SINCLAIR hille architects

Addendum #3

Project Name:	Nebraska Innovation Campus - 4H Building Renovation & NIC Office Building.
Project No.:	11053
Issued:	November 13, 2012
Bid Date:	**Tuesday**, November **20th,** 2012
Bid Opening:	2:00pm – Private Opening
Location:	728 Q Street Suite C, Lincoln, NE 68508

This Addendum is issued to all known bidders before receipt of proposals. This Addendum is to authorize the use of the following information in preparing proposals for the above named project. The bidder **must** enter the number of this Addendum on the **Proposal Sheet.**

GENERAL CLARIFICATIONS

ADD 3-1. A list of plan holders as of this date can be found at A & D Technical Supply, http://www.adtechplans.com

ADD 3-2. Concrete pavement joint pattern to be decided upon contractor. Joint pattern to be a square pattern with joint spacing at 15' maximum.

ADD 3-3. Site Demolition and Site Grading will be performed in a separate contract. The General Contractor shall coordinate this work with the grading and demolition Contractor.

ADD 3-4. Plan Sheet C300 is at a scale of 1"=30' and not 1"=20'.

ADD 3-5. Window Shades: All windows in the NIC Building are to have manually operated roller shades with single rollers and light filtering fabric. Refer to the wall sections for locations requiring the recessed shade pocket condition. All window shades in the 4H Building are to be manually operated shades with double rollers with light filtering and light blocking fabric. see ADD 3-10.a in this addendum for more information on window shades.

MODIFICATIONS TO THE DRAWINGS

ADD 3-6. COVER SHEET

a. Refer to keynote 061600.B. Change this keynote to 5/8" FIRE RESISTANCE TREATED, PLYWOOD WALL SHEATHING.

ADD 3-7. DRAWING C300

a. Add General Note reading "CONDENSER PIPING FROM PROPOSED CAMPUS LOOP ASSOCIATED WITH ALTERNATE NO 1B OR 1C SHALL BE DIRECT BURIED ASTM D3350, DR 9, HDPE PE3408/PE3608, WITH FUSED JOINTS.".

ADD 3-8. DRAWING AS100

b. Refer to Keynote 321313. This Keynote is to indicate 5" thick concrete paving.

c. In areas where concrete pavers are indicated, the 5" thick slab is depressed 4" and is to serve as the base for the concrete pavers.

ADD 3-9. DRAWING AS101

a. Drawing AS101 was issued with Addendum Number One but was not described in the "MODIFICATIONS TO THE DRAWINGS" portion of the addendum. Drawing AS101 includes enlarged plans of the trash enclosures and sections thru the parking lot screen walls.

b. Plaza Benches: The length of the plaza benches has been indicated on the attached drawings A1/AS100.
c. Added typical section L16/A304 tag to bench. See attached drawing A1/AS100.

ADD 3-10. DRAWING A101A

a. Refer to Vestibule 100.1. Design on this vestibule is not complete, Contractors are to include in their bid the materials and components of this vestibule already indicated on the drawings. There is to be a future skywalk from a building to the south of 4H that will extend over the top of this vestibule. That skywalk is not yet designed and will impact how Vestibule 100.1 is constructed not allowing design to be completed at this time. However, the scope of work that has been identified on the drawings will be necessary in the final solution and is to be included in the bid. It is anticipated that the design of the vestibule and skywalk will be finalized before this project concludes. Changes necessary to complete Vestibule 100.1 will be handled in accordance with specification Section 012600 – CONTRACT MODIFICATION PROCEDURES.
b. Refer to Door Opening 132 – Sliding Acoustical Door located at the east exterior wall of Auditorium Floor 131. There are to be a pair of 6'-6" x 9'-3" sliding hollow metal acoustical doors with astragals and seals. The doors are to be hung w/ "Barn Door" hardware – Tubular track hardware, style to be "Oden Face-mount" of Specialty Doors www.specialtydoors.com Each door to have one wall track, two trolleys, bottom guide post, guide track and mounting hardware assembly.

ADD 3-11. DRAWING A101C

a. In drawing A1/A101C, added detail callout G7/A403 and deleted keynote 074219.A. See attached sketch A1/A101C.
b. In drawing A10/A101C, added ladder for roof hatch. See attached sketch A10/A101C.

ADD 3-12. DRAWING A102A

a. Roller Window Shades in 4H Building: Clarification – The only locations where Roller Window Shades are to be installed in the 4H Building was described in Addendum Number One, (ADD 1-11.a). Roller Window Shades in the NIC Building are as indicated on the wall sections.
b. Dimensional controls for the sloped structural slab in the auditorium have been added with attachment A1/A102A.

ADD 3-13. DRAWING A106 and A107

a. Refer to the Room Finish Schedules. Add the following note:
In Rooms where the roof or floor structure above is left exposed in finished areas, all exposed ductwork, conduit and piping is also to be painted to match the exposed structure above.
b. Refer to the Room Finish Schedules, Floor Finish columns: The indication CPTM is an abbreviation for "modular carpet" it does not indicate Carpet M.

ADD 3-14. DRAWING A107

a. Refer to the Room finish Schedules. The floor finish in rooms 1101 and 2101 are to indicate both modular carpet (CPTM) and ceramic tile (CT) See sheets 801D and 802D for extent of ceramic tile.

ADD 3-15. DRAWING A202

a. Added keynote 074213.J2 to drawing H5/A202. Coordinated graphics to match keynote. See attached sketch H5/A202.

ADD 3-16. DRAWING A301

a. Added detail callout N7/A403 to drawing A1/A301. Overhang at entry to Link Vestibule modified. See attached sketch A1/A301.

ADD 3-17. DRAWING A304

a. Added typical section detail L16/A304 of plaza benches. See attached sketch L16/A304.

ADD 3-18. DRAWING A351

a. Detail A6; Delete the following keynote 097713.A from the windows and replace with 085113.B. Delete keynote 097713.A from 2nd floor wood veneer mullion at middle bay of windows – see H11/A510 for keynotes associated with typical Area A exterior windows.

ADD 3-19. DRAWING A400

a. Reference Detail N4; Replace with new detail – see attached N4/A400.
b. Reference Detail D13; Add ½" ¼-round hardwood trim stained finish at trim transitions as shown. Replace with new detail – see attached D13/A400.
c. Reference Detail 5; Replace with new clerestory plan detail – see attached K4/A400.
d. Reference Detail 4; Replace with new clerestory plan detail – see attached K7/A400.

ADD 3-20. DRAWING A401

a. Added zinc escutcheon plate to detail M1/A401. Added keynote 074213.J2. See attached sketch M1/A401.

ADD 3-21. DRAWING A403

a. Added section detail N7/A403 of overhang at Link Entry Vestibule. See attached sketch N7/A403.
b. Added plan detail G7/A403 of overhang at Link Entry Vestibule. See attached sketch G7/A403.

ADD 3-22. DRAWING A510

a. Refer to detail H15; Replace with new interior elevation - see attachment H15/A510.

ADD 3-23. DRAWING A600

a. Refer to Detail K16: The embed plate and steel angle assembly that is to support the hanger rods of the moveable partition shall be installed in 23 locations (each partition) at spacings determined by partition manufacturer.
b. Add Detail D10 showing section detail of fabric transition to wall below between windows in Area A – see attached D10/A600. Also see interior elevation H15/A510 this addendum.
c. Add Detail D12 showing plan detail of furred out condition between windows in Area A – see attached D12/A600. Also see interior elevation H15/A510 this addendum.

ADD 3-24. DRAWING A801D

a. In the Link Building, the flooring transition at gridline H, the carpet indicated should read CPT-1.
b. In Vestibule 1100 the CPT should read, CPT-6.
c. In the north Vestibule, it should read CPT-6.
d. South of Corridor 1201, the transitions indicated between carpet and tile are to be eliminated. Addendum 01 changed the carpet in those locations to Tile (see ADD1-17.a).

ADD 3-25. DRAWING A802D

a. Refer to the transition indicated between carpet and tile at the elevator lobby. There will be no carpet installed on the second or third floor in the NIC Building
b. Refer to NIC Link 2101. Where the transition between the tile on the steps and the floor level and the bottom of the ramp and the floor level, the carpet is to be CPT-1.
c. Refer to Office 2100 (@ gridlines G6). The carpet in this room is to be CPT-7

ADD 3-26. DRAWING S101CD

a. The note "LOWER FOOTING" appears in several locations. Change the note to read "LOWER BOTTOM OF FOOTING TO MATCH BOTTOM OF GRADE BEAM. SEE DETAIL 2/S502CD."

ADD 3-27. DRAWING S501AB

a. The footing extensions previously specified (Sketch 1, Addendum 1) at grid locations e13-eF.9, e14-eF.9, and e15-eF.9 shall be 9'-6" wide instead of the 9'-0" dimension specified. Ten dowels shall be provided top and bottom as shown.

ADD 3-28. DRAWING S502AB

a. As clarification to the beams listed in the Concrete Beam Schedule; the beams listed are miscellaneous beams noted on the framing plan. No beam elevations are provided.

b. See attached Sketch S17. The detail has been revised to match architectural.

c. See attached Sketch S18 and Sketch S19. The edge beam structural depth is 16" (5" slab + 11" below the slab). In addition, the beam is deeper at the sides of the existing windows.

ADD 3-29. DRAWING F101, F102, F103

a. Add General Note reading "ALL FUTURE TENANT SPACES SHALL BE DESIGNED FOR A LIGHT HAZARD OCCUPANCY WITH ONE SPRINKLER HEAD PER 130 SQUARE FEET."

ADD 3-30. DRAWING M403C

a. Modify keyed note 16 to read, "CAMPUS CONDENSER LOOP PIPING BELOW BUILDING SHALL BE DIRECT BURIED ASTM D3350, DR 9, HDPE PE3408/PE3608, WITH FUSED JOINTS TO MATCH MATERIAL SPECIFIED FOR EXTERIOR CAMPUS CONDENSER PIPING."

ADD 3-31. DRAWING E104A

a. Refer to keyed note 8; replace the phrase “4 inch” with “3 inch” in the first sentence.

ADD 3-32. DRAWING E104A

a. Refer to keyed note 5; replace the phrase “#RF34 box” with “RFB4 box”.

ADD 3-33. DRAWING E105B

a. Provide three additional wall mounted fire alarm speaker strobes on the east wall of Corridor-Link 200 (4 speaker strobes in all). Space devices per NFPA requirements.

ADD 3-34. DRAWING E401

a. Refer to Plan 2; add a ceiling speaker strobe fire alarm device in Room 119.

ADD 3-35. DRAWING E501

a. Refer to Detail 1; remove the word ‘galvanized’ from the description of the light pole. Light poles shall be finished with a powder coated paint, not with a galvanized finish.
b. Refer to Detail 2; remove the word ‘galvanized’ from the description of the light pole. Light poles shall be finished with a powder coated paint, not with a galvanized finish.

ADD 3-36. DRAWING E502

a. Refer to Detail 3, keyed note 4; replace the phrase “CAT 6A” with “CAT 6”.

ADD 3-37. DRAWING E505

a. Refer to Detail 3, keyed notes 9 and 11; replace the phrase “CAT 6A” with “CAT 6”.

ADD 3-38. DRAWING E604

a. Refer to the lighting fixture schedule; add the following manufacturers in the ‘other manufacturers’ column of the table as follows:

Fixture Type Nos. M1, M2	Legion Lighting
Fixture Type Nos. M5, M7	Metalux

b. Refer to the Lighting Fixture Schedule, add the following manufacturer to the ‘Other Manufacturer’ column of the schedule: Type K1 Lighting Fixture – Beacon Lighting.

MODIFICATIONS TO THE SPECIFICATIONS

ADD 3-39. BID PROPOSAL FORM

a. Refer to the Bid Proposal Form issued in Addendum 01. Replace that bid proposal form with the Bid Proposal Form included with this addendum. Allowance 1 and 1A were combined and the amounts were changed.

ADD 3-40. SECTION 012100- ALLOWANCES

b. Refer to The Schedule of Allowances as issued in Addendum 01. Replace that schedule with the schedule included with this addendum. Allowance 1 and 1A were combined and the amounts were changed.

ADD 3-41. SECTION 034500- PRECAST ARCHITECTURAL CONCRETE

a. Refer to article 2.A. Stonco and Artisan Stone have been approved as Fabricators.

ADD 3-42. SECTION 057300- DECORATIVE METAL RAILINGS

a. Refer to article 2.1.A.2. Illuminated Decorative Railings, sub-paragraph a, add the following: Section 265100, Part 3.1, Paragraph F. Also see the Lighting Fixture Schedule (Type K1 fixture) on sheet E604.

ADD 3-43. SECTION 061600- SHEATHING

a. Refer to keynote 061600.B. Change this keynote to 5/8" FIRE RESISTANCE TREATED, PLYWOOD WALL SHEATHING.

ADD 3-44. SECTION 071416- COLD FLUID-APPLIED WATERPROOFING

a. Refer to article 2.1.A.1. Polyguard Poly Wall Commercial Stretch is an approved substitution.

ADD 3-45. SECTION 072100- THERMAL INSULATION

a. Refer to article 2.1.B.1. Hunter Panels Xci CG is an approved substitution
a. Refer to article 2.1.A.1. Foam Control Plus 250 will be allowed for below grade perimeter foundation insulation applications only.

ADD 3-46. SECTION 072726- FLUID-APPLIED MEMBRANE AIR BARRIERS

a. Refer to article 2.3.A.1. STO; StoGuard is an approved substitution.

ADD 3-47. SECTION 083323- OVERHEAD COILING DOORS

a. Refer to article 2.6.A.1. Cornell Ironworks is an approved substitution.

ADD 3-48. SECTION 096813- TILE CARPETING

a. Refer to article 2.1.A.1. Lees and Interface have been approved as substitutions for the specified products. The specific products are as follows:
    a. Lees –
        i. CPT-1 Wavelength
        ii. CPT-2 A Premonition
        iii. CPT-4 A Premonition
        iv. CPT-5 First Step
        v. CPT-6 First Step
        vi. CPT-7 Wavelength
        vii. CPT-8 Coordination (Mohawk)
    b. Interface –
        i. CPT-1 Reduce
        ii. CPT-2 Redeliver
        iii. CPT-4 ReDesign
        iv. CPT-5 Entry Level
        v. CPT-6 Entry Level
        vi. CPT-7 Deliver
        vii. CPT-8 Viva Colores

ADD 3-49. SECTION 096813- SHEET CARPETING

a. Refer to article 2.1.A.1. Lees has been approved as a substitution for the specified product. The specific products are as follows:
    a. Lees –
        i CPT-1 Wavelength

ADD 3-50. SECTION 099123- INTERIOR PAINTING

A. Add the following paint system for Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings.

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior, MPI #50.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1), MPI #53.

