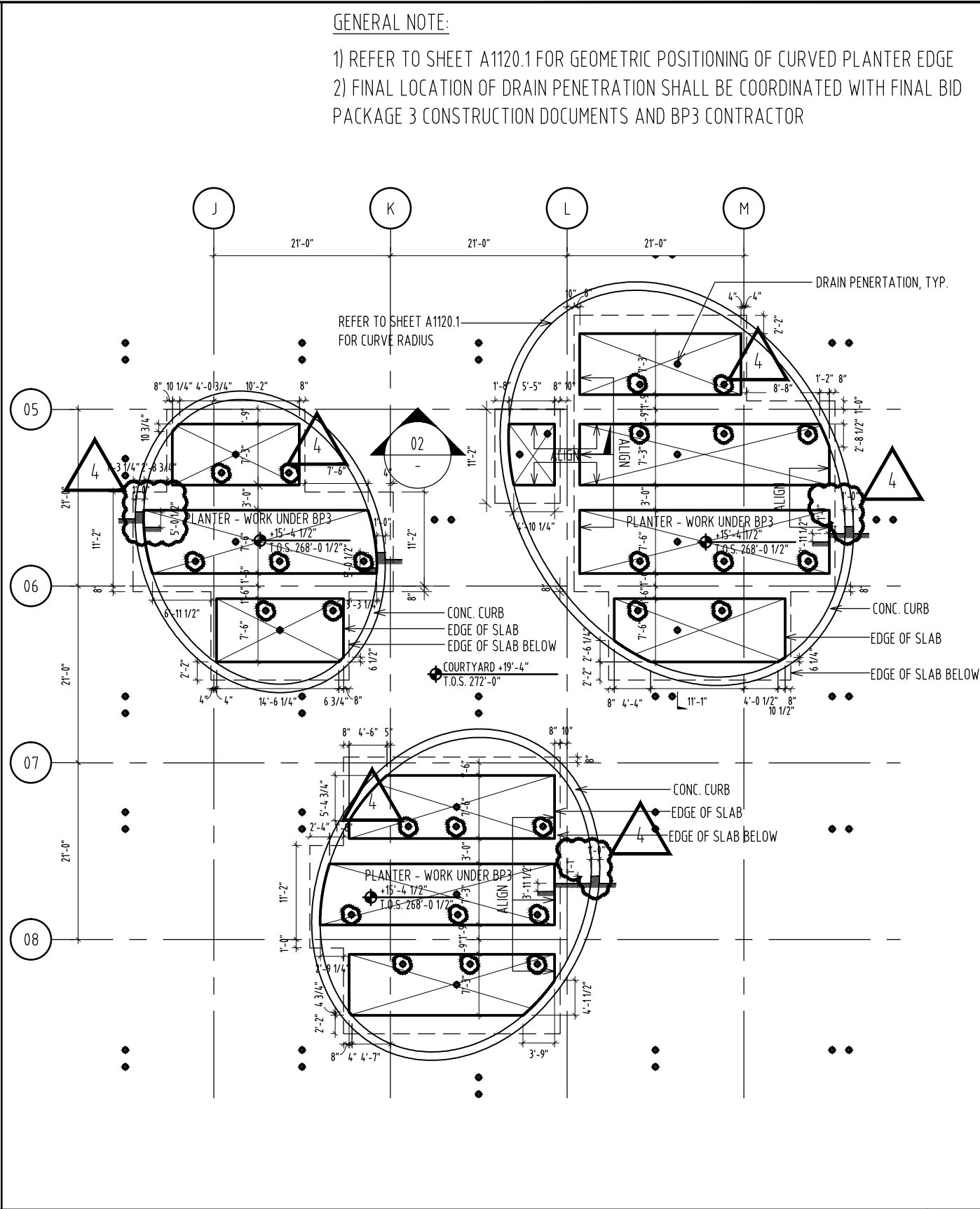






ENLARGED SECTION OF PLANTERS
SCALE 3/4" = 1'-0"

02



SLAB EDGE PLAN OF PLANTERS
SCALE 1/16" = 1'-0"

01

GENERAL NOTE:
1) REFER TO SHEET A1120.1 FOR GEOMETRIC POSITIONING OF CURVED PLANTER EDGE
2) FINAL LOCATION OF DRAIN PENERTATION SHALL BE COORDINATED WITH FINAL BID PACKAGE 3 CONSTRUCTION DOCUMENTS AND BP3 CONTRACTOR

