IBI GROUP

December 17, 2010

TORRANCE UNIFIED SCHOOL DISTRICT
PURCHASING DEPARTMENT
2335 Plaza Del Amo, Torrance, California 90501

FERN ELEMENTARY SCHOOL
1314 Fern Avenue
Torrance, CA 90503

A D D E N D U M N O . 1

The following modifications are hereby made a part of the Contract Documents and supersede or amend the information included in the original Contract Documents for **D.S.A. Application No. 03-113162**. All other requirements of the contract documents shall remain the same. It is mandatory to Acknowledge Receipt of the Addendum by inserting its number in the Bid Proposal.

This Addendum consists of 4 parts as follows:

PART 1 - CLARIFICATIONS
PART 2 - SPECIFICATIONS
PART 3 – DRAWINGS
PART 4 – PRE-BID INQUIRIES

PART 1 – CLARIFICATIONS

AD1-1.1 Downspout Termination: Downspouts connect to storm drain system as shown in Detail 16/A503 per Site Utility Plan (C400). Downspouts not indicated on C400 but shown on other plans shall spill to grade. Provide precast concrete splash blocks (12”W x 30”L x 3”H, min.) at all downspouts that do not connect directly to the storm sewer.

AD1-1.2 Finish Floor Elevations: Architectural exterior building elevations for both buildings show vertical datum points referenced to Building #2 main floor slab (established as +0’-0”). Building #1 first floor slab intentionally references minus (-)2’-6”. The actual vertical elevations are shown on the Finish Grading Plan (C300).

AD1-1.3 Pendant Light Fixture Mounting Height: Pendant lights in classrooms shall be mounted at 9’-6” above finished floor (just below truss bottom chord on first floor). Pendant lights in Multi-Purpose Room (2-101) shall be mounted at 15’-0” above finished floor.

AD1-1.4 Wood Trusses: The majority of the wood trusses on this job are exposed. Appearance grade trusses are required. Trusses shall be prepared to receive clear transparent finish. No visible marks allowed.

PART 2 - SPECIFICATIONS

Architectural:

AD1-2.1 Table of Contents, Errata: Delete Section 08 33 26, Overhead Coiling Grilles. Not applicable to this job.

AD1-2.2 Table of Contents, Errata: "Pavement Marking" should be Section *32 94 00*, not 32 17 23 as shown.

AD1-2.3 Section 06 10 00, Rough Carpentry: Revise Paragraph 2.04A.2 as follows:
"Wood Preservative, Surface Application: Exterior: 'Copper Green', as manufactured by Willard Products. Interior: 'Termite Prufe' as manufactured by Copper Brite."

AD1-2.4 ADD Section 07 25 00 – "Weather Barriers." Refer to attached section.

AD1-2.5 Section 07 54 21, Thermoplastic Adhered PVC Membrane Roofing: Revise Paragraph 2.02B in its entirety as follows:
"Manufacturers. Provide one of the following:
1. Sarnafil Inc.
2. FiberTite
3. Johns- Manville."

AD1-2.6 REPLACE Section 31 31 16 – "Termite Control" with attached Section 31 31 16.13 - "Chemical Termite Control." This section includes wood and soil treatment for termite protection.

Mechanical/ Plumbing:

AD1-2.7 Section 22 40 00 – Plumbing Fixtures: Specification has been revised. Refer to attached section.

AD1-2.8 Section 23 09 00 – Instrumentation and Control for HVAC: Specification has been revised. Refer to attached section.

AD1-2.9 Section 23 09 60 – Sequence of Operations for HVAC Controls: Specification has been revised. Refer to attached section.

PART 3 – DRAWINGS

Civil:

AD1-3.1 Sheet C101, Civil Details-1: Detail #5: Replace detail with Contech CMP Detention and Infiltration System detail; Detail #6: Delete detail. Refer to attached sketch CSK-1.

AD1-3.2 Sheet C102, Civil Details-2: Details #1 and #2: Replace details with details shown on attached CSK-2.

AD1-3.3 Sheet C300, Finish Grading Plan: Refer to clouded changes identified by Delta 1. Refer to attached sketches CSK-3, CSK-4, CSK-5, CSK-6 and CSK-7.

AD1-3.4 Sheet C400, Site Utilities Plan: Refer to clouded changes identified by Delta 1. Refer to attached sketches CSK-8, CSK-9, CSK-10, CSK-11 and CSK-12.

AD1-3.5 Sheet C500, Erosion Control Plan: Temporary Sediment Control: SE-8 (sandbag barrier) is attached for reference. Contractor may elect to use a silt fence that complies with Section SE-1.

AD1-3.6 Sheet C500, Erosion Control Plan: Temporary Sediment Control: SE-10 (storm drain inlet protection) is attached for reference. Contractor may choose which type of storm drain inlet protection to use during construction.

Landscape:

AD1-3.7 Sheet L-01, Landscape Irrigation Plan: Refer to revised areas shown clouded on attached sketches L-SK-1 and L-SK-2.

AD1-3.8 Sheet L-03, Details/Notes: Refer to revised areas shown clouded on attached sketches L-SK-3, L-SK-4 and L-SK-5.

AD1-3.9 Sheet L-04, Landscape Irrigation Details: Refer to revised areas shown clouded on attached sketch L-SK-6.

AD1-3.10 Sketches L-SK-7, L-SK-8: Revision to Landscape specifications are shown on these attached sketches.

Architectural:

AD1-3.11 ADD Site Demolition Plan, Sheet A104. Refer to attached drawing.

AD1-3.12 ADD detail, Cement Plaster Wall Penetration, AD-1-SK1. Detail is typical for duct penetration of exterior stucco wall. Refer to attached sketch AD-1-SK1.