ADD 3-51. SECTION 126100- FIXED AUDIENCE SEATING

a. Refer to article 2.3.A.1. Sedia Systems from Carroll Seating Company is an approved substitution.
b. Refer to article 2.3.A.1. American Seating Company, Focus Acton is an approved substitution.

ADD 3-52. SECTION 122400- HYDRAULIC ELEVATORS

a. Refer to article 2.1.A.3. Schumacher Elevator Company is an approved substitution.

ADD 3-53. SECTION 211200 – FIRE SUPPRESSION STANDPIPES

1. Refer to Paragraph 1.5.C, delete both sub-paragraphs 1 and 2. To clarify, the fire standpipe pressure will be provided through the FDC by the fire department in a fire event

ADD 3-54. SECTION 221113- FACILITY WATER DISTRIBUTION PIPING

a. Entire section is an addition.

ADD 3-55. SECTION 221313- FACILITY SANITARY SEWERS – PRIVATE SEWER SERVICE

a. Entire section is an addition.

ADD 3-56. SECTION - VARIOUS MECHANICAL SPECIFICATIONS

a. The following manufacturers have received prior approval for the sections listed for bidding purposes subject to shop drawing review:

1) 233113 – Metal Ducts (Single and Double Wall Round)	SET Duct Mfg.
2) 233413 – Axial HVAC Fans	Aerovent
3) 233423 – HVAC Power Ventilators	Aerovent

ADD 3-57. SECTION 262923 – VARIABLE FREQUENCY MOTOR CONTROLLERS

a. Refer to Paragraph 2.6.B, replace paragraph with the following: NC and NO auxiliary contact(s). Unless specifically noted on the plans, a bypass contactor / switch is not required for VFDs on this project.

ADD 3-58. SECTION 283111 – DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

a. Remove the following manufacturer from the approved manufacturer list: Edwards.

ADD 3-59. SECTION 321313- CONCRETE PAVING

a. Entire section is an addition.

ADD 3-60. SECTION 321373- CONCRETE JOINT SEALANTS

a. Entire section is an addition.

ADD 3-61. SECTION 334100- STORM UTILITY DRAINAGE PIPING

a. Entire section is an addition.

End of Addendum #3

BID PROPOSAL

CONTRACTOR:

DATE:

TO: **NEBRASKA NOVA LLC**
c/o Scott Woodbury Wiegert
728 Q Street, Suite C
Lincoln, Nebraska 68508

RE: **4H and NIC SDL1 Buildings**
Nebraska Innovation Campus
Lincoln, Nebraska

The undersigned having carefully examined the drawings, the Instructions to Bidders, the Contract Form, Supplementary General Conditions, and Specifications pertaining to the above-referenced Project; having familiarized myself with the site and job conditions; and having visited the site and observed and accepted all existing conditions, hereby proposes and agrees to furnish all labor, materials, equipment, plant, transportation, services, sales taxes, inspection fees, permits, testing, and other costs necessary to complete the construction of the Work for the above Project in strict conformity with said Documents and any Work specified in Addenda for the lump-sum cost and terms as described below.

I acknowledge receipt of Addenda:_____.

FIXED LUMP SUM BASE BID:

	4H Building	NIC SDL1 Building
Cost for all building construction and associated improvements for the 4H and Connector Buildings and	$	
Cost for all building construction and associated improvements for the NIC SDL1 Building is:		$
Cost for all site and utility work within the designated contract limit area, which shall include grading of entire site, is:	$	
TOTAL FIXED LUMP SUM BASE BID **(Aggregate amount to equal the sum of each individual building)**	**#VALUE!**	

ALTERNATES

1. Bidder acknowledges that an alternate is an amount proposed by Contractor and stated on the Bid Form that will be added to or deducted from Base Bid Amount if Owner decides to accept a corresponding change in either Scope of Work or in products, materials, equipment, systems, or installation methods described in Contract Documents.
2. Bidder acknowledges its responsibility to coordinate related work and modify or adjust adjacent work as required so that alternate is complete and fully integrated. Any additional cost or savings associated with adjustments or modifications in adjoining work are included in the respective alternate. Alternate also includes any miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
3. Owner shall generally notify Bidder of selected alternates in conjunction with the award of the contract. Notwithstanding, Bidder acknowledges that Owner has the right to defer a decision on any alternate until after an award at no additional cost to the Owner provided the final decision thereof is made in a timely manner as to not affect the normal sequencing of the Work.

	Description	4H Building	NIC SDL1 Building
1a	Provide traditional chiller/boiler central plant system with McQuay WMC250	$	$
1b	Provide chiller/heater central plant system with Trane RTWD screw chiller/heaters	$	$
1c	Provide chiller/heater central plant system with Multistack chiller/heaters	$	$
2	PVC Aboveground Sanitary Waste, Vent and Storm Drain Piping	$	$
3	PVC Underground Sanitary Waste, Vent and Storm Drain Piping	$	$
4	Pressure Seal Copper Fittings.	$	$
5	Data Room VAV Boxes.	$	$
6	Parking Lot Screen Walls	$	$
7	West Sun Shading.	$	$
8	Canopy.	$	$

BID PROPOSAL

ALLOWANCES

1 Where allowances are called for, Bidder has included the amount in its Base Bid.

2 Bidder's costs for unloading, handling, labor, installation, overhead, profit, and other expenses contemplated for the original allowance shall be included in the Base Bid and not in the allowance.

3 Bidder acknowledges that the Contract Sum will be adjusted by the actual cost of the allowance without any application of or adjustment to overhead, profit, general conditions, or other expenses associated therewith for handling and labor.

4 Bidder acknowledges that the Contract Sum will be adjusted for unit-cost type allowances based solely on the difference between the actual unit purchase amount and the unit allowance multiplied by the final measure or count of work-in-place with reasonable adjustment, where applicable, for cutting losses, tolerances, mixing wastes, and similar margins. No mark-up shall be included with respect to allowance costs and change order prices.

Cost of each item to be included in Base Bid.		4H Building	NIC SDL1 Building
1	Cost of all Building Permit and Impact Fees included in the Base Bid are:	$13,896.00	$92,189.00
2	Quality control and testing. Indicate the amount included in Base Bid.	$5,000.00	$5,000.00
3	Signage Allowance	$2,500.00	$2,500.00
4	Contingency Allowance	$ 120,000.00	$120,000.00

PERFORMANCE BOND

The undersigned agrees if awarded the Contract and, if so directed by Owner, to deliver to the Owner within 10 calendar days after signing the Contract, a satisfactory Performance and 100% Material and Labor Payment Bond on a form and with a bonding company acceptable to Owner. The cost of such Bond will be added to the Lump Sum Base Price.

1	The cost of the bonds described above will be equal to: (express as a % of the Contract Sum)	%	%
2	Adjustments to the above amount based on changes in scope (indicate % if different from the % above):	%	%

BID PROPOSAL

TIME OF COMPLETION

The time period required to complete the work expressed in the number of calendar days from the time of Notice to Proceed is as indicated. The dates established below are based on the assumption that the Contract for the entire project is awarded within no more than 60-days of the receipt of bids and that a building permit is available to be picked up as of the date of the Notice to Proceed. Any Notice to Proceed will include authorization to proceed on both buildings simultaneously.

1	If this proposal is accepted, the undersigned agrees to complete building core and shell construction for the NIC SDL1 Building within the number of calendar days indicated from the date of receipt of Notice to Proceed.		Days
2	Time required to complete the 4H and Connector Building construction including interior finish for common areas and UNL conference center portion after given Notice to Proceed is:		Days
3	Time required to complete site and utility work including landscaping after given Notice to Proceed is:		Days
4	Contractor agrees to pay liquidated damages in the amount of $2,000.00 per day for each calendar day that work is not substantially complete beyond the indicated time of completion of the each portion of the work.	$ 2,000.00	$ 2,000.00

CHANGES IN THE WORK

The undersigned agrees if work is added or deducted by written order of the Owner and such work is not called out as an alternate or a unit price, the cost of such changes shall be determined in accordance with the provisions of the Supplementary General Conditions and the percentage mark-up added shall be as follows:

1	For work not scheduled, performed by this contractor, mark-up on account of all General Conditions and contractor profit and overhead on net-direct cost of materials and labor will be as indicated. Material, labor, and equipment rates to be as described in A201 General Conditions of the Contract, as modified.		%
2	For work not scheduled, performed by any subcontractor, mark-up for contractor on account of all General Conditions, profit and overhead on subcontractor costs will be as indicated. Material, labor, equipment rates, and subcontractor mark-up to be as described in A201 General Conditions of the Contract, as modified.		%
3	For work deleted, general contractor's mark-up and/or credit on account of general supervision, overhead and other general conditions shall be as indicated. Insert zero if none or provide the % of additional credit to be added to the actual value of the work deleted.		%

BID PROPOSALS AND CONTRACT

1. The undersigned understands that the preparation and submission of this Proposal and other quotations herein contained does not obligate the Owner or Architect in any way; and that the Owner assumes no obligation to enter into a contract for the work.
2. If awarded a contract or contracts for the work, the undersigned agrees to execute the Contract Agreement on the form provided herein with the appropriate blank spaces filled in, in accordance with the above-stated compensation.
3. This Bid Proposal is a firm offer continuing for sixty (60) days after the date set for the opening of bids. If the undersigned is notified of the acceptance of this Proposal within the 60 day period, he agrees to execute the Construction Contract for the above-stated compensation.
4. A 5% Bid Bond is included herewith. If Owner notifies contractor of its intent to award the work and contractor fails to enter into the Contract Agreement in substantially the form provided, or fails to provide Performance and 100% Labor and Materials Payment Bonds (if requested by Owner), contractor shall forfeit the amount of its Bid Bond.

UNIT PRICES

1. Bidder acknowledges that unit pricing may be used as the basis for adjusting the Contract Sum on account of changes in the scope of the work. The unit amount shown multiplied by the in-place quantity shall be the method by which any adjustment will be calculated. Unit price adjustments may be either a deduction from or an addition to the Base Bid price without any additional mark-up for overhead and profit or General Conditions.
2. Bidder acknowledges that unit pricing will be in effect for the duration of the construction contract time, but will not be effective for work necessary to be performed after normal construction periods unless agreed to otherwise.

1		$	Per SF
2		$	Per SF
3		$	Per SF
4		$	Per SF
5		$	Per SF

SEPARATE CONTRACTS

1. Bidder acknowledges that Owner has the right to let other contracts and to employ other contractors in connection with this project including the construction of tenant improvements. Bidder shall afford such other contractors reasonable opportunity for the storage of materials and equipment, and at such time that does not materially interfere with Bidder's work, to commence construction of their work. Bidder shall properly coordinate the work of separate contractors with Bidder's work and allow connection to its facilities.
2. Bidder recognizes that plans for tenant improvements or Owner-provided work will be issued as separate bid packages. It is the Owner's intent, but not obligation, to allow the successful Bidder to submit a bid proposal on all such work, recognizing that, in some instances, tenants may perform their own tenant work.

BID PROPOSAL

THE UNDERSIGNED CERTIFIES

1. That he/she has reviewed and understands the drawings, specifications, scope of the work, and sample contracts provided relating to this Project.
2. That he/she has the equipment, technical ability, personnel, and facilities to construct the Project in accordance with the drawings and specifications.
3. That he/she has inspected the site and familiarized himself with the requirements of Lincoln City and other municipal agencies having jurisdiction.
4. That he/she has qualified each of his subcontractors and materials suppliers and determined that such persons have the equipment, technical ability, personnel, and facilities to perform their work in accordance with the Contract Documents; and that each subcontractor has the financial capacity to fulfil all aspects of the work.