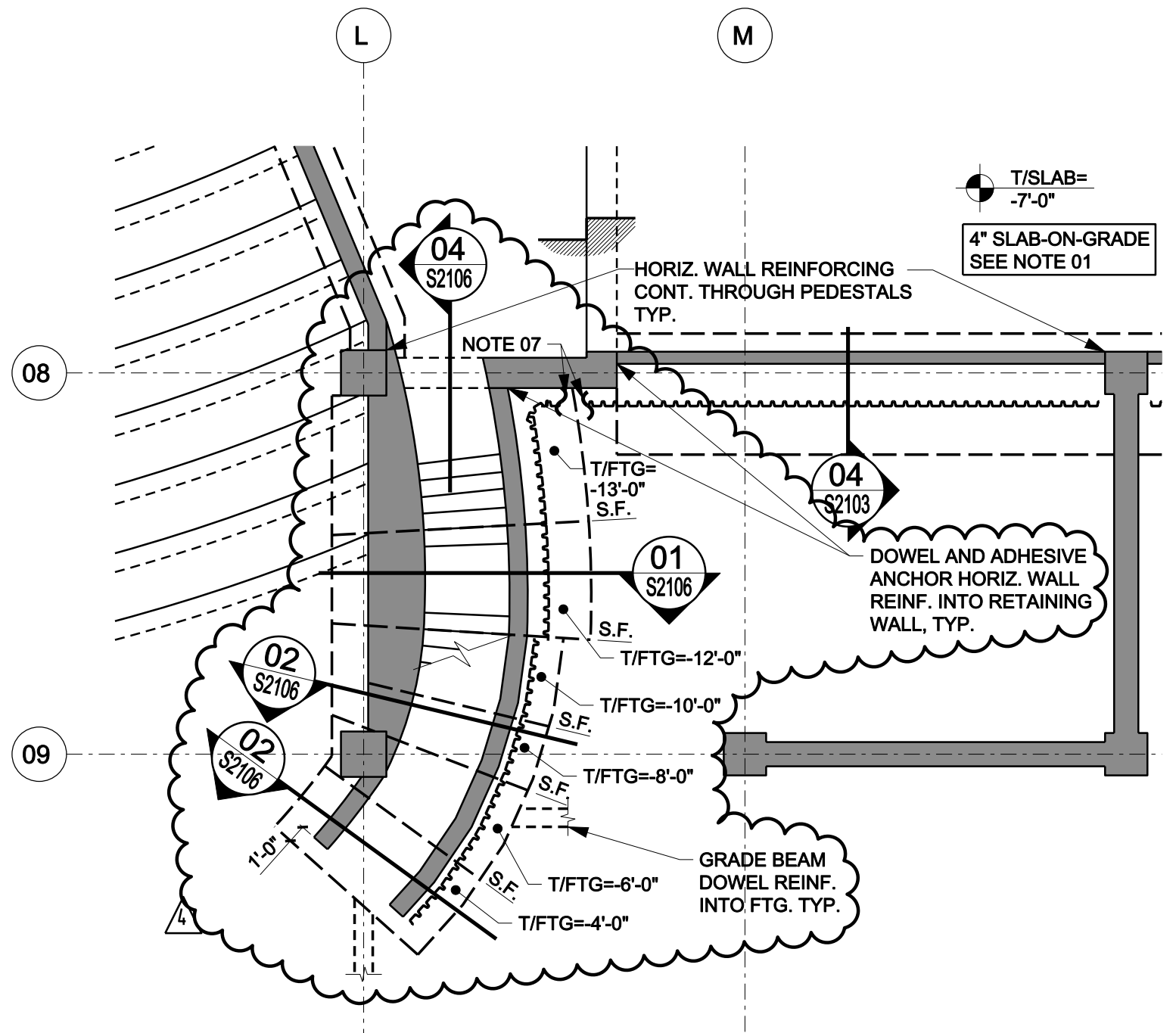
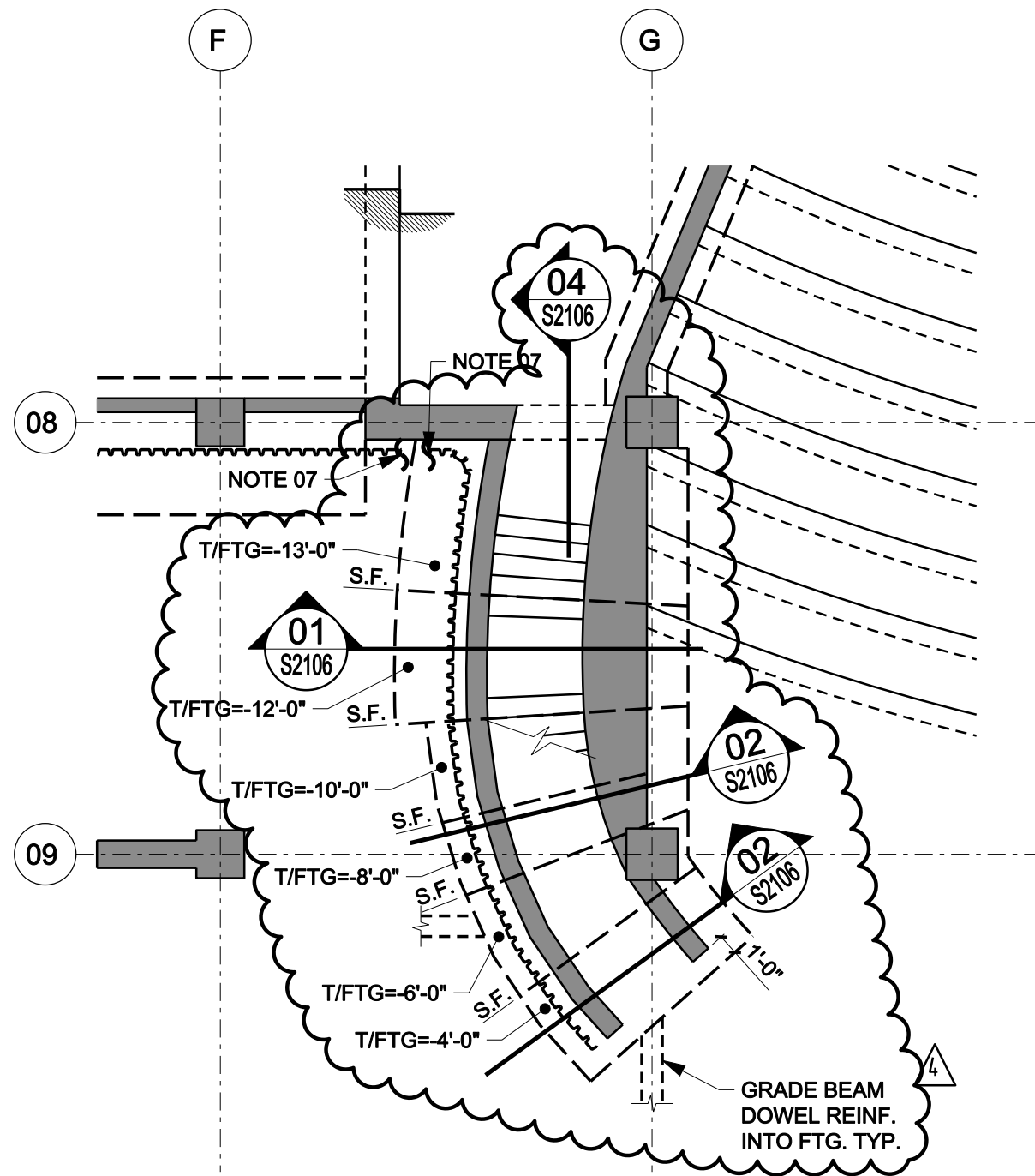
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PROJECT NO. 655.000