AD1-3.13 ADD detail, Projector Screen Soffit, AD-1-SK2. Detail occurs in Building #2, along Gridline 2.3, centered on Gridline 2D between Platform 2-102 and Multi-Purpose Room 2-101. Refer to attached sketch AD-1-SK2.

AD1-3.14 Sheet A107-1, Detail 17: Revise note "T.O. METAL ROOFING" to read "T.O. ROOFING." Typical for four notes on this detail.

AD1-3.15 Sheet A302-1, Wall Section #1: Delete note below concrete stairs indicating "VOID SPACE." Space is earth-filled per structural detail 8/S304.

AD1-3.16 Sheet A404-1, Elevation 7A: Casework identified as Type "600" should be changed to Type 100. There is no Type 600 in project.

AD1-3.17 Sheet A101-2: At Room 2-102 and 2-103 where note says, "WOOD FLOOR, SEE DETAIL," detail is 13/A521.

AD1-3.18 Sheet A505, Detail 9: Tic Tac Toe Board grid paint stripes should be spaced at 20" o.c. Stripe width is 2-inches, typical for all painted games indicated on sheet.

Structural:

AD1-3.19 Sheet S002, Abbreviations: Add to the abbreviation list the following:
"NWC = NORMAL WHT CONCRETE
TOSH = TOP OF SHEATHING."

AD1-3.20 Sheet S101-2, Errata: Notation "SLAB ON GRADE PER NOTE #7" should be "NOTE #17." Refer to attached sketch SSK-1.

AD1-3.21 Sheet S101-1, Building #1, Foundation Plan: Top of Slab elevations are adjusted to coordinate with architectural referencing. Building #2 is datum 0'-0". Refer to attached sketches SSK-7, SSK-8 and SSK-9.

AD1-3.22 Sheet S101-2, Building #2, Foundation Plan: Top of Slab elevations are adjusted to coordinate with architectural referencing. Building #2 is datum 0'-0". Refer to attached sheet with clouded elevation revisions.

AD1-3.23 Sheet S102-1, Building #1, Second Floor Framing Plan: Top of Sheathing elevations are adjusted to coordinate with architectural referencing. Building #2 is datum 0'-0". Refer to attached sketches SSK-10, SSK-11 and SSK-12.

AD1-3.24 Sheet S103-1, Building #1, Roof Framing Plan: Top of Sheathing elevations are adjusted to coordinate with architectural referencing. Building #2 is datum 0'-0". Refer to attached sketches SSK-13 and SSK-14.

AD1-3.25 Sheet S201-2, Building #2, Moment Frame and Wall Elevations: Elevation datum points revised to coordinate with architectural. Refer to attached sketches SSK-2 and SSK-3.

AD1-3.26 Sheet S202-1, Building #1, North and West Elevations: Elevation datum points revised to coordinate with architectural. Refer to attached sketches SSK-4 and SSK-5.

AD1-3.27 Sheet S301, Trench Drain Detail #12: Where notes call for "SEE ARCH", change to "SEE CIVIL".

AD1-3.28 Sheet S306, Lightpole Footing Detail #3: Delete detail. Not applicable to this project.

AD1-3.29 Sheet S505, Detail #9: Add architectural detail cross-reference. Refer to attached sketch SSK-6.

AD1-3.30 ADD details, Site Wall Detail, Detail #1 and #2, SSK-15: These details are for the site wall occurring along the public sidewalk along Elm Avenue. Refer to attached sketch SSK-15 and structural calculations 1.16 through 1.19.

Mechanical/Plumbing:

AD1-3.31 Sheet M702, Mechanical Controls, Detail #2: Revise portion of detail shown clouded. Refer to attached sketch MSK-001.

AD1-3.32 Sheet P002, Plumbing Schedules: Revise kitchen sink designations to match Kitchen plans. Added gas equipment schedule. Refer to attached sketch PSK-001.

AD1-3.33 Sheet P101-2, Plumbing Bldg. 2- 1st Floor Plan: Revise kitchen sink designations to match Kitchen plans. Refer to attached sketch PSK-002.

AD1-3.34 Sheet P401, Plumbing Riser Diagrams, Bldg. 1: Revise cold water riser diagram to indicate separate cold water headers and shut off valves for restrooms. Refer to attached sketch PSK-003.

AD1-3.35 Sheet P601, Plumbing Details: Add sampling box to grease interceptor detail. Refer to attached sketch PSK-004.

PART 4 – PRE-BID INQUIRIES

AD1-4.1 RFI #BC001 Response: "District will accept steel fabricators certified by the City of Los Angeles in lieu of AISC certification."

AD1-4.2 RFI #BC004 Response: "Do the fixture count for the labor and transportation cost. In the event a designation of the fixture type is missing provide $800.00 allowance to cover the cost of the fixture."

AD1-4.3 RFI #BC011 Response: "All classrooms are to receive projector mounts only. No projector screens in the classrooms. Multipurpose Room 2-101 will have projector mount (in approximate location identified on Sheet E-101-2). A projector screen as described in Spec. Section 11 52 13 occurs in Multipurpose Room 2-101. Refer to addendum for detail."