FIRM NAME: _____

SIGNED BY: _____

TITLE: _____

DATE: _____

ADDRESS: _____

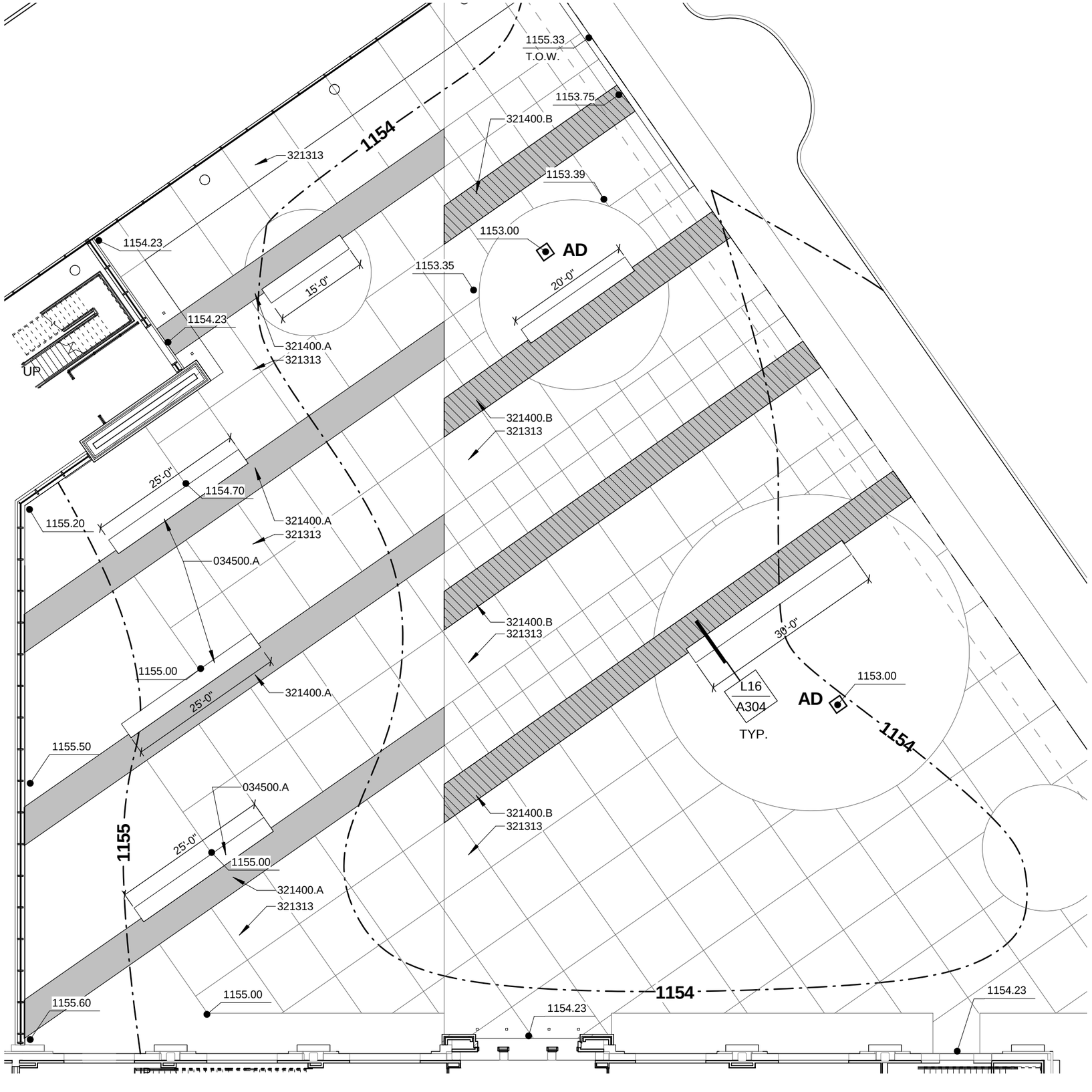
TELEPHONE NO: _____

LICENSE NO: _____

BONDING AGENT: _____

PHONE NUMBER. _____

STATE OF INCORPORATION: _____

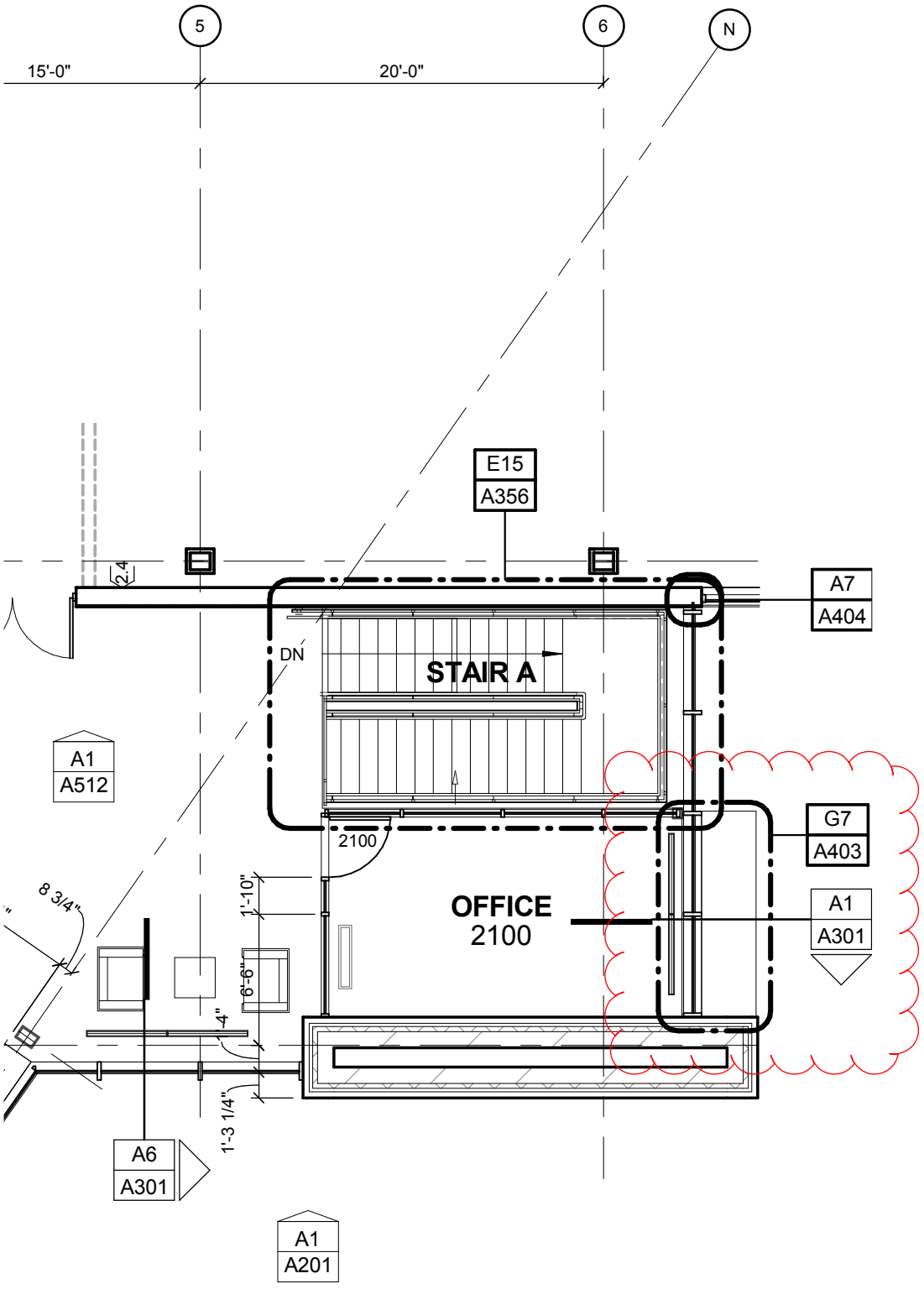


SITE PLAZA

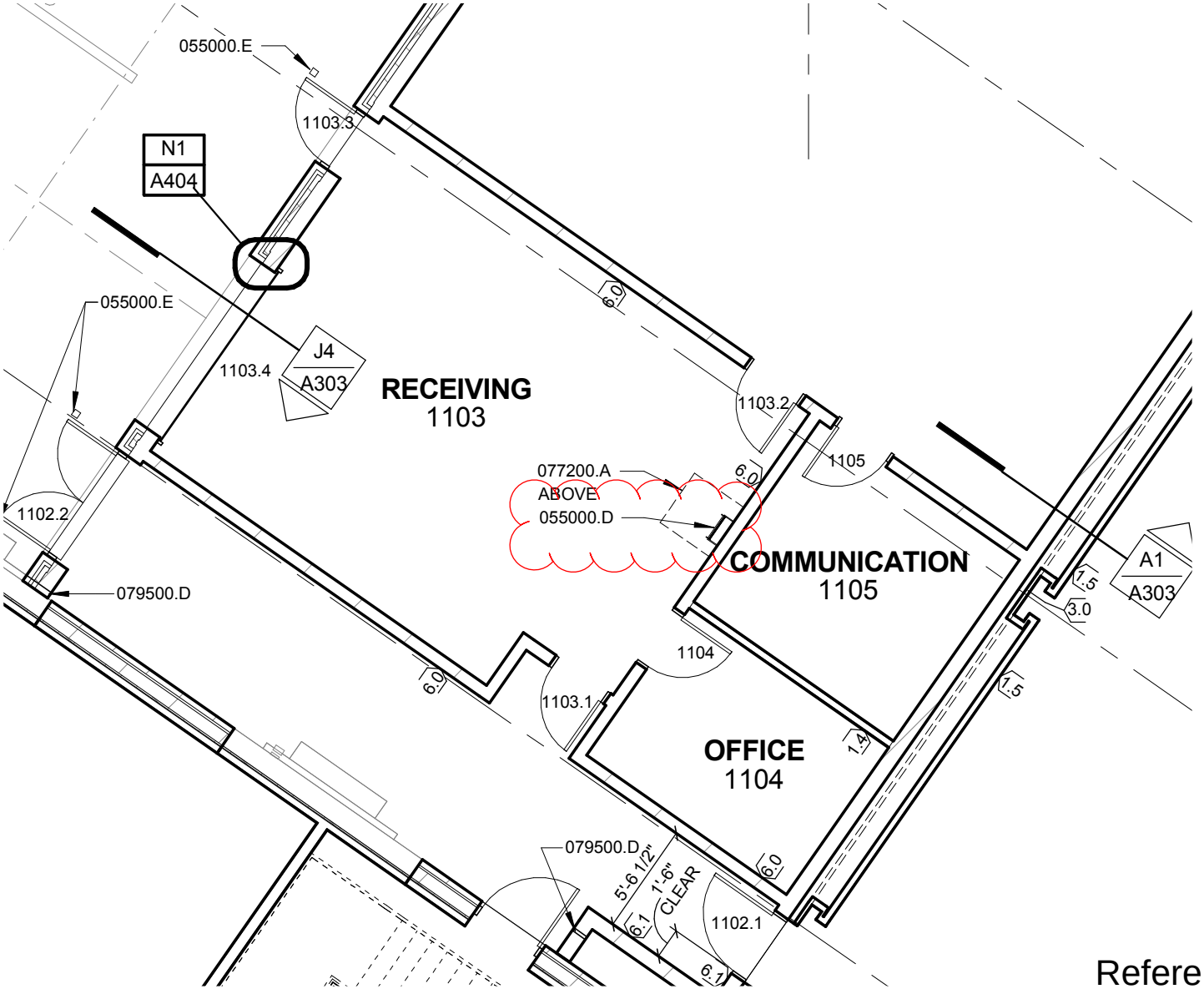
CONCRETE BENCH DIMENSIONS & DETAIL REFERENCE