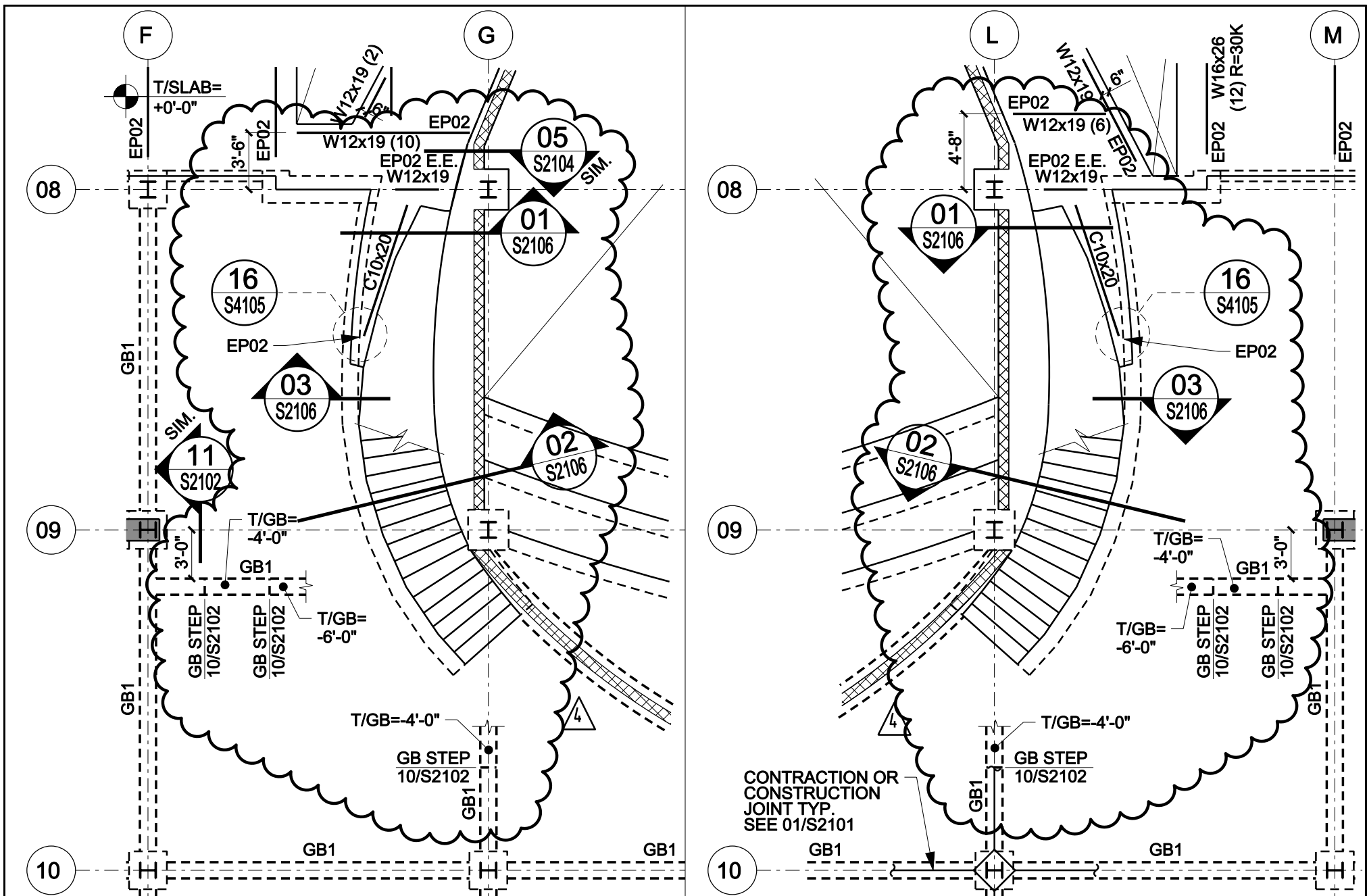
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SLAB EDGE REVISION AT PLANTERS - LEVEL 2
REF. DWG # A1620, A1620E
SHEET TITLE :