Attachments:

Pre-Bid RFIs:
- RFI #BC001
- RFI #BC004
- RFI #BC011

Sketches/Drawings:
- Architectural Sketch (AD-1-SK1, AD-1-SK2)
- Sheet A104, Site Demolition Plan (30 x42)
- Civil Sketches (CSK-1 through CSK-12)
- Landscape Sketches (L-SK-1 through L-SK-8)
- Structural Sketches (SSK-1 through SSK-15), calculations for SSK-15
- Mechanical Sketch (MSK-001)
- Plumbing Sketches (PSK-001, PSK-002, PSK-003, PSK-004)
- Electrical Sketches (ESK-1 through ESK-9)

Specifications:
- Specification Section 31 31 16.13 - Chemical Termite Control
- Specification Section 07 25 00 – Weather Barriers
- Specification Section 09 06 00 – Color & Material Schedule
- Specification Section 22 40 00 – Plumbing Fixtures (revised)
- Specification Section 23 09 00 – Instrumentation and Control for HVAC (revised)
- Specification Section 23 09 60 – Sequence of Operations for HVAC Controls (revised)

Supplementary:
- California Stormwater BMP Handbook, SE-8
- California Stormwater BMP Handbook, SE-10

END OF ADDENDUM NO.1

ATTACHMENT TO ADDENDUM #1
FERN ELEMENTARY SCHOOL
A#03-113162

Request for Information BC001

Detailed, RFIs Grouped by RFI Number

FERN ES
1314 Fern Ave. Torrance, CA 90503

Project # 0930400
Tel: TBD Fax: TBD

Barnhart-Balfour Beatty, Inc.

RFI #: BC001 **Date Created: 12/14/2010**

Answer Company	Answered By	Author Company	Authored By
		Barnhart-Balfour Beatty, Inc. 10760 Thornmint Road San Diego, CA 92127	Vince Madsen

Co-Respondent

Author RFI Number
Blazing Industrial Steel, Inc.

Subject	Discipline	Category
License Requirments	Structural Steel	Clarification

Cc: Company Name	Contact Name	Copies	Notes

Question **Date Required: 12/21/2010**

We are a City LA certified fabricator shop, requesting to be approved in lieu of AISC cert.

Suggestion

Answer **Date Answered:**

ARCHITECT'S RESPONSE:
District will accept steel fabricators certified by the City of Los Angeles in lieu of AISC certification.
D. Wooten, IBI Group, 12-14-10

ATTACHMENT TO ADDENDUM #1
FERN ELEMENTARY SCHOOL
A#03-113162

Request for Information BC004

Detailed, RFIs Grouped by RFI Number

FERN ES
1314 Fern Ave. Torrance, CA 90503

Project # 0930400
Tel: TBD Fax: TBD

Barnhart-Balfour Beatty, Inc.

RFI #: BC004 **Date Created: 12/12/2010**

Answer Company	Answered By	Author Company	Authored By
		Barnhart-Balfour Beatty, Inc. 10760 Thornmint Road San Diego, CA 92127	Vince Madsen

Co-Respondent

Author RFI Number

Subject	Discipline	Category
Lighting Fixtures	Electrical	Clarification

Cc: Company Name	Contact Name	Copies	Notes

Question **Date Required: 12/19/2010**

Per Section 26 50 00 lighting Fixtures 1.01 General note D "include an allowance of 800.00 for the material cost of any lighting fixture where outlet is shown on drawings without a fixture type designation. include all labor and transportation costs in base bid." please clarify

Suggestion

Answer **Date Answered:**

RESPONSE:
Do the fixture count for the labor and transportation cost. In the event a designation of the fixture type is missing provide $800.00 allowance to cover the cost of the fixture.

mm/fba
12/15/10

ATTACHMENT TO ADDENDUM #1
FERN ELEMENTARY SCHOOL
A#03-113162

Request for Information BC011

Detailed, RFIs Grouped by RFI Number

FERN ES
1314 Fern Ave. Torrance, CA 90503

Project # 0930400
Tel: 310.972.6500 X 2941 Fax: 310.972.6834

Barnhart-Balfour Beatty, Inc.

RFI #: BC011 **Date Created: 12/16/2010**

Answer Company	Answered By	Author Company	Authored By
		Barnhart-Balfour Beatty, Inc. 10760 Thornmint Road San Diego, CA 92127	Vince Madsen

Co-Respondent **Author RFI Number**

Subject	Discipline	Category
Projectors and Screens	Architectural	Clarification

Cc: Company Name **Contact Name** **Copies** **Notes**

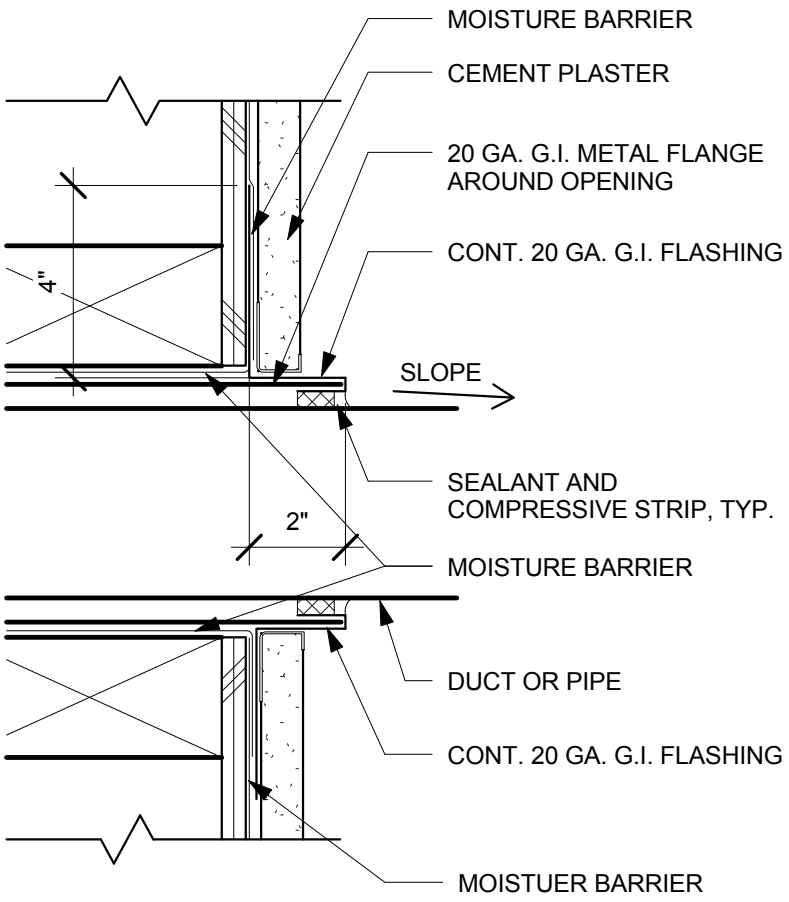
Question **Date Required: 12/23/2010**

please clarify that all classrooms are to receive ceiling projector mounts only and there will be no projector screens provided or installed in any of the classrooms.
please clarify there will be no projector mount or projector screen in the multi purpose building