A1/AS100

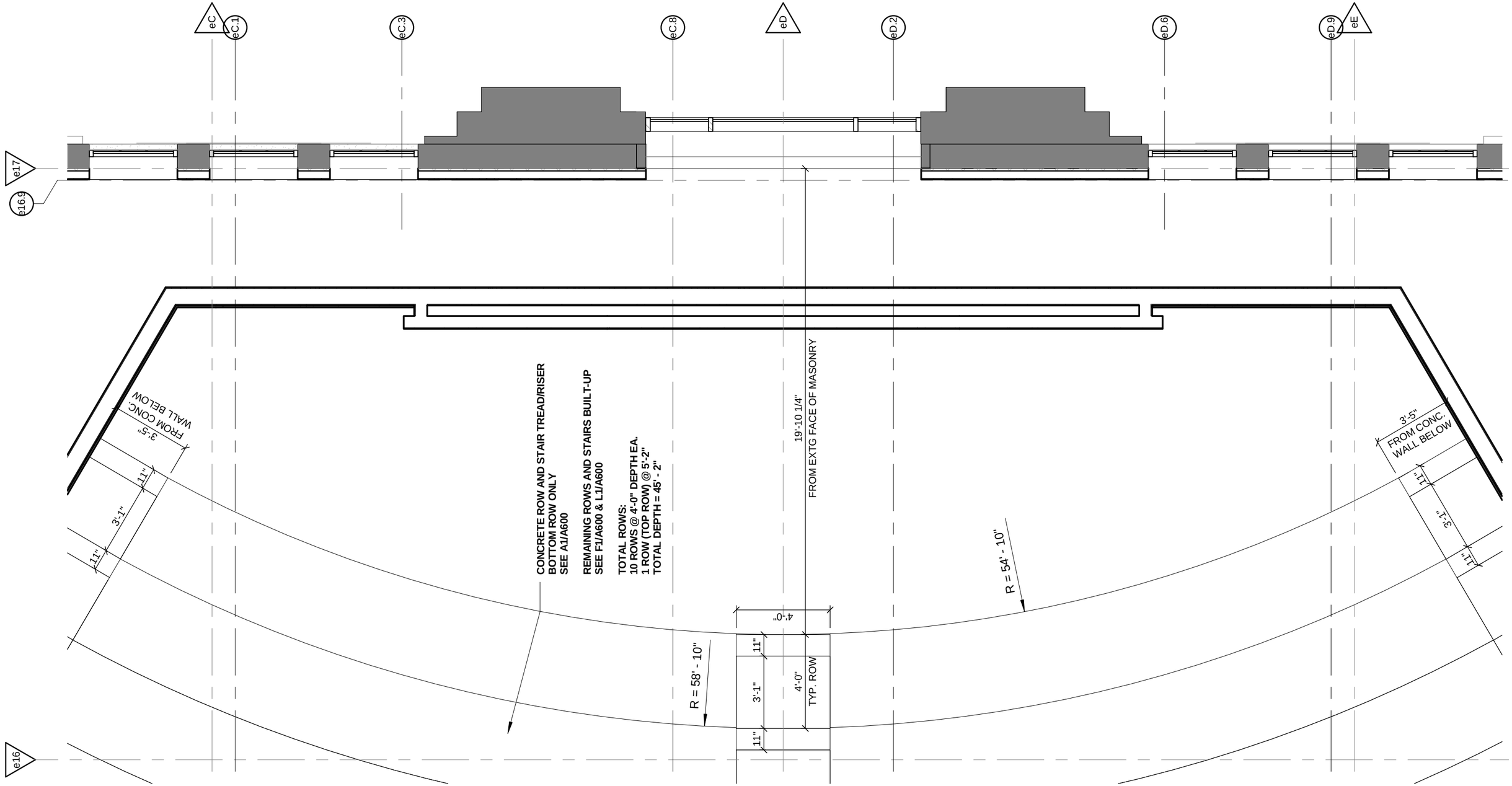
Bid Package 02
Addendum 03



Reference: A1/A101C
Bid Package 02
Addendum 03
4H Renovation & NIC Building



Reference: A10/A101C
Bid Package 02
Addendum 03
4H Renovation & NIC Building



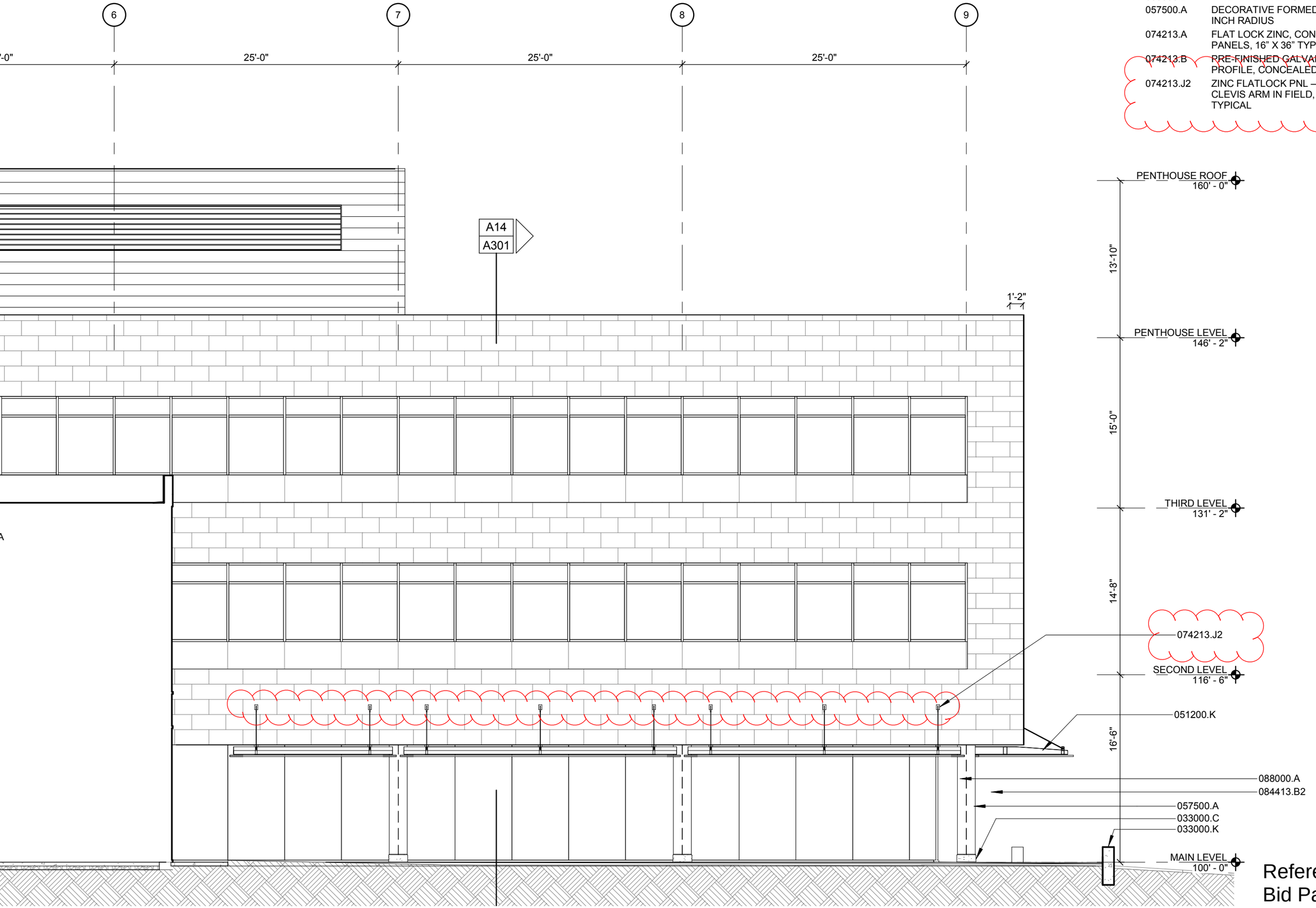
ENLARGED PLAN

SLOPED SLAB DIMENSIONAL CONTROLS

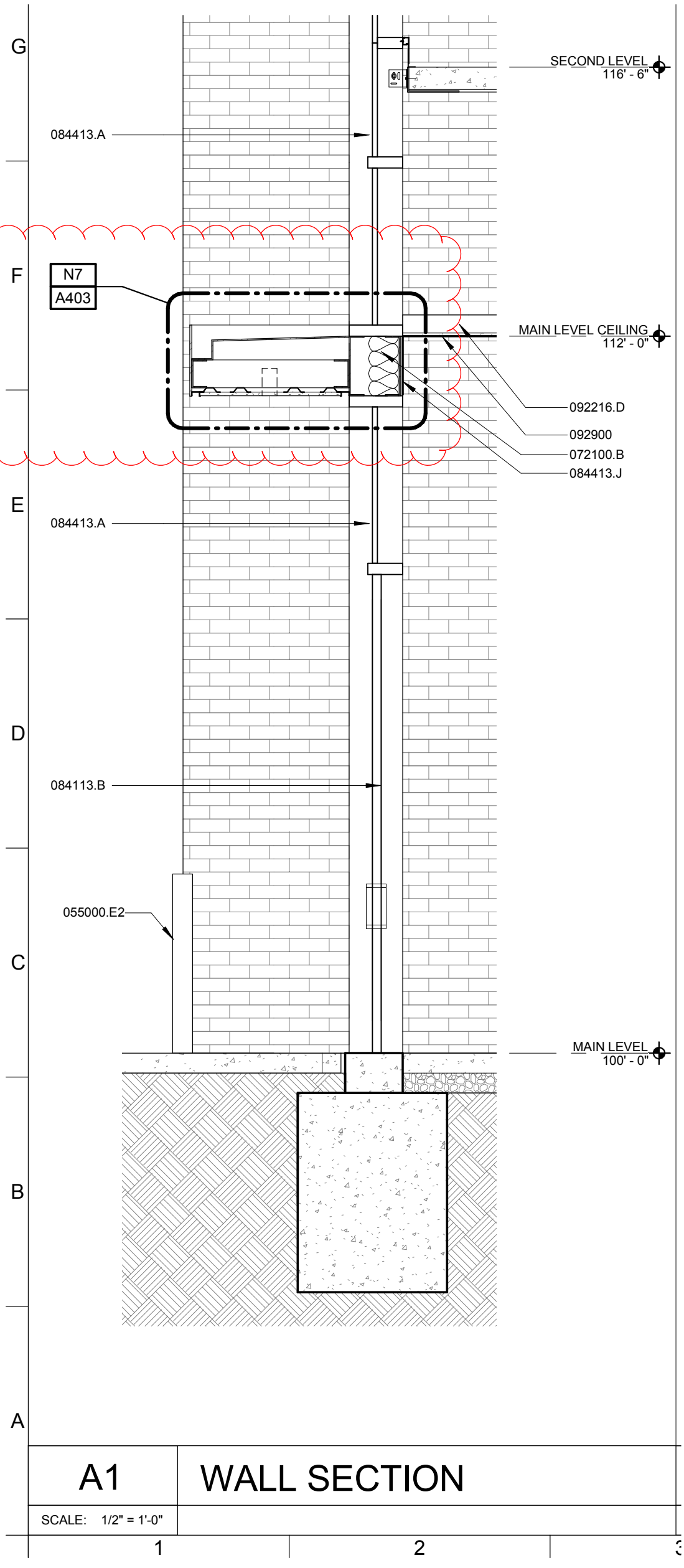
A1/A102A

Bid Package 02
Addendum 03

	STRUCTURAL
055000.L	1 1/2" DIAMETER STAINLESS STEEL HANDRAIL
057500.A	DECORATIVE FORMED METAL COLUMN COVERS - 9.75 INCH RADIUS
074213.A	FLAT LOCK ZINC, CONCEALED FASTENER, METAL WALL PANELS, 16" X 36" TYPICAL
074213.B	PRE-FINISHED GALVANIZED STEEL, HORIZONTAL FLUSH PROFILE, CONCEALED FASTENER METAL WALL PANEL
074213.J2	ZINC FLATLOCK PNL – COORDINATE HOLE LOCATION FOR CLEVIS ARM IN FIELD, ZINC ESCUTCHEON PLATE ON TOP, TYPICAL



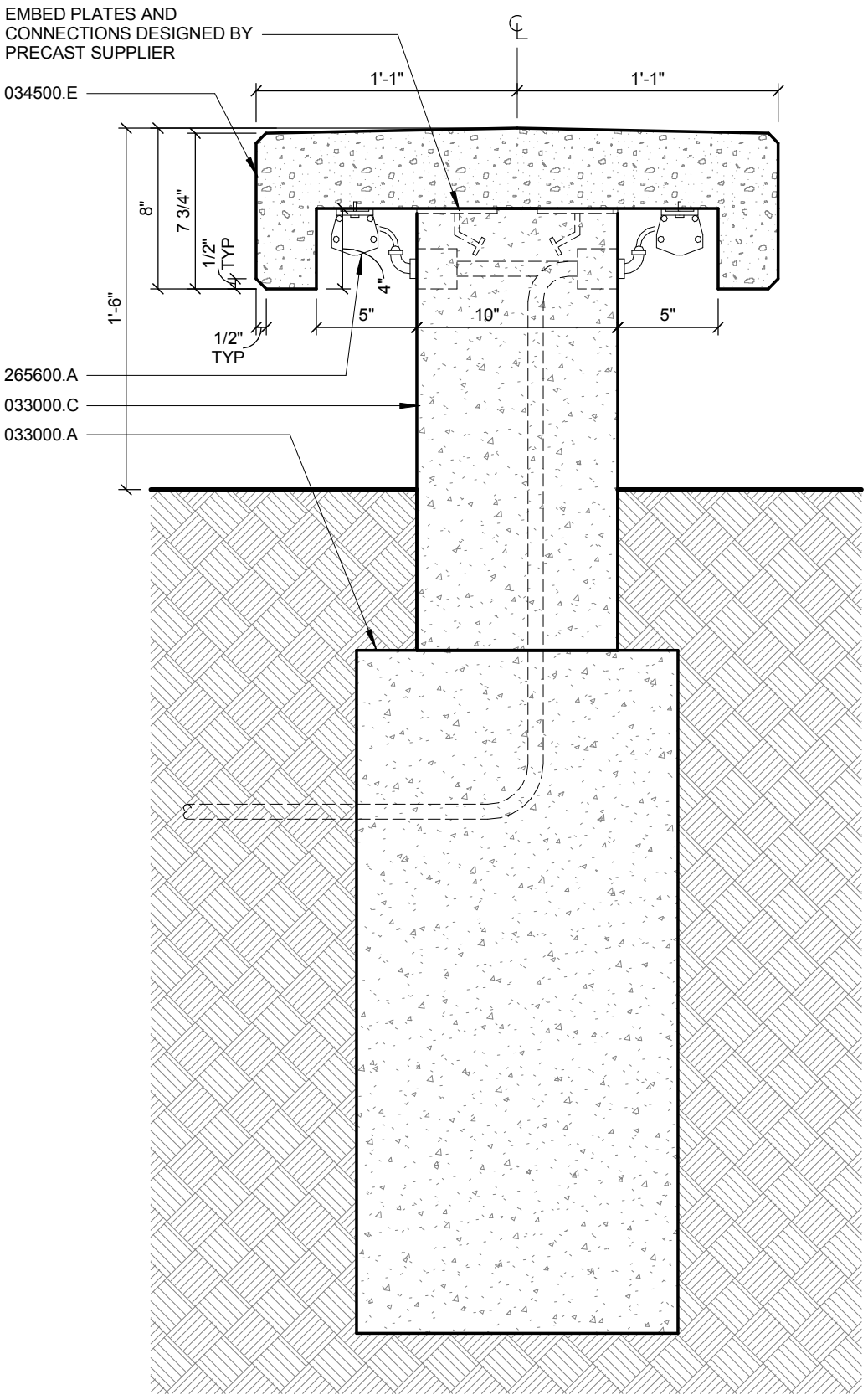
Reference: H5/A202
Bid Package 02
Addendum 03
4H Renovation & NIC Building



A1 WALL SECTION

SCALE: 1/2" = 1'-0"

Reference: A1/A301
Bid Package 02
Addendum 03
4H Renovation & NIC Building



L16 SECTION

SCALE: 1 1/2" = 1'-0"