SCALE :
AS NOTED
SHEET NUMBER :
A-SK-026

FLOOR BOX TYPE	TYPICAL SECTION - AT LEVEL 3 & LEVEL 4	TYPICAL SECTION - AT LEVEL 0 & LEVEL 1 S.O.G. LOCATIONS	QUANTITY BY LEVEL
FSR FL500P SIZE: 10"(W) X 12"(L) X 6"(D) SIZE OF BLOCK-OUT: 12"(W) X 14"(L)	<p>TOTAL = 6</p>	<p>TOTAL = 6</p>	LEVEL 0 = 6 LEVEL 1 = 0 LEVEL 2 = 0 LEVEL 3 = 6 LEVEL 4 = 0 <hr/> GRAND TOTAL = 12
FSR FL600P SIZE: 13-1/2"(W) X 12"(L) X 6"(D) SIZE OF BLOCK-OUT: 15-1/2"(W) X 14"(L)	<p>TOTAL = 70</p>	<p>TOTAL = 95</p>	LEVEL 0 = 9 LEVEL 1 = 106 LEVEL 2 = 0 LEVEL 3 = 34 LEVEL 4 = 16 <hr/> GRAND TOTAL = 165
WALKER RFB2 SIZE: 6-1/2"(W) X 13-1/8"(L) X 3-7/16"(D) SIZE OF BLOCK-OUT: 8-1/2"(W) X 15-1/8"(L)	<p>TOTAL = 267</p>	<p>TOTAL = 303</p>	LEVEL 0 = 50 LEVEL 1 = 310 LEVEL 2 = 0 LEVEL 3 = 124 LEVEL 4 = 86 <hr/> GRAND TOTAL = 570





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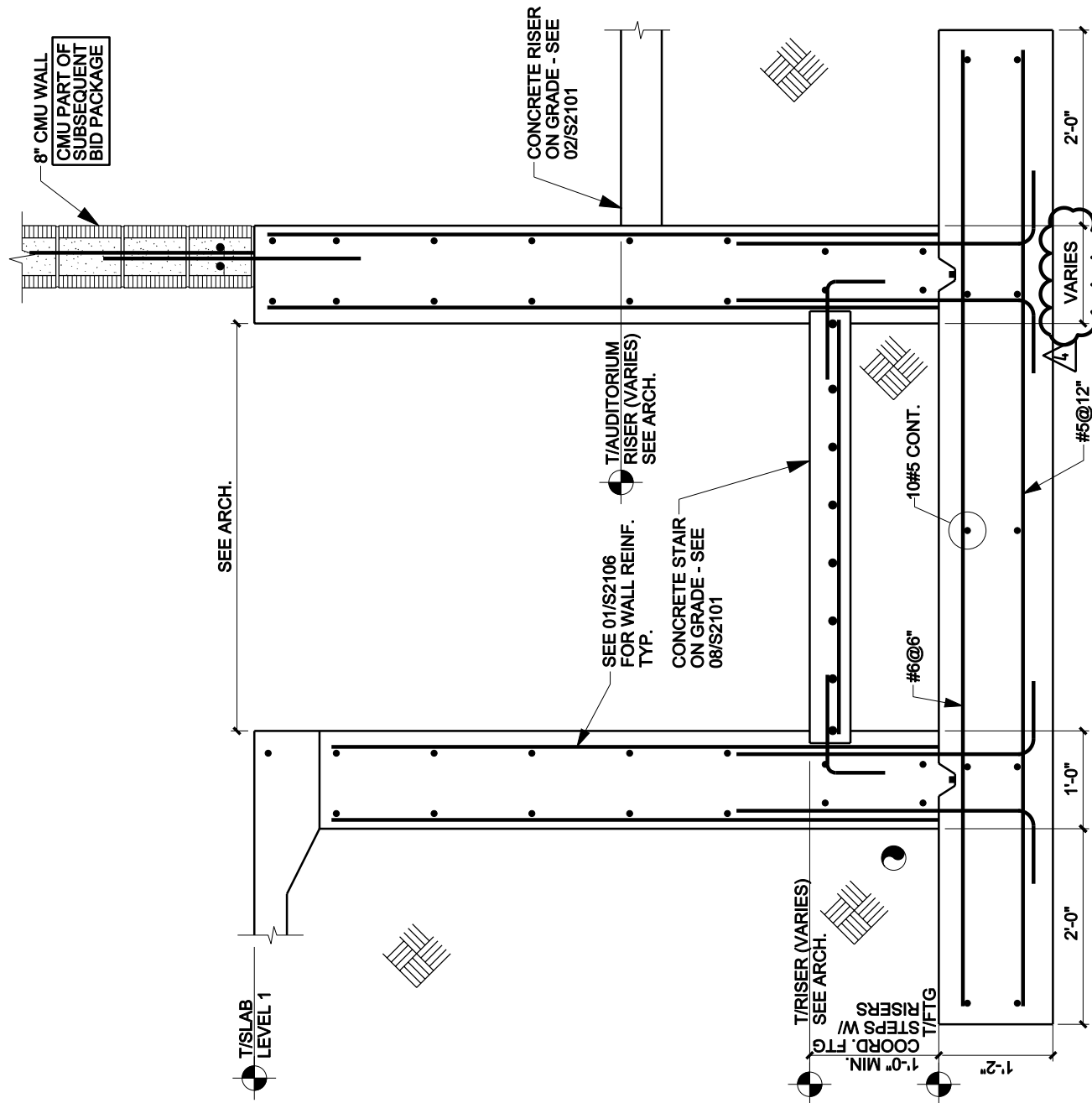
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FRAMING PLAN - LEVEL 1 - ZONE C
REF. DRAWING NO.: S1110C