Suggestion

Answer **Date Answered:**

ARCHITECT'S RESPONSE:
All classrooms are to receive projector mounts only. No projector screens in the classrooms. Multipurpose Room 2-101 will have projector mount (in approximate location identified on Sheet E-101-2). A projector screen as described in Spec. Section 11 52 13 occurs in Multipurpose Room 2-101. Refer to addendum for detail.
D. Wooten, IBI Group, 12-17-10



CEMENT PLASTER WALL PENETRATION

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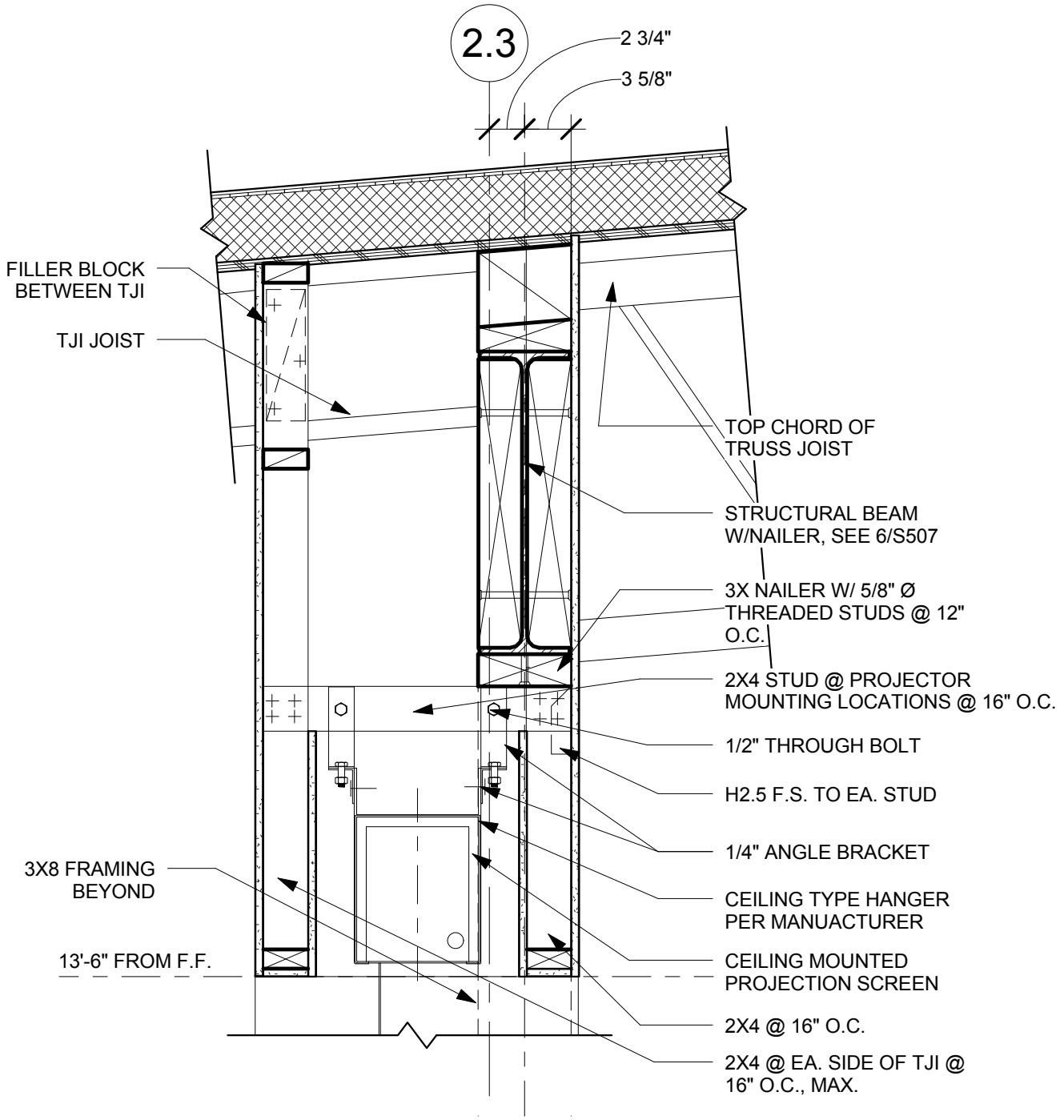
ARCHITECTS ENGINEERS PLANNERS

SUITE 110, 18401 VON KARMAN AVE.
IRVINE, CA. 92612
P: 949-833-5588, F: 949-833-5511

PROJECT TITLE:
FERN ELEMENTARY SCHOOL - ADD. #1
1314 FERN AVE. TORRANCE, CA 90503
TORRANCE UNIFIED SCHOOL DISTRICT
2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE: STUCCO WALL PENETRATION	
DATE: 12/17/10	SCALE: 3" = 1'-0"	SHEET NUMBER AD-1-SK1
ISSUE: ADDENDUM	DSA PROJECT NUMBER: 03-113162	IBI PROJECT NUMBER: 24703