TYPICAL PLAZA BENCH

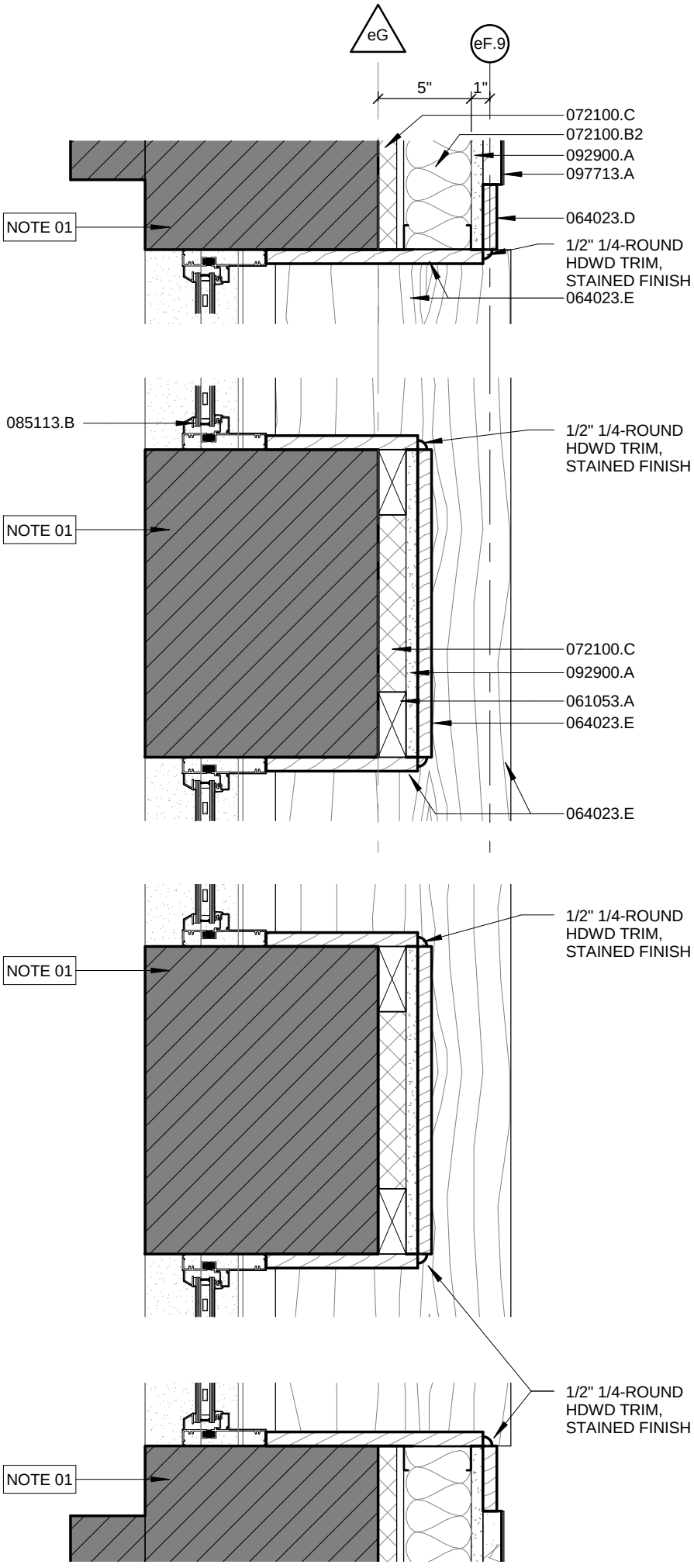
SHEET A304 SHEET SPECIFIC NOTES

NOTE 1 TYPICAL ROOF ASSEMBLY, AREA C & D, REFER TO A14/A301

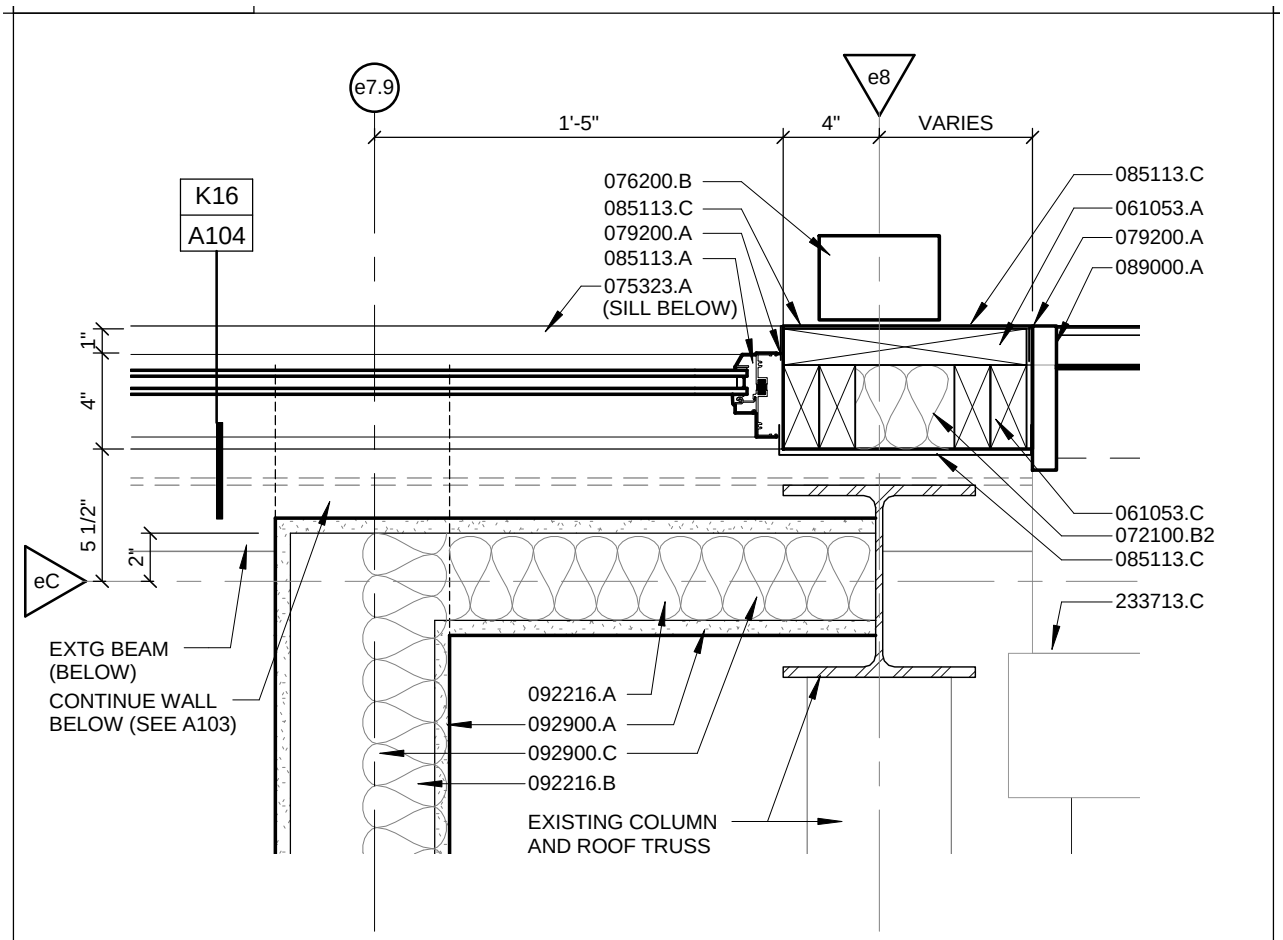
KEYNOTE LEGEND

033000.A	CONCRETE FOOTING – SEE STRUCTURAL
033000.C	CAST-IN-PLACE CONCRETE WITH GROUT CLEANED FINISH
033000.D	5” CONCRETE FLOOR SLAB – SEE STRUCTURAL
033000.H	12” CONCRETE SHEAR WALL – SEE STRUCTURAL
033000.K	12” CAST-IN-PLACE CONCRETE SITE WALL WITH GROUT CLEANED FINISH – CHAMFER EDGES
033000.L	CAST-IN-PLACE CONCRETE STAIR
034500.E	PRECAST ARCHITECTURAL CONCRETE BENCH CAP
051200.B	STEEL BEAM – REFER TO STRUCTURAL
051200.D	STEEL TUBE – REFER TO STRUCTURAL
051200.F3	4” X 4” X 1/4” STEEL ANGLE – CONTINUOUS
054000.A	6” STRUCTURAL STEEL STUDS SPACED AT 24” O.C.
054000.F	COLD-FORMED METAL FRAMING – SEE STRUCTURAL
055000.L	1 1/2” DIAMETER STAINLESS STEEL HANDRAIL
057300.A3	DECORATIVE STAINLESS STEEL RAIL SYSTEM – NO GUARDRAIL – POST & HANDRAIL ONLY
061600.A	5/8” GLASS MAT GYPSUM WALL SHEATHING
061600.B	5/8" FIRE RESISTANCE TREATED, ORIENTED –STRAND BOARD WALL SHEATHING
072100.B	6” GLASS-FIBER BLANKET INSULATION R=19
072100.C4	2” FOAM PLASTIC BOARD INSULATION R=10
072100.D	6 MIL POLY VAPOR BARRIER
072726.A	FLUID APPLIED MEMBRANE AIR BARRIER SYSTEM, 40 MILS THICK (PERMIABLE)
074213.B	PRE-FINISHED GALVANIZED STEEL, HORIZONTAL FLUSH PROFILE, CONCEALED FASTENER METAL WALL PANEL
074213.B12	COLD FORMED METAL FRAMING, 2” Z FURRING CHANNELS
074213.V	PRE-FINISHED CORRUGATED PROFILE, GALVANIZED STEEL WALL PANEL
074213.V6	SILL FLASHING
074213.V7	HEAD FLASHING
074213.V8	COLD FORMED METAL FRAMING, 2” Z FURRING CHANNELS
075323.A	FULLY ADHERED, 60 MIL EPDM ROOFING SYSTEM
075323.C	POLYISO ROOF INSULATION – 2” THICK LAYERS TOTAL 4” THICKNESS. TOTAL R=24 MIN
075323.C2	TAPERED POLYISO ROOF INSULATION TO RESULT IN A MINIMUM SLOPE OF ¼” PER FOOT TOWARD THE DRAIN.
075323.D	¼” GLASS MAT COVER BOARD
076200.C	PRE-FINISHED ALUMINUM SHEET METAL GRAVEL STOP – 10’ LENGTHS, ALIGN JOINTS WITH METAL PLATE PANEL JOINTS BELOW – REFER TO BUILDING ELEVATIONS – SEE TYPICAL FLASHING DETAIL ON A400 FOR JOINT CONDITION
089000.A	PRE-FINISHED, EXTRUDED ALUMINUM, DRAINABLE, STATIONARY LOUVER
092216.B	6” METAL STUDS @ 16” O.C.
092900.A	5/8” TYPE X GYPSUM WALLBOARD
093000.A4	CT-7, 12 X 24 PORCELAIN PAVER TILE, GRIS
093000.F	METAL TRIM
265600.A	LIGHT FIXTURE – REFER TO ELECTRICAL

Reference: L16/A304
Bid Package 02
Addendum 03
4H Renovation & NIC Building



D13/A400
Bid Package 02
Addendum 03

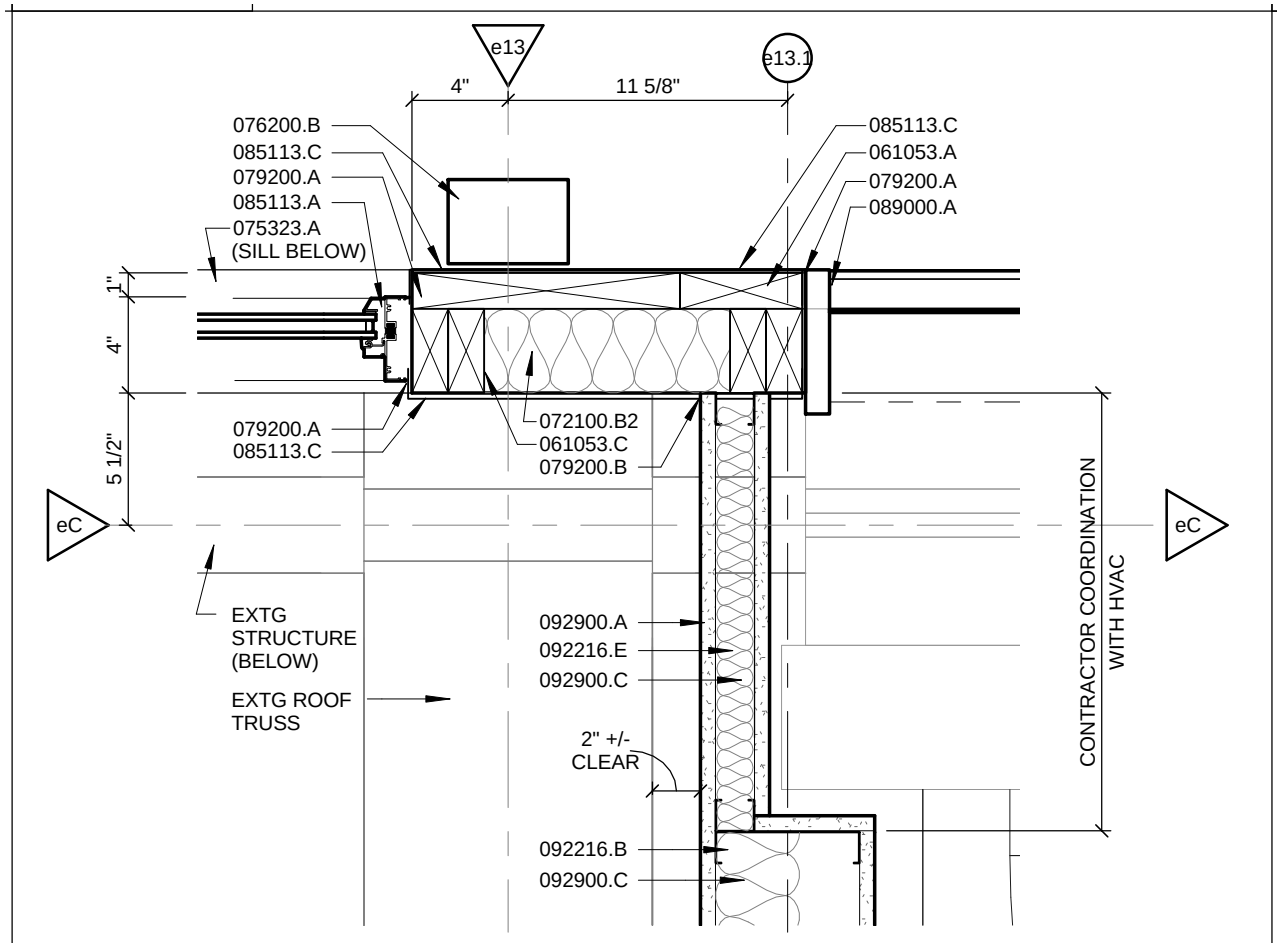


K4 PLAN DETAIL

SCALE: 1 1/2" = 1'-0"

MECHANICAL ROOM CLOSURE AT CLERESTORY

K4/A400
Bid Package 02
Addendum 03

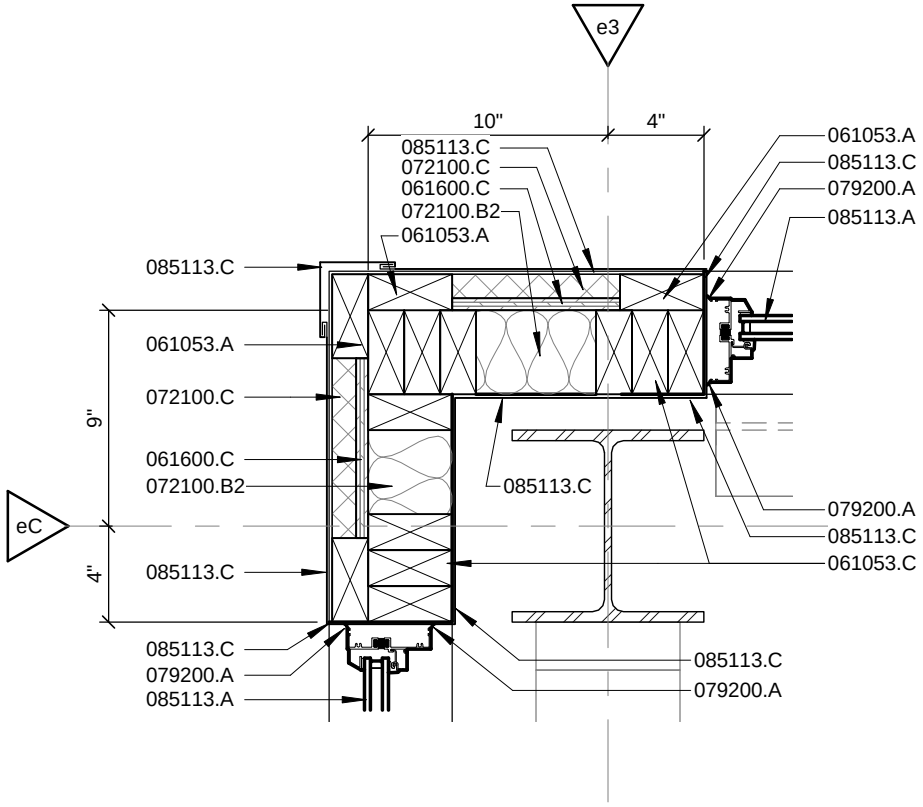


K7 PLAN DETAIL

SCALE: 1 1/2" = 1'-0"