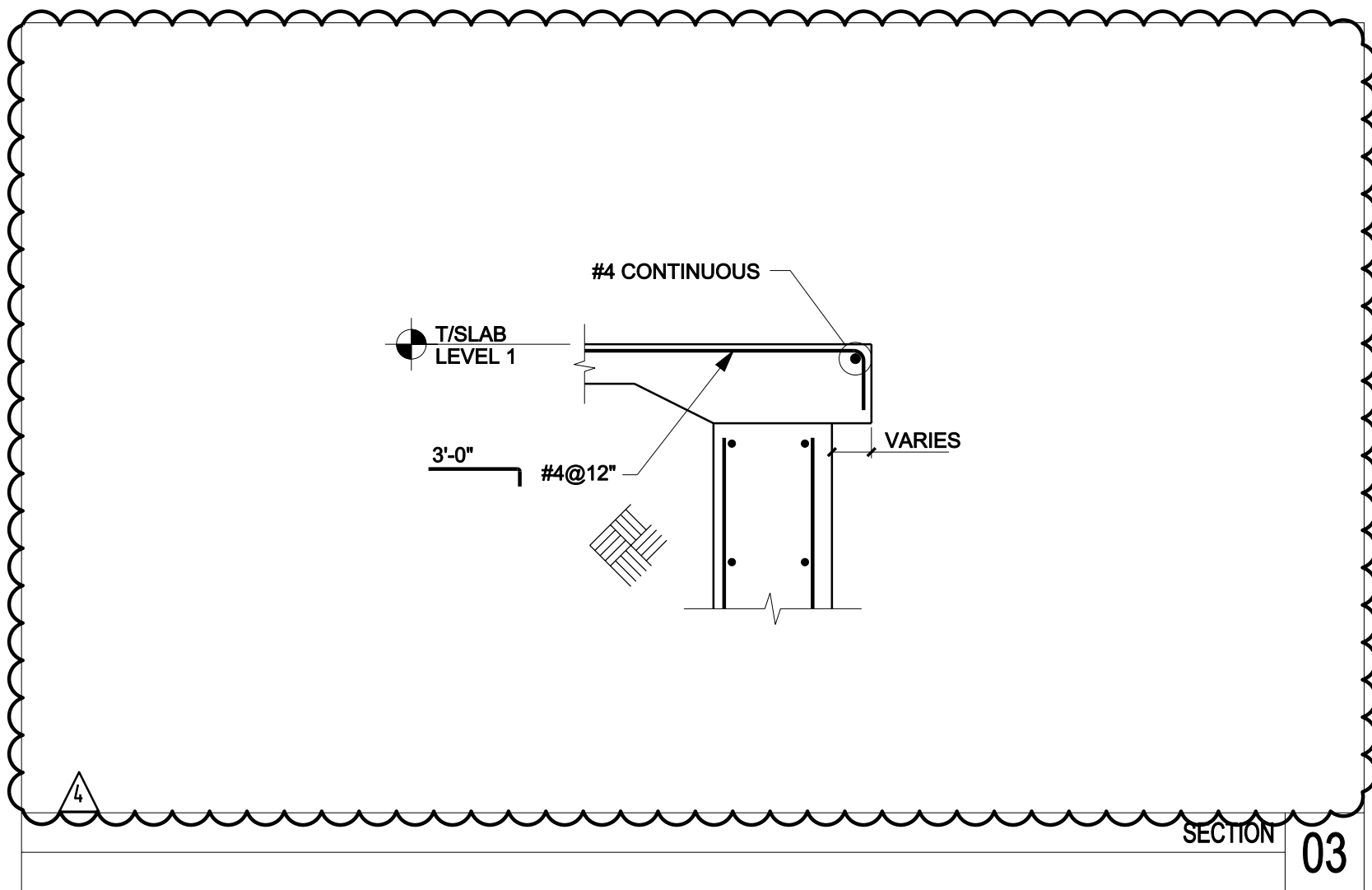
SHEET TITLE :

SCALE :
N.T.S.