LICENSED ARCHITECT
BARBARA G. HELTON
NO. C-19168
07-31-11
RENEWAL DATE
STATE OF CALIFORNIA



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ARCHITECTS ENGINEERS PLANNERS

SUITE 110, 18401 VON KARMAN AVE.
IRVINE, CA. 92612
P: 949-833-5588, F: 949-833-5511

PROJECT TITLE:

FERN ELEMENTARY SCHOOL - ADD. #1

1314 FERN AVE. TORRANCE, CA 90503

TORRANCE UNIFIED SCHOOL DISTRICT

2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE: PROJECTOR SCREEN SOFFIT	
DATE: 12/17/10	SCALE: 1" = 1'-0"	SHEET NUMBER AD-1-SK2
ISSUE: ADDENDUM #1	DSA PROJECT NUMBER: 03-113162	IBI PROJECT NUMBER: 24703

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NO. C19188
07-31-11
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1

NOT USED
FOR REFERENCE ONLY

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CONTECH CMP DETENTION SYSTEMS

CONTECH STORMWATER SOLUTIONS INC.

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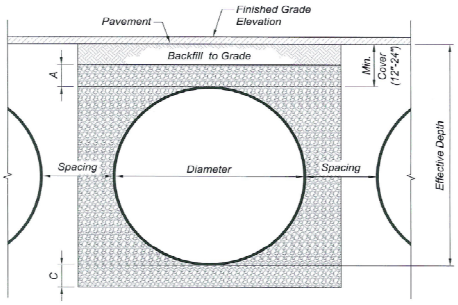


Project Summary		
Date:	12/14/2010	
Project Name:	Fern Elementary School	
City / County:	Torrance	
State:	CA	
Designed By:		
Company:		Enter Information in Blue Cells
Telephone:		

Corrugated Metal Pipe Calculator		
Storage Volume Required (cf):	2,753	
Limiting Width (ft):	15.00	
Invert Depth Below Asphalt (ft):	11.50	
Solid or Perforated Pipe:	Perforated	
Shape Or Diameter (in):	120	78.54 ft² Pipe Area
Number Of Headers:	0	
Spacing between Barrels (ft):	3.00	
Stone Width Around Perimeter of System (ft):	1	
Depth A: Porous Stone Above Pipe (in):	6	
Depth C: Porous Stone Below Pipe (in):	6	
Stone Porosity (0 to 40%):	40	

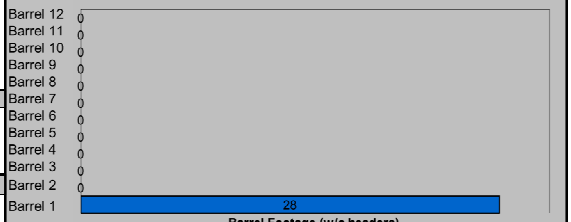
System Sizing			
Pipe Storage:	2,199	cf	
Porous Stone Storage:	704	cf	
Total Storage Provided:	2,903	cf	105.5% Of Required Storage
Number of Barrels:	1	barrels	
Length per Barrel:	28.0	ft	
Length Per Header:	0.0	ft	
Rectangular Footprint (W x L):	12. ft x 30. ft		

CONTECH Materials		
Total CMP Footage:	28	ft
Approximate Total Pieces:	2	pcs
Approximate Coupling Bands:	1	bands
Approximate Truckloads:	1	trucks

Construction Quantities**		
Total Excavation:	154	cy
Porous Stone Backfill For Storage:	65	cy stone
Backfill to Grade Excluding Stone:	7	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



CONTECH CMP DETENTION AND INFILTRATION SYSTEM
NOT TO SCALE

5
–

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ARCHITECTS ENGINEERS PLANNERS
SUITE 110, 18401 VON KARMAN AVE.
IRVINE, CA. 92612
P: 949-833-5588, F: 949-833-5511

PROJECT TITLE:
FERN ELEMENTARY SCHOOL
1314 FERN AVE., TORRANCE, CA 90503
TORRANCE UNIFIED SCHOOL DISTRICT
2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:
C101	CIVIL DEATAILS-1

DATE:	SCALE:	SHEET NUMBER
12/17/10	NONE	1
ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
	03-113161	24701

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BARBARA G. HELTON
NO. C19188
07-31-11
RENEWAL DATE
STATE OF CALIFORNIA

CSK-1

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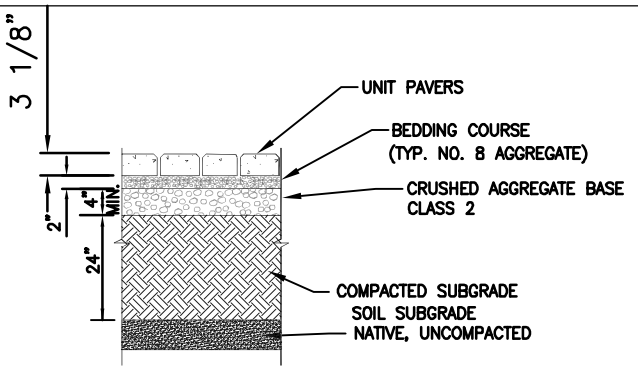