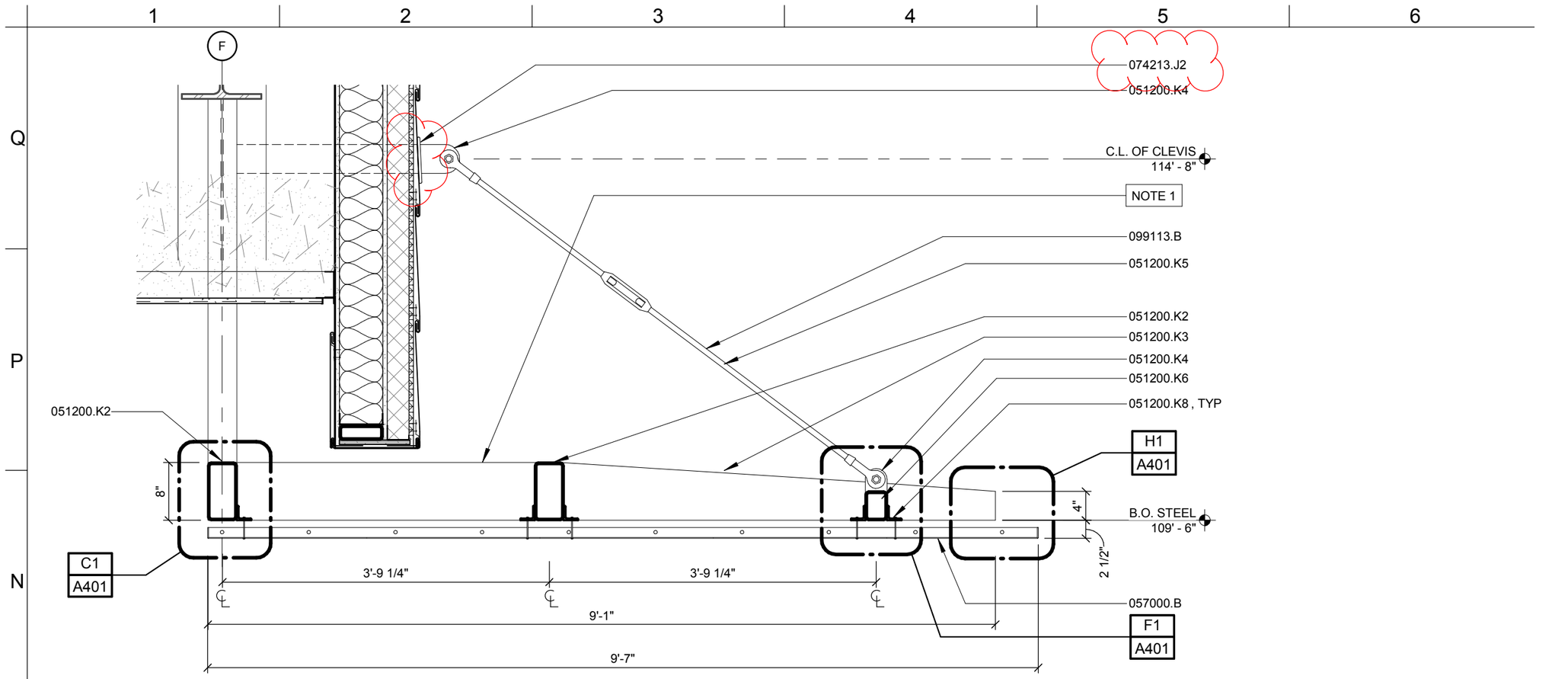
JAMB DETAIL AT LOUVER - AREA A

K7/A400
Bid Package 02
Addendum 03



N4	PLAN DETAIL
SCALE: 1 1/2" = 1'-0"	CLERESTORY WINDOW AT CORNER CONDITIONS

N4/A400
Bid Package 02
Addendum 03



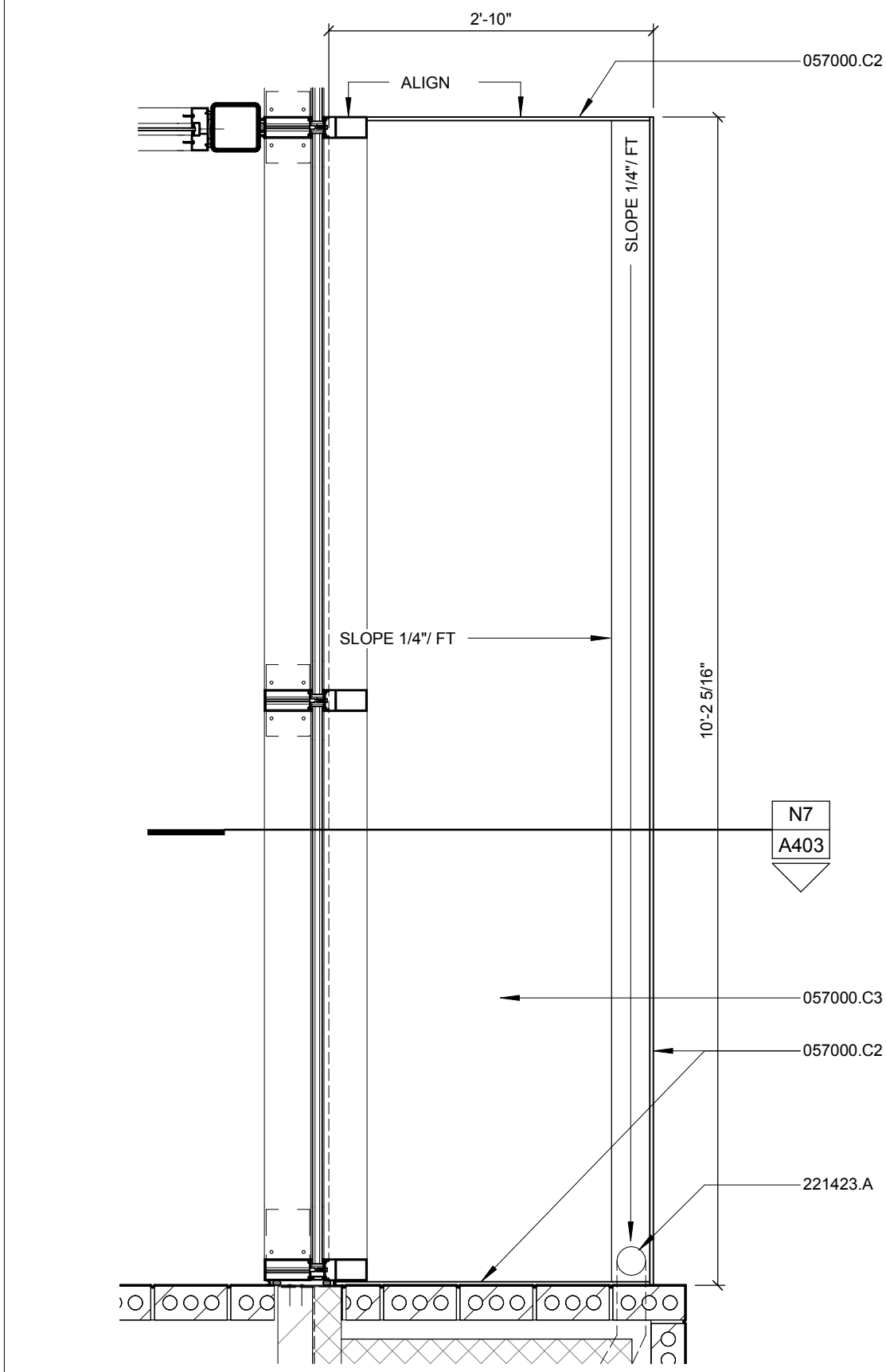
M1 CANOPY SECTION

SCALE: 3/4" = 1'-0"

TYPICAL CANOPY

074213.J2 ZINC FLATLOCK PNL – COORDINATE HOLE LOCATION FOR CLEVIS ARM IN FIELD, ZINC ESCUTCHEON PLATE ON TOP, TYPICAL

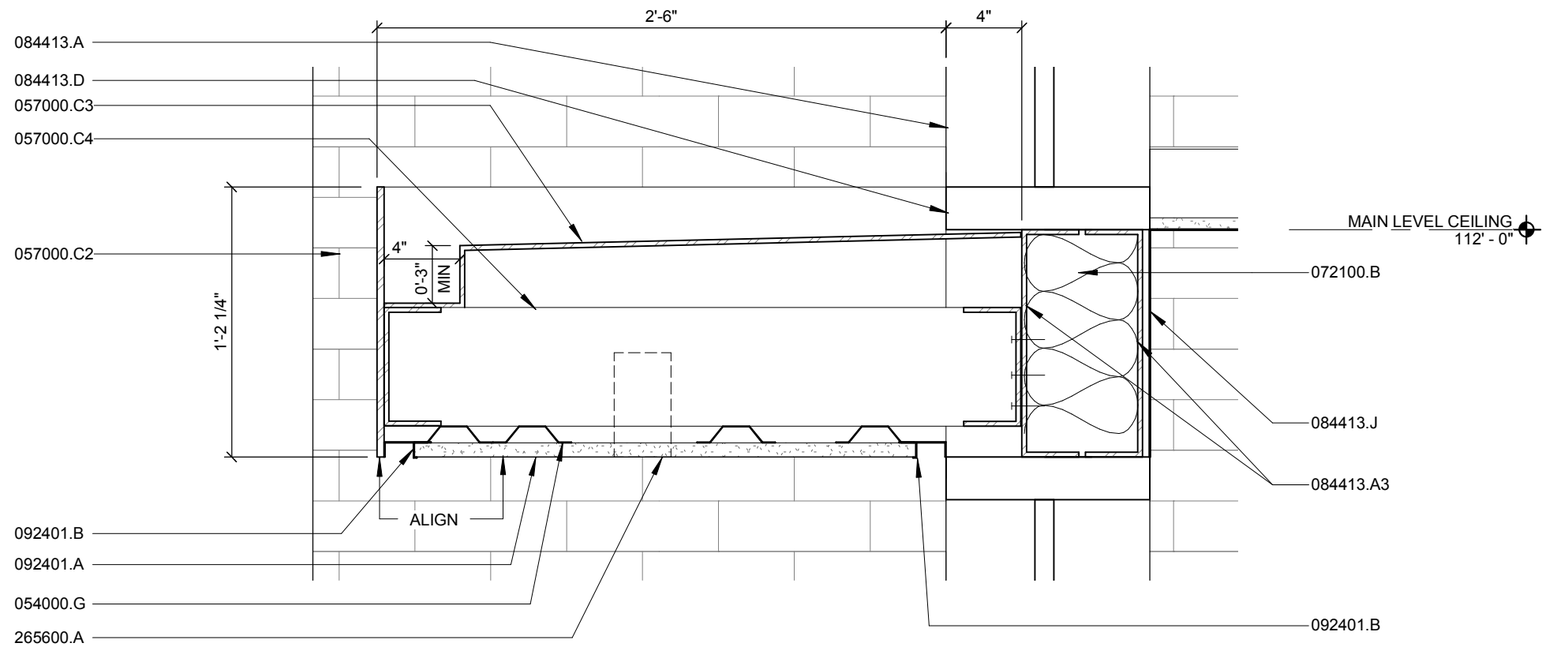
Reference: M1/A401
Bid Package 02
Addendum 03
4H Renovation & NIC Building



G7	PLAN DTL
SCALE: 3/4" = 1'-0"	

Reference: G7/A403
Bid Package 02
Addendum 03
4H Renovation & NIC Building

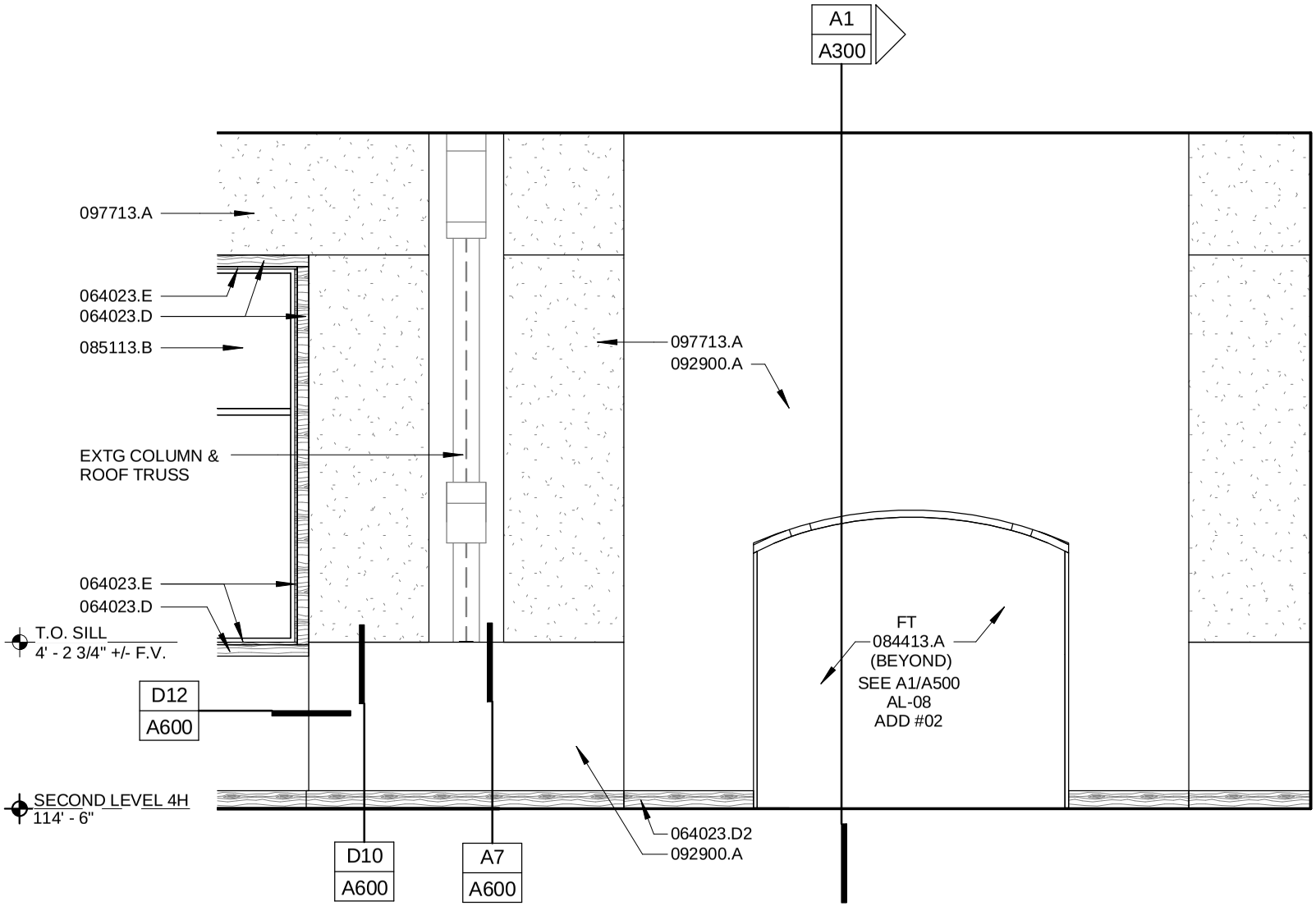
7 8 9 10 11



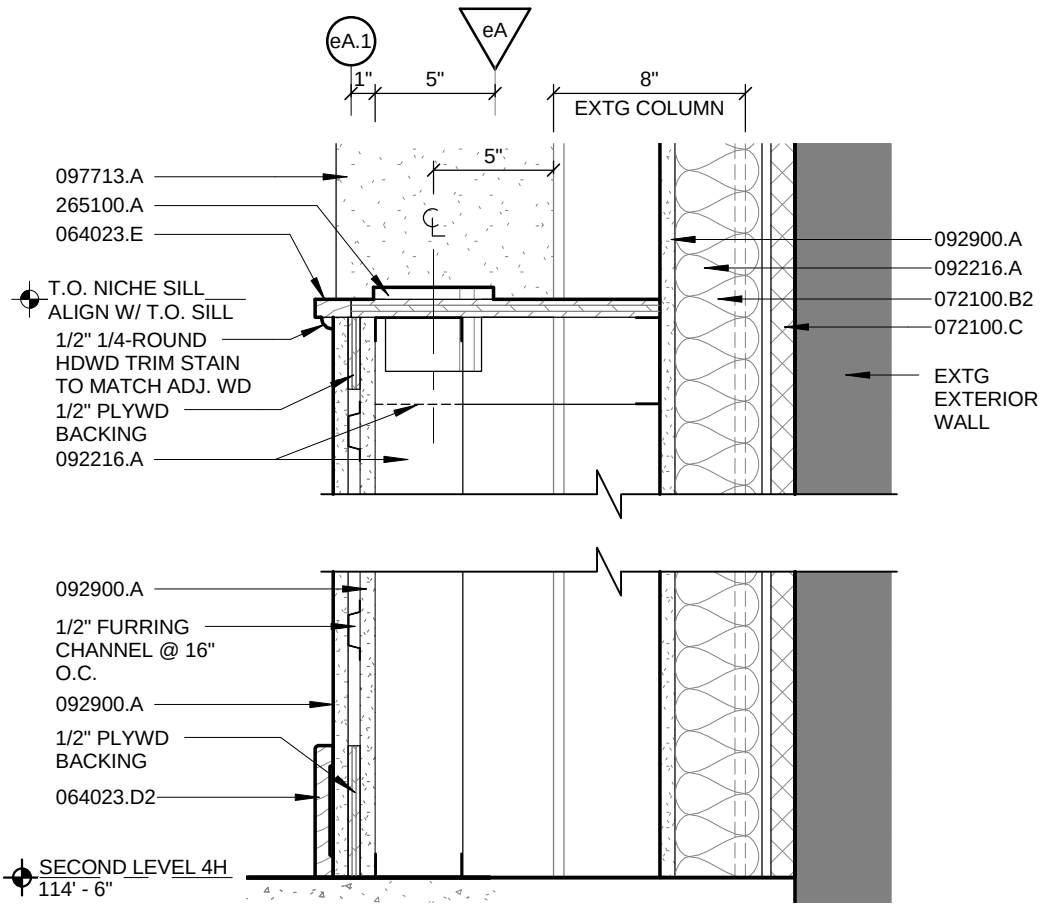
N7 SECTION DTL

SCALE: 1 1/2" = 1'-0"