SHEET NUMBER :
S-SK-020



NOTE: SEE 01/S2106
FOR INFO. NOT SHOWN



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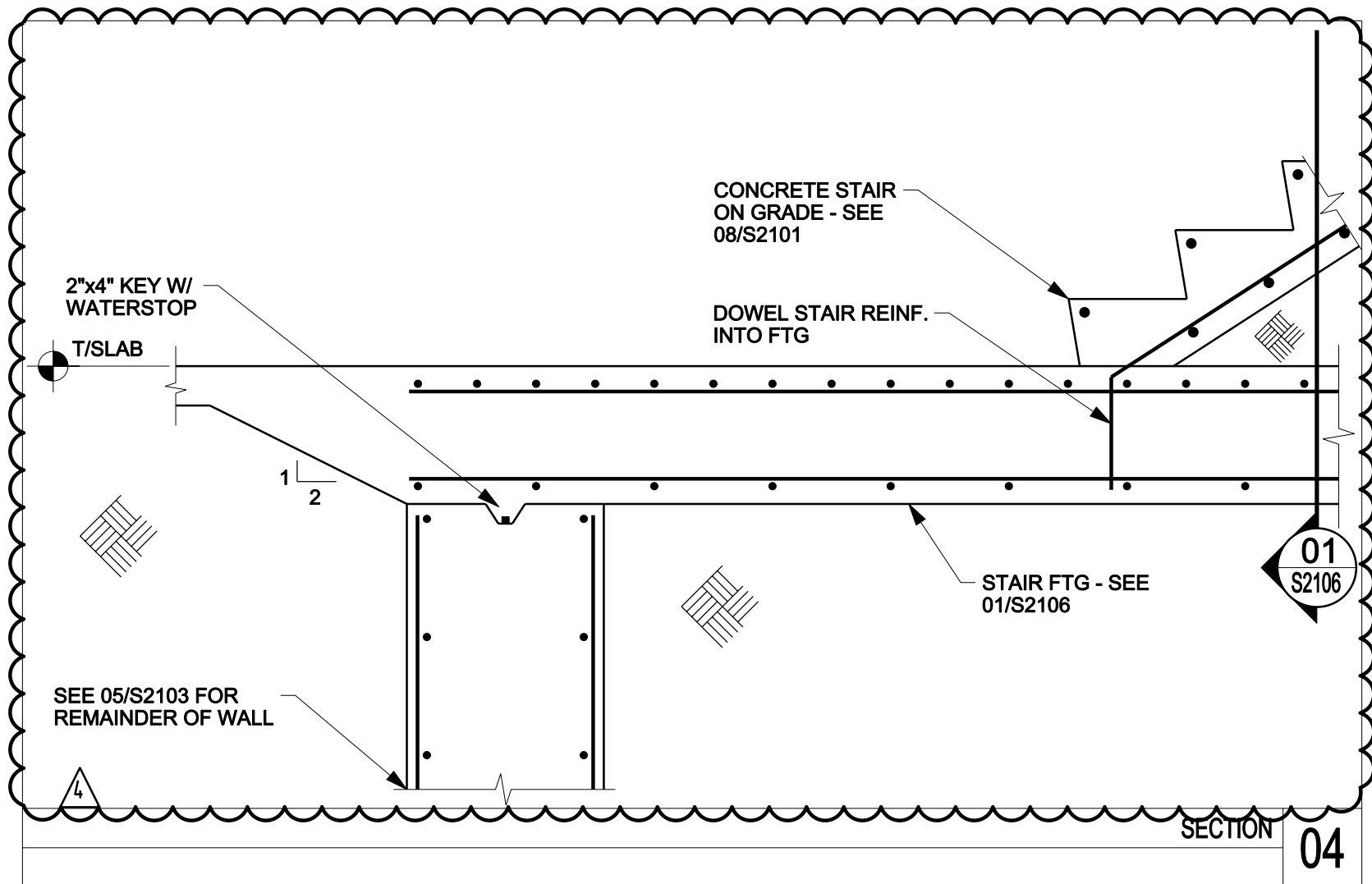
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FOUNDATION SECTIONS AND DETAILS
REF. DRAWING NO.: S2106

SHEET TITLE :

SCALE :
N.T.S.