PAVER SECTIONS
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UNIT PAVERS
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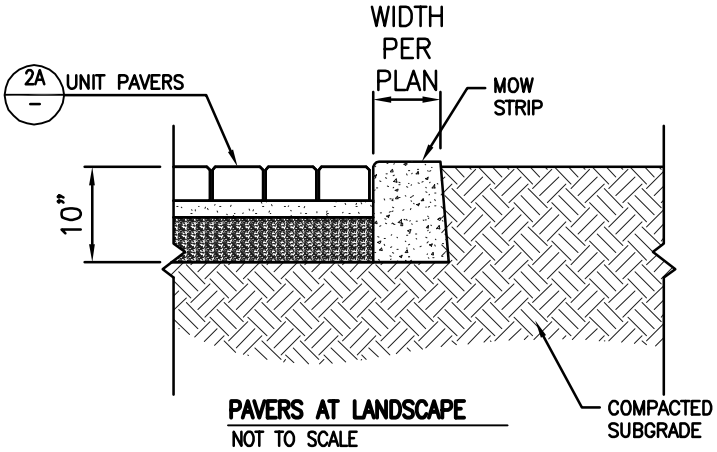

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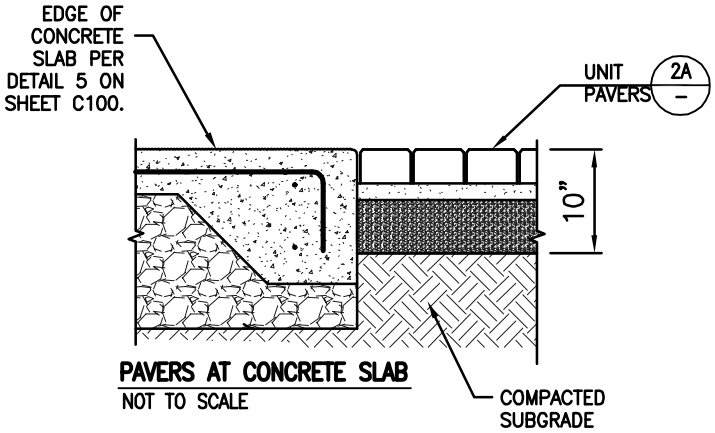

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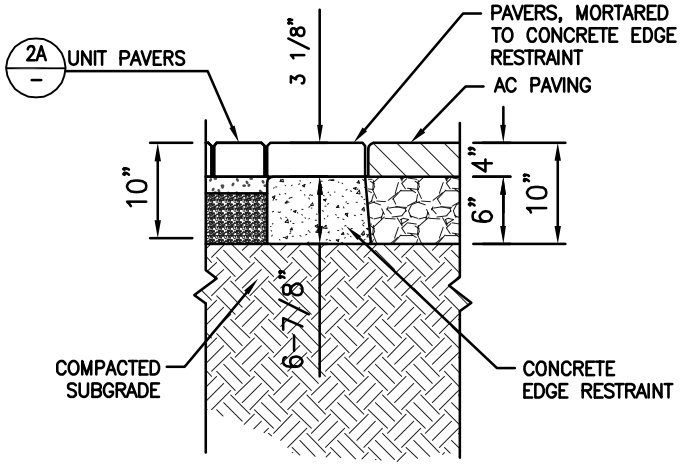

PAVERS AT AC PAVING
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PAVER BOUNDARY CONDITIONS
NOT TO SCALE

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ARCHITECTS ENGINEERS PLANNERS

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IRVINE, CA. 92612
P: 949-833-5588, F: 949-833-5511

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1314 FERN AVE., TORRANCE, CA 90503

TORRANCE UNIFIED SCHOOL DISTRICT
2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:
C102	CIVIL DEATAILS-2

DATE:	SCALE:	SHEET NUMBER
12/17/10	NONE	1
ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
	03-113161	24701

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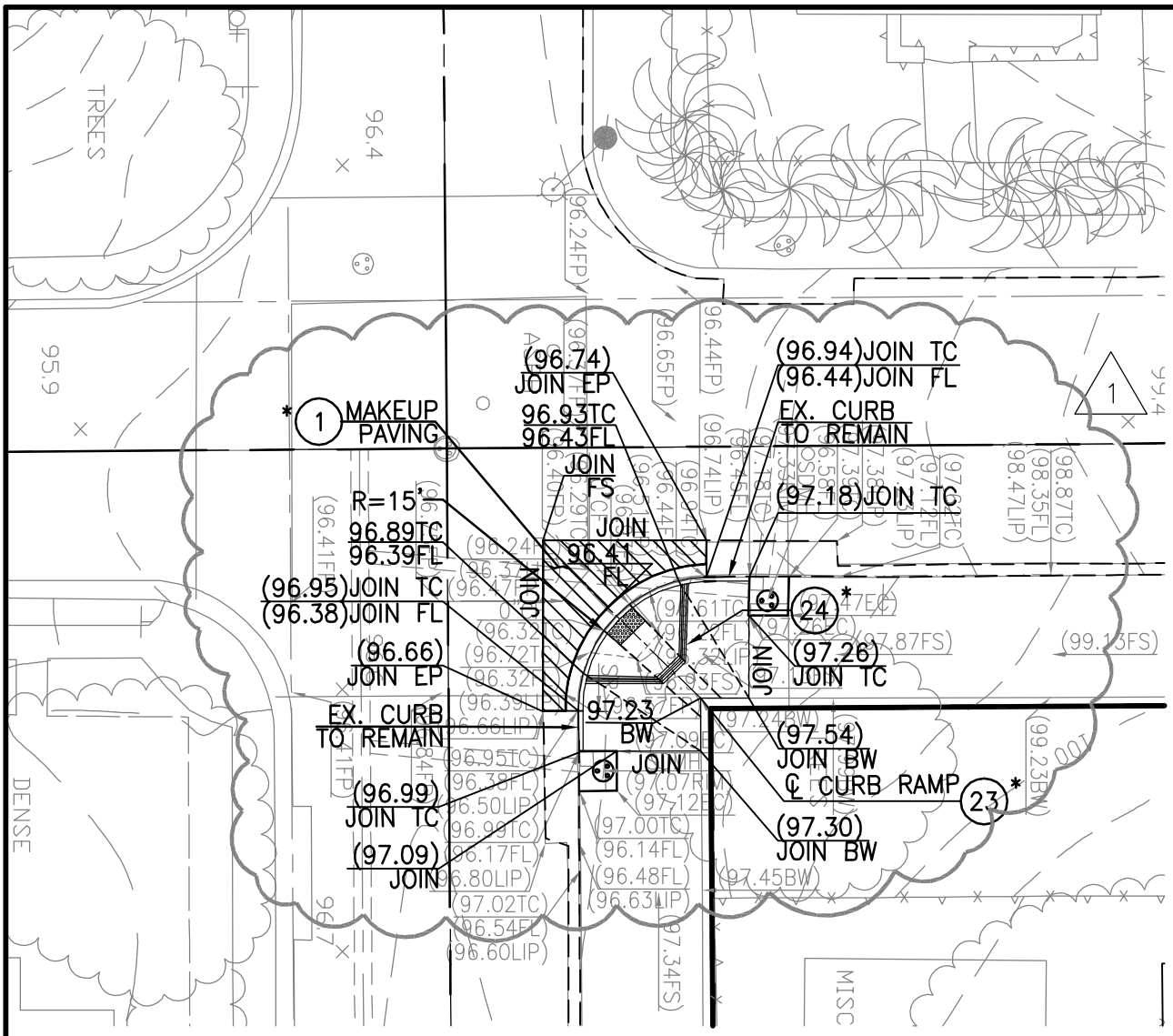