Reference: N7/A403
Bid Package 02
Addendum 03
4H Renovation & NIC Building

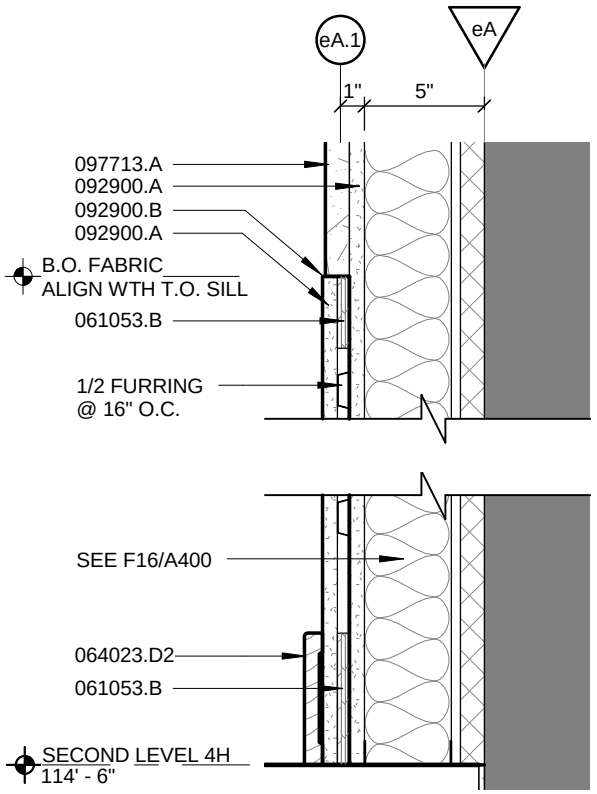


H15/A510
Bid Package 02
Addendum 03



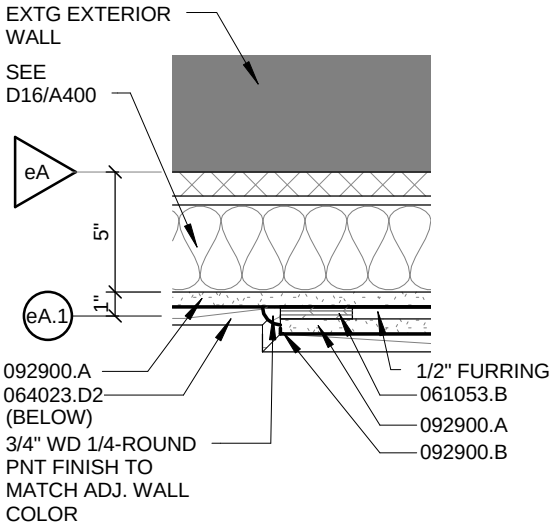
A7	SECTION DETAIL
SCALE: 1 1/2" = 1'-0"	AREA A - TRUSS NICHE LIGHTING

A7/A600
Bid Package 02
Addendum 03



D10	SEC DETAIL
SCALE: 1 1/2" = 1'-0"	EXT. WALL FABRIC TRANSITION

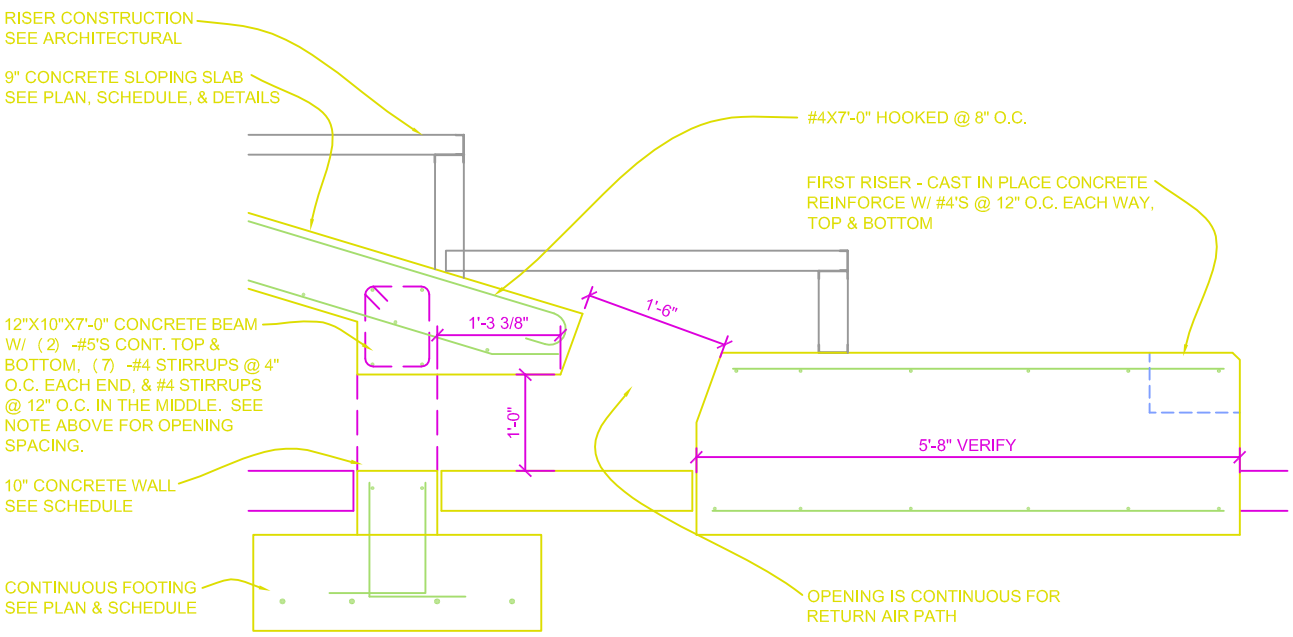
D10/A600
Bid Package 02
Addendum 03



D12	PLN DETAIL
SCALE: 1 1/2" = 1'-0"	AREA A EXT. WALL GWB BUMP

D12/A600
Bid Package 02
Addendum 03

PROVIDE (4) -7'-0" OPENINGS EQUALLY SPACED ALONG THE LENGTH OF THE WALL.
COORDINATE W/ MECHANICAL.
COORDINATE W/ ARCHITECTUARAL



7 Const. Joint Thru Conc. Joist

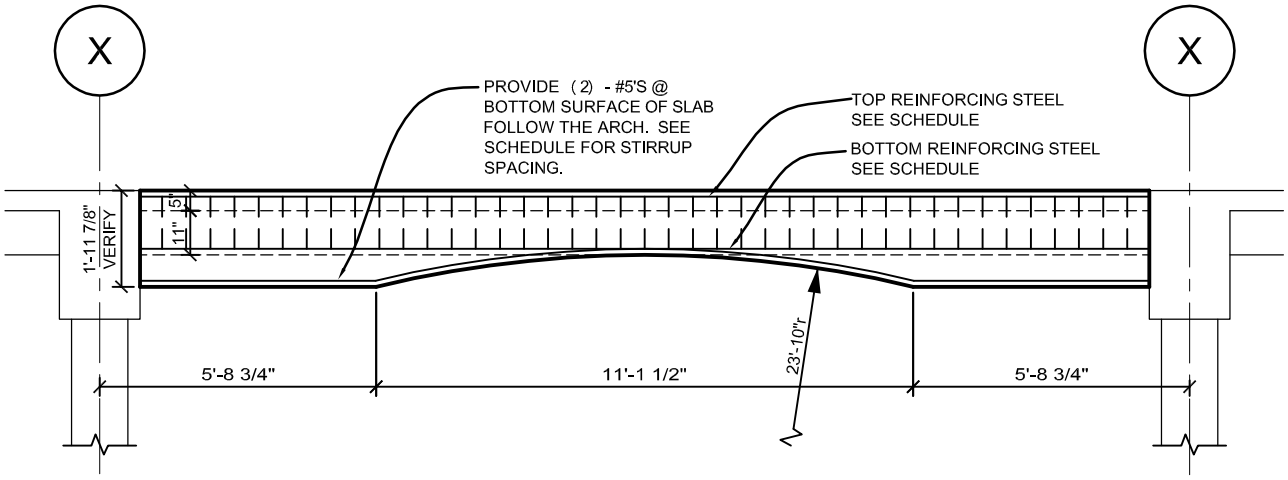
Scale: 1/2" = 1'-0"

Attachment: S17
Reference: 7/S502AB
Bid Package: 02
Addendum: 03

CONCRETE BEAM SCHEDULE

MARK	SIZE		TOP BARS	BOTTOM BARS	STIRRUPS	REMARKS
	WIDTH	HEIGHT				
CB100	12"	10"	(2) -#4's	(2) -#6's	(4) -#4's @ 4"o.c. Each End #4's @ 12"o.c. Between	
CB121	20"	32"	(2) -#4's	(6) -#6's	#4's @ 12"o.c.	
CB122	20"	32"	(2) -#4's	(6) -#6's	#4's @ 12"o.c.	
CB128	20"	32"	(2) -#6's	(2) -#4's	#4's @ 12"o.c.	
CB129	8"	16 1/2"	(2) -#4's	(4) -#7's	#4's @ 12"o.c.	
CB130	13 1/2"	16 1/2"	(2) -#4's	(4) -#7's	#4's @ 6"o.c.	SOUTH BEAM OF FLOOR OPENING FOR GRAND STAIR
EDGE BEAM	12"	16"	(2) -#4's	(4) -#6's	#4's @ 6"o.c.	

Attachment: S18
Reference: Concrete Beam Schedule
Bid Package: 02
Addendum: 03



9 Concrete Edge Beam Elevation

Scale: 1/4" = 1'-0"

Attachment: S19
Reference: 9/S502AB
Bid Package: 02
Addendum: 03

SECTION 012100 - ALLOWANCES

1.1 SCHEDULE OF ALLOWANCES

A. Allowance No.1: Lump-Sum Allowance: Include the sum of $106,085.00 for Building Permits and Impact Fees as required by Local Jurisdiction.

1. This allowance is to be divided as follows; 4H = $13,896.00 and NIC = $92,189.00 and entered onto the attached proposal form.

B. Allowance No.2: Lump-Sum Allowance: Include the total sum of $10,000 for Quality Control Testing by the Owner.

1. This allowance is to be divided in half on the proposal $5,000.00 for 4H and $5,000.00 for NIC.

C. Allowance No.3: Lump-Sum Allowance: Include the sum of $5,000 for signage as designated by the Owner.

1. This allowance includes material cost, receiving, handling, and installation, and Contractor overhead and profit.

D. Allowance No. 4: Contingency Allowance: Include a contingency allowance of $240,000.00 for use according to Owner's written instructions.

1. This allowance is to be divided in half on the proposal $120,000.00 for 4H and $120,000.00 for NIC.

SECTION 221113 - FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes water-distribution piping and related components outside the building for water service, fire-service mains and combined water service and fire-service mains.

B. Utility-furnished products include water meters that will be furnished, ready for installation.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control test reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

D. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

E. NSF Compliance:

1. Comply with NSF 14 for plastic potable-water-service piping.
2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:

1. Notify construction manager no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service without construction manger's written permission.

1.7 COORDINATION

A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.

1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
2. Gaskets: AWWA C111, rubber.

B. PVC, AWWA Pipe: AWWA C900, Class 200 with bell end with gasket, and with spigot end.

1. Comply with UL 1285 for fire-service mains if indicated.
2. PVC Fabricated Fittings: AWWA C900, Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
3. PVC Molded Fittings: AWWA C907, Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
4. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

    a. Gaskets: AWWA C111, rubber.

5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.2 PIPING SPECIALTIES

A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.3 GATE VALVES

A. AWWA, Cast-Iron Gate Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide product name or designation or a comparable product by one of the following:

    a. American AVK Co.; Valves & Fittings Div.
    b. American Cast Iron Pipe Co.; American Flow Control Div.
    c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
    d. Crane Co.; Crane Valve Group; Stockham Div.
    e. East Jordan Iron Works, Inc.
    f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
    g. McWane, Inc.; Kennedy Valve Div.
    h. McWane, Inc.; M & H Valve Company Div.
    i. McWane, Inc.; Tyler Pipe Div.; Utilities Div.
    j. Mueller Co.; Water Products Div.
    k. NIBCO INC.
    l. U.S. Pipe and Foundry Company.
    m. Or approved equal.

4. Nonrising-Stem, High-Pressure, Resilient-Seated Gate Valves:

    a. Description: Ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem, and stem nut.

        1) Standard: AWWA C509.
        2) Minimum Pressure Rating: 250 psig
        3) End Connections: Push on or mechanical joint.
        4) Interior Coating: Complying with AWWA C550.

B. UL/FMG, Cast-Iron Gate Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide product name or designation or a comparable product by one of the following:

    a. American Cast Iron Pipe Co.; American Flow Control Div.
    b. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
    c. Crane Co.; Crane Valve Group; Stockham Div.
    d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).McWane, Inc.; Kennedy Valve Div.
    e. McWane, Inc.; M & H Valve Company Div.
    f. Mueller Co.; Water Products Div.
    g. NIBCO INC.
    h. U.S. Pipe and Foundry Company.
    i. Or approved equal

4. UL/FMG, Nonrising-Stem Gate Valves:

    a. Description: Iron body and bonnet with flange for indicator post, bronze seating material, and inside screw.

        1) Standards: UL 262 and FMG approved.
        2) Minimum Pressure Rating: 175 psig
        3) End Connections: Flanged.

2.4 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Tapping-Sleeve Assemblies:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide product name or designation or a comparable product by one of the following:

    a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
    b. East Jordan Iron Works, Inc.
    c. Flowserve.
    d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
    e. McWane, Inc.; Kennedy Valve Div.
    f. McWane, Inc.; M & H Valve Company Div.
    g. Mueller Co.; Water Products Div.
    h. U.S. Pipe and Foundry Company.
    i. Or approved equal.