SHEET NUMBER :
S-SK-023



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PROJECT NO. 655.000



2012.01.20

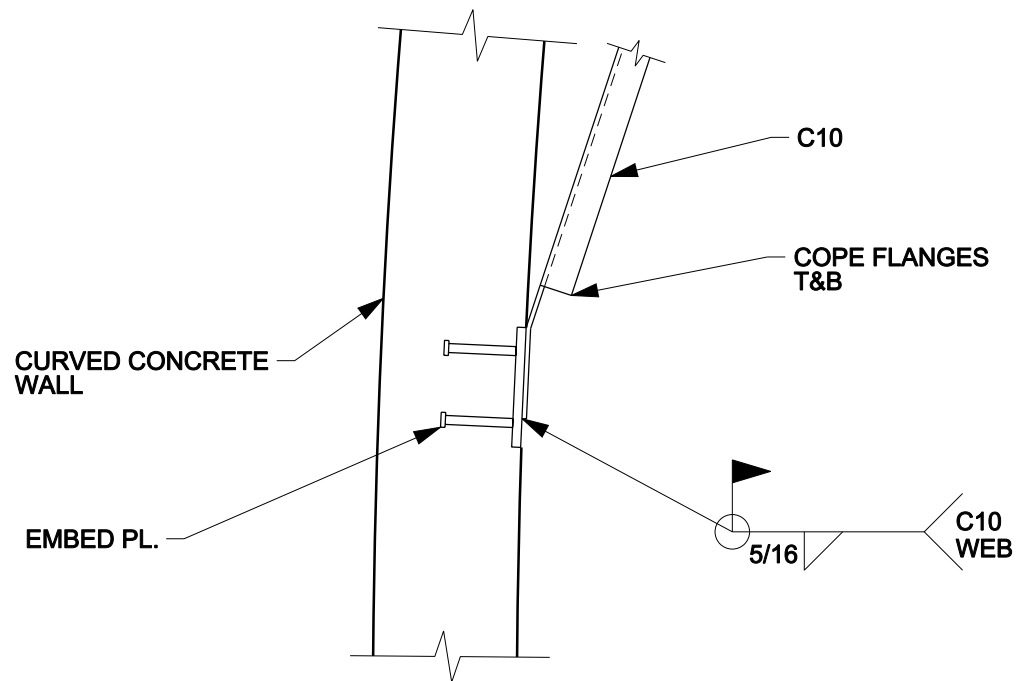
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FOUNDATION SECTIONS AND DETAILS
REF. DRAWING NO.: S2106

SHEET TITLE :

SCALE :
N.T.S.

SHEET NUMBER :
S-SK-024



DETAIL ⁴
16

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PROJECT NO. 655.000



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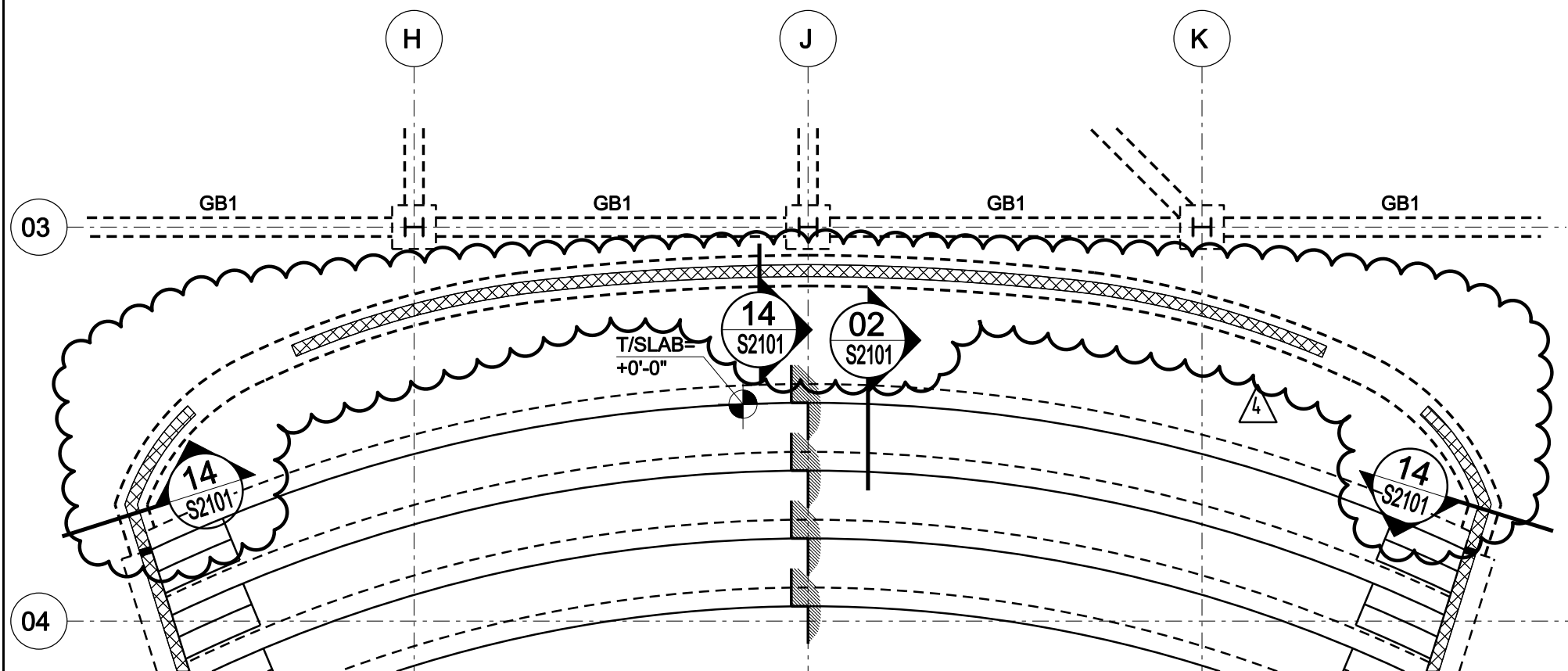


FRAMING SECTIONS AND DETAILS
REF. DRAWING NO.: S4105

SHEET TITLE :

SCALE :
N.T.S.