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TORRANCE UNIFIED SCHOOL DISTRICT

2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:	
C300	FINISH GRADING PLAN	
DATE: 12/17/10	SCALE: 1"=20'	SHEET NUMBER 1
ISSUE:	DSA PROJECT NUMBER: 03-113161	IBI PROJECT NUMBER: 24701

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BARBARA G. HELTON
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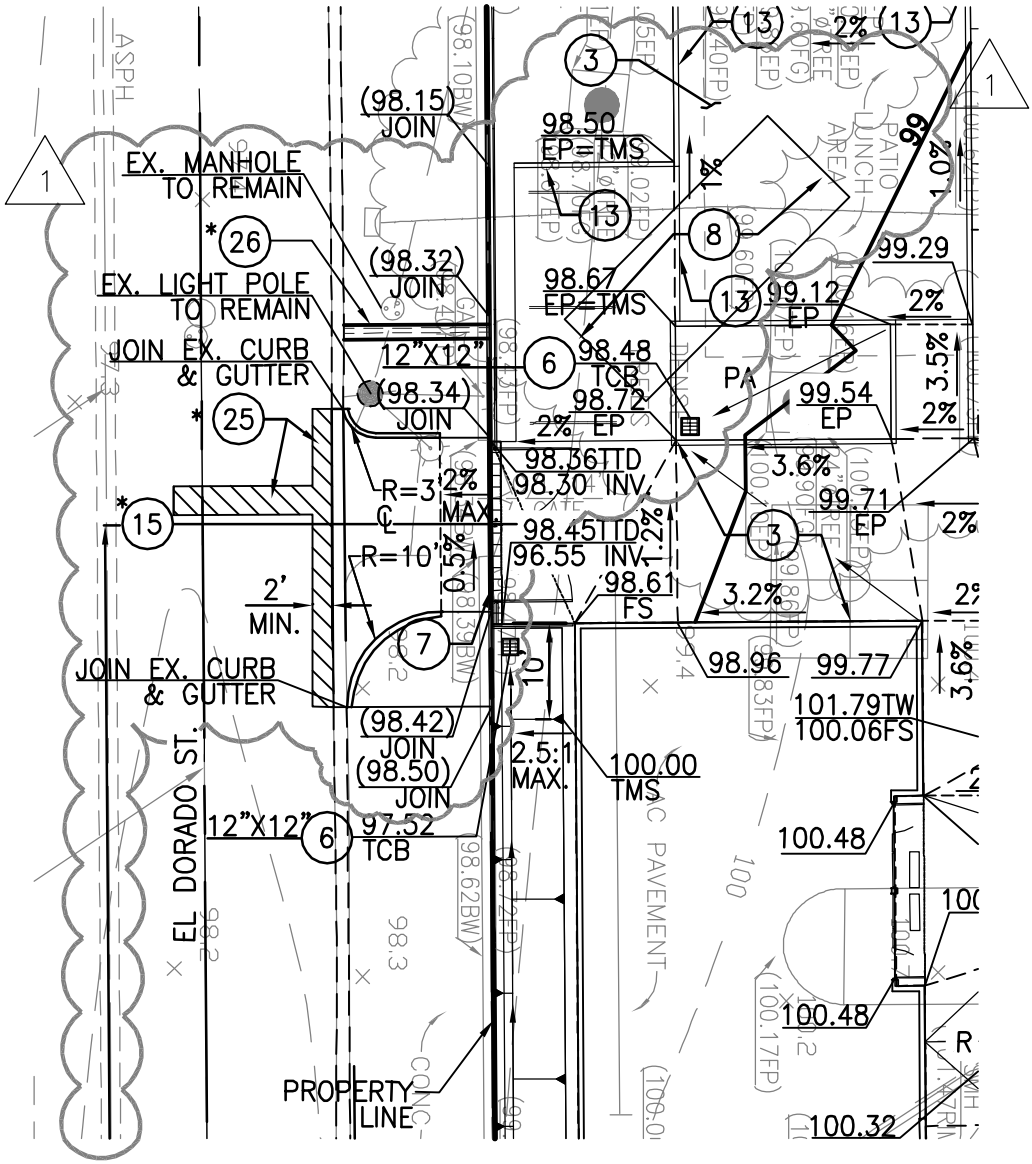