4. Description: Sleeve and valve compatible with drilling machine.

    a. Standard: MSS SP-60.
    b. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
    c. Valve: AWWA, cast-iron, nonrising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.

B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.

    1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

C. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

2.5 FIRE HYDRANTS (not used)

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

C. Do not use flanges or unions for underground piping.

D. Flanges, unions, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

E. Underground water-service piping NPS 6 and NPS 8 shall be any of the following:
    1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints.
    2. PVC, AWWA Class 150 pipe; PVC, AWWA Class 150 molded fittings; and gasketed joints.

F. Underground Fire-Service-Main Piping NPS 4 to NPS 8 shall be any of the following:

1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints.
2. PVC, AWWA Class 150 pipe listed for fire-protection service; PVC Class 150 fabricated or molded fittings; and gasketed joints.

G. Underground Combined Water-Service and Fire-Service-Main Piping NPS 6 to NPS 10 shall be any of the following:

1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints.
2. PVC, AWWA Class 150 pipe listed for fire-protection service; PVC fabricated or molded fittings of same class as pipe; and gasketed joints.

3.3 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for NPS 4 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts.

B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Underground Valves, NPS 4 and Larger: AWWA, cast-iron, nonrising-stem, high-pressure, resilient-seated gate valves with valve box.
2. Underground Valves, NPS 4 and Larger, for Indicator Posts: UL/FMG, cast-iron, nonrising-stem gate valves with indicator post.

3.4 PIPING INSTALLATION

A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.

B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.

C. Make connections larger than NPS 2 with tapping machine according to the following:

1. Install tapping sleeve and tapping valve according to MSS SP-60.
2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.

D. Comply with NFPA 24 for fire-service-main piping materials and installation.

E. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

F. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.

G. Bury piping with depth of cover over top at least 60 inches with top at least 12 inches below level of maximum frost penetration.

H. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.

I. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

3.5 JOINT CONSTRUCTION

A. Make pipe joints according to the following:

1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
3. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
4. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
5. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure.

3.6 ANCHORAGE INSTALLATION

A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:

1. Concrete thrust blocks.
2. Locking mechanical joints.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
3. Fire-Service-Main Piping: According to NFPA 24.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.7 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.

3.8 FIRE HYDRANT INSTALLATION

A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.

B. AWWA Fire Hydrants: Comply with AWWA M17.

C. UL/FMG Fire Hydrants: Comply with NFPA 24.

3.9 CONNECTIONS

A. Connect water-distribution piping to utility water main. Use tapping sleeve and tapping valve.

B. Connect water-distribution piping to interior domestic water and fire-suppression piping.

3.10 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.

1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.11 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 312000 "Earth Moving."

B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel. See Section 330500 "Common Work Results for Utilities" for identifying devices.

3.12 CLEANING

A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:

    a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
    b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
    c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
    d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION 221113

SECTION 221313 - FACILITY SANITARY SEWERS – PRIVATE SEWER SERVICE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Nonpressure and pressure couplings.
3. Cleanouts.
4. Manholes.

1.2 ACTION SUBMITTALS

A. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewer system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

B. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.

C. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

A. PVC Type PSM Sewer Piping:

1. Pipe: ASTM D 3034, Schedule 40, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: ASTM D 3034, PVC with bell ends.
3. Gaskets: ASTM F 477, elastomeric seals.

2.2 NONPRESSURE-TYPE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded, Flexible Couplings:

1. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Ring-Type, Flexible Couplings: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.3 CLEANOUTS

A. Cast-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.

1. Top-Loading Classification(s): Light Duty, Medium Duty, Heavy Duty and Extra-Heavy Duty.
2. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.4 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.
5. Riser Sections: 4-inch minimum thickness, of length to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.

8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual FRP; wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.
10. Adjusting Rings: Interlocking HDPE rings, with level or sloped edge in thickness and diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser, with 4-inch-minimum-width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER."
2. Material: ASTM A 48/A 48M, Class 35 gray iron unless otherwise indicated.

2.5 CONCRETE

A. General: Cast-in-place concrete complying with ACI 318, ACI 350/350R and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

   a. Invert Slope: 2 percent through manhole.

2. Benches: Concrete, sloped to drain into channel.

a. Slope: 4 percent.

D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

F. Install gravity-flow, nonpressure, drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope of 1 percent unless otherwise indicated.
2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
3. Install piping with 36 inch minimum cover.
4. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.

G. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure, drainage piping according to the following:
   1. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
   2. Join dissimilar pipe materials with nonpressure-type, rigid couplings.

B. Pipe couplings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

   1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.

      a. Unshielded flexible couplings for pipes of same or slightly different OD.
      b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
      c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.4 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318.

3.5 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

   1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
   2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
   3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
   4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.

B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.

C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.6 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains.

B. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
2. Make branch connections from side into existing piping, NPS 4 to NPS 20 Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
3. Make branch connections from side into existing underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

    a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
    b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.7 IDENTIFICATION

A. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.

3.8 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate report for each system inspection.
2. Defects requiring correction include the following:

    a. Alignment: Less than full diameter of inside of pipe is visible between structures.

b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
d. Infiltration: Water leakage into piping.
e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:

a. Fill sewer piping with water. Test with pressure of at least 10-foot head of water, and maintain such pressure without leakage for at least 15 minutes.
b. Close openings in system and fill with water.
c. Purge air and refill with water.
d. Disconnect water supply.
e. Test and inspect joints for leaks.

6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

a. Option: Test plastic gravity sewer piping according to ASTM F 1417.
b. Option: Test concrete gravity sewer piping according to ASTM C 924.

7. Manholes: Perform hydraulic test according to ASTM C 969.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.9 CLEANING

A. Clean dirt and superfluous material from interior of piping.

END OF SECTION 221313

SECTION 321313 - CONCRETE PAVING

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. Driveways.
   2. Curbs and gutters.
   3. Walks.

B. Related Sections:
   1. Division 03 Section "Cast-in-Place Concrete" for general building applications of concrete.
   2. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Other Action Submittals:
   1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Material Certificates: For the following, from manufacturer:
   1. Cementitious materials.
   2. Steel reinforcement and reinforcement accessories.
   3. Fiber reinforcement.
   4. Admixtures.
   5. Curing compounds.

6. Applied finish materials.
7. Bonding agent or epoxy adhesive.
8. Joint fillers.

1.5 QUALITY ASSURANCE

A. Ready-Mix-Concrete 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 "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

B. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.

C. ACI Publications: Comply with ACI 301 (ACI 301M) unless otherwise indicated.

D. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to concrete paving, including but not limited to, the following:
      a. Concrete mixture design.
      b. Quality control of concrete materials and concrete paving construction practices.
   2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:
      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixtures.
      c. Ready-mix concrete manufacturer.
      d. Concrete paving subcontractor.
      e. Manufacturer's representative of stamped concrete paving system used for detectable warnings.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F (4.4 deg C) for oil-based materials, and not exceeding 95 deg F (35 deg C).

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

A. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, Grade 60 (Grade 420) deformed bars.

B. Epoxy-Coated-Steel Wire: ASTM A 884/A 884M, Class A coated, plain.

C. Epoxy-Coated, Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars.

D. Tie Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
   1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
   2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

F. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating, compatible with epoxy coating on reinforcement.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
   1. Portland Cement: ASTM C 150, gray portland cement Type I. Supplement with the following:
      a. Fly Ash: ASTM C 618, Class C or Class F.

B. Normal-Weight Aggregates: ASTM C 33, graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: Potable and complying with ASTM C 94/C 94M.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.4 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
1. Products:
   a. Burke by Edoco; BurkeFilm.
   b. Dayton Superior Corporation; Sure Film.
   c. Euclid Chemical Company (The); Eucobar.
   d. Kaufman Products, Inc.; Vapor Aid.
   e. L&M Construction Chemicals, Inc.; E-Con.
   f. Meadows, W. R., Inc.; Sealtight Evapre.
   g. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
   h. Symons Corporation, a Dayton Superior Company; Finishing Aid.

2.5 RELATED MATERIALS

A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork in preformed strips.

B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. 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, of grade complying with requirements, and of the following types:
   1. Types I and II, non-load bearing and Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
   1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
   2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.

B. Proportion mixtures to provide normal-weight concrete with the following properties:
   1. Compressive Strength (28 Days): 4000 psi (27.6 MPa).
   2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.44.
   3. Slump Limit: 4 inches (8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture), plus or minus 1 inch.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
   1. Air Content: 5-1/2 percent plus or minus 1.5 percent for 1-1/2-inch (38-mm) nominal maximum aggregate size.

D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

E. Cementitious Materials: Limit percentage by weight of cementitious materials other than portland cement according to ACI 301 (ACI 301M) requirements as follows:
   1. Fly Ash or Pozzolan: 15 percent.

F. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd. (0.60 kg/cu. m).

G. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph (5 km/h).
2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch (13 mm) according to requirements in Division 31 Section "Earth Moving."

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M.

F. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch (50-mm) overlap of adjacent mats.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
   1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
   1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
   2. Provide tie bars at sides of paving strips where indicated.
   3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
   4. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
   1. Locate expansion joints at intervals of 50 feet (15.25 m) unless otherwise indicated.
   2. Extend joint fillers full width and depth of joint.
   3. Terminate joint filler not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
   4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
   5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
   6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
   1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
   2. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 (ACI 301M) by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
   1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement dowels and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further

disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

L. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

M. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by curing compound or a combination of these as follows:
1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm) and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.
2. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:
1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch.
6. Vertical Alignment of Dowels: 1/4 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
   1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
      a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when it is 80 deg F (27 deg C) and above, and one test for each composite sample.
   5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
   6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days. One cylinder shall be in reserve
      a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

G. Concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.11 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Expansion and contraction joints within cement concrete pavement.
2. Joints between cement concrete and asphalt pavement.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each type and color of joint sealant required.

C. Product certificates, test reports.

D. Compatibility and Adhesion Test Reports: From sealant manufacturer.

1.3 QUALITY ASSURANCE

A. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact or affect joint sealants to joint-sealant manufacturers for testing according to ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

B. Installer Qualifications: An employer of workers trained and approved by manufacturer.

C. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

1. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 COLD-APPLIED JOINT SEALANTS

A. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.

1. Products:

a. Crafco Inc.; RoadSaver Silicone.
b. Dow Corning Corporation; 888.

B. Type SL Silicone Sealant for Concrete and Asphalt: Single-component, low-modulus, neutral-curing, self-leveling silicone sealant complying with ASTM D 5893 for Type SL.

1. Products:

a. Crafco Inc.; RoadSaver Silicone SL.
b. Dow Corning Corporation; 890-SL.

2.4 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience.

C. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

D. Install backer materials to support sealants during application and at position required to produce optimum sealant movement capability. Do not leave gaps between ends of backer materials. Do not stretch, twist, puncture, or tear backer materials. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

E. Install sealants at the same time backings are installed to completely fill recesses provided for each joint configuration and to produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

G. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION 321373

SECTION 334100 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Manholes.
3. Cleanouts.
4. Nonpressure transition couplings.
5. Catch basins.
6. Stormwater inlets.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. Manholes: Include plans, elevations, sections, details, frames, and covers.
2. Catch basins and stormwater inlets. Include plans, elevations, sections, details, frames, covers, and grates.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

B. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.

C. Field quality-control reports.

1.4 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 PE PIPE AND FITTINGS

A. Corrugated PE Drainage Pipe and Fittings NPS 3 to NPS 10: AASHTO M 252M, Type S, with smooth waterway for coupling joints.

1. Watertight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.
2. Watertight Couplings: AASHTO M 252M, corrugated, matching tube and fittings.

B. Corrugated PE Pipe and Fittings NPS 12: AASHTO M 294M, Type S, with smooth waterway for coupling joints.

1. Watertight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.
2. Watertight Couplings: AASHTO M 294M, corrugated, matching pipe and fittings.

2.2 CONCRETE PIPE AND FITTINGS

A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76.

1. Tongue-and-groove ends and gasketed joints with ASTM C 443, rubber gaskets sealant joints with ASTM C 990 bitumen or butyl-rubber sealant.
2. Class III, Wall B.

2.3 NONPRESSURE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Concrete Pipes: ASTM C 443, rubber.
2. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
3. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded, Flexible Couplings:

1. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Shielded, Flexible Couplings:

1. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

E. Ring-Type, Flexible Couplings:

1. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.4 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
2. Top-Loading Classification(s): Light Duty, Medium Duty, Heavy Duty and Extra-Heavy Duty.
3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. Plastic Cleanouts:

1. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

2.5 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required preventing flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
5. Riser Sections: 4-inch minimum thickness and lengths to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923 cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual FRP steps, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.

10. Adjusting Rings: Interlocking HDPE rings with level or sloped edge in thickness and diameter matching manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch- minimum width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
2. Material: ASTM A 48/A 48M, Class 35 gray iron unless otherwise indicated.

2.6 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350/350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

    a. Invert Slope: 2 percent through manhole.

2. Benches: Concrete, sloped to drain into channel.

    a. Slope: 4 percent.

D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.

2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

2.7 CATCH BASINS

A. Standard Precast Concrete Catch Basins:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
3. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
4. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
5. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
6. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
7. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch- diameter frame and grate.
8. Steps: Individual FRP steps wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 60 inches.
9. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.

1. Size: 24 by 24 inches minimum unless otherwise indicated.
2. Grate Free Area: Approximately 50 percent unless otherwise indicated.

C. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch- diameter flat grate with small square or short-slotted drainage openings.

1. Grate Free Area: Approximately 50 percent unless otherwise indicated.

2.8 STORMWATER INLETS

A. Curb Inlets: Made with vertical curb opening, of materials and dimensions according to utility standards.

B. Gutter Inlets: Made with horizontal gutter opening, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.

C. Combination Inlets: Made with vertical curb and horizontal gutter opening, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.

D. Frames and Grates: Heavy duty.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

F. Install gravity-flow, nonpressure drainage piping according to the following:

1. Install piping pitched down in direction of flow.
2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
3. Install PE corrugated sewer piping according to ASTM D 2321.
4. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
5. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure drainage piping according to the following:

1. Join corrugated PE piping according to ASTM D 3212 for push-on joints.
2. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
3. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.4 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service.
4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.

B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade.

C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.5 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections with sealants according to ASTM C 891.

C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.

D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements.

3.6 CATCH BASIN INSTALLATION

A. Set frames and grates to elevations indicated.

3.7 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318.

3.8 CONNECTIONS

A. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

    a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
    b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.9 IDENTIFICATION

A. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

3.10 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:

    a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    d. Infiltration: Water leakage into piping.
    e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

    a. Exception: Piping with watertight joints unless required by authorities having jurisdiction.
    b. Option: Test plastic piping according to ASTM F 1417.
    c. Option: Test concrete piping according to ASTM C 924.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 334100