SHEET NUMBER :
S-SK-025



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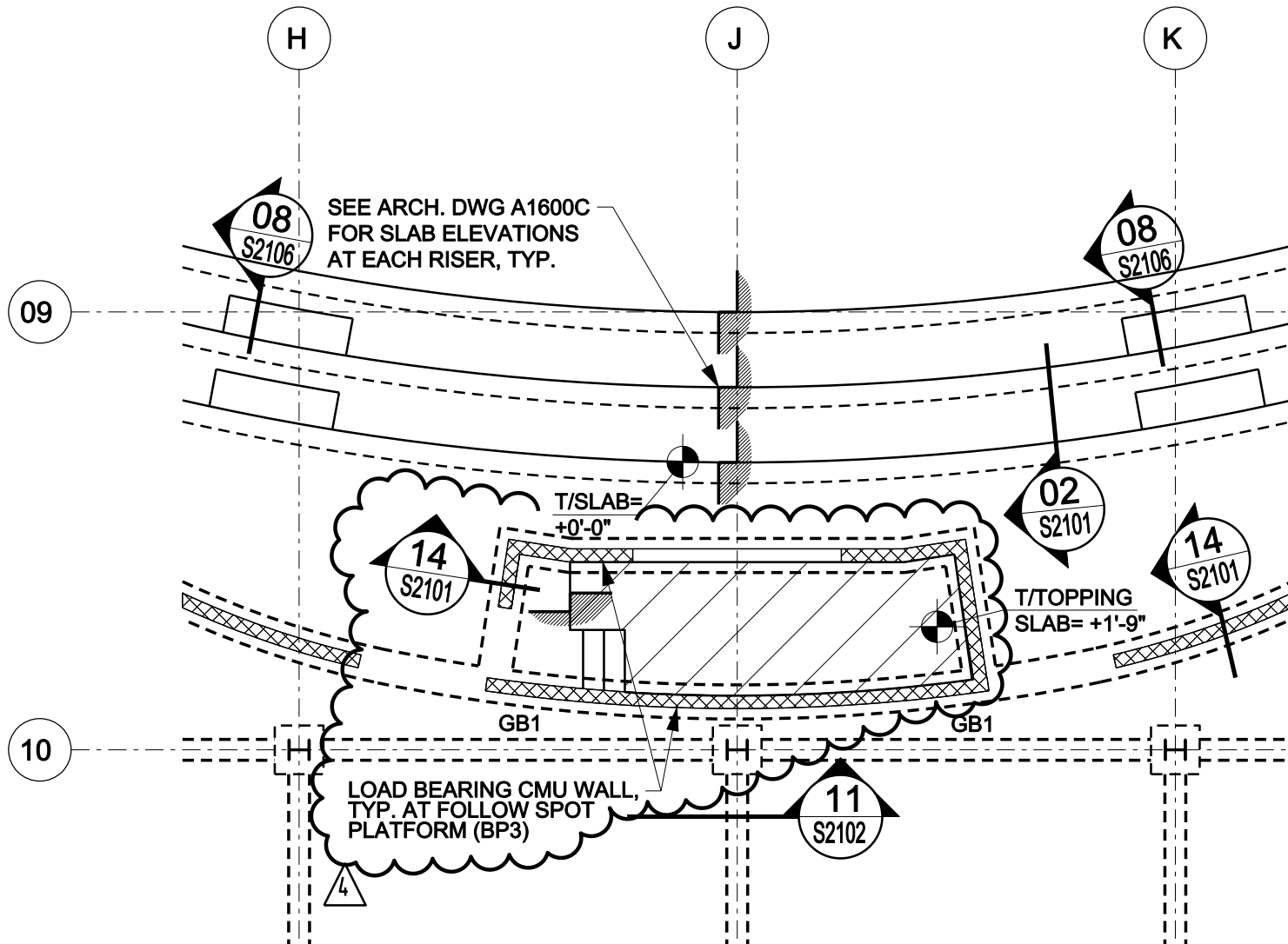
FRAMING PLAN - LEVEL 1 - ZONE F

REF. DRAWING NO.: S1110F

SHEET TITLE :

SCALE :
N.T.S.

SHEET NUMBER :
S-SK-027



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BP2-STRUCTURE ADDENDUM #002

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FRAMING PLAN - LEVEL 1 - ZONE C
REF. DRAWING NO.: S1110C

SHEET TITLE :

SCALE :
N.T.S.

SHEET NUMBER :
S-SK-028