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1314 FERN AVE., TORRANCE, CA 90503

TORRANCE UNIFIED SCHOOL DISTRICT

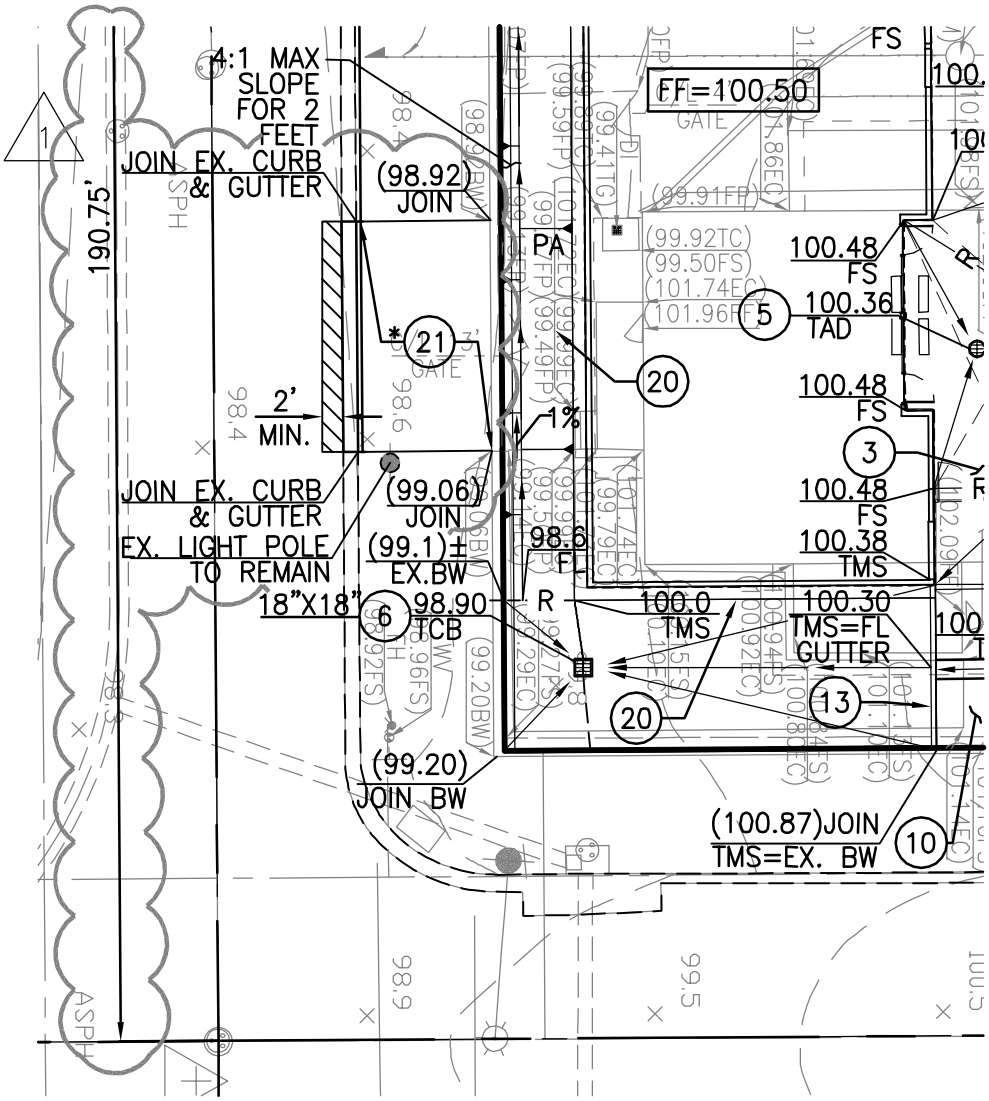
2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:
C300	FINISH GRADING PLAN

DATE:	SCALE:	SHEET NUMBER
12/17/10	1"=20'	2

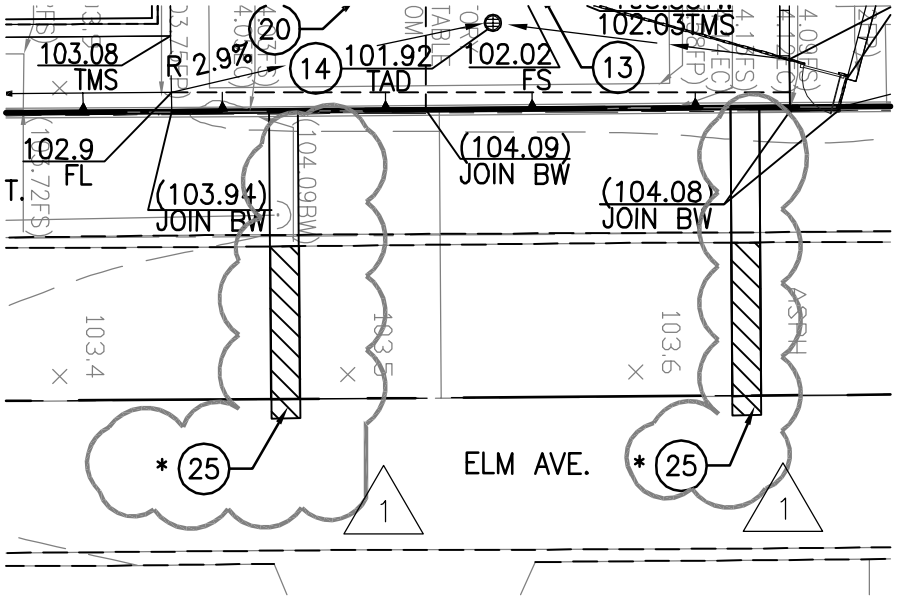
ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
	03-113161	24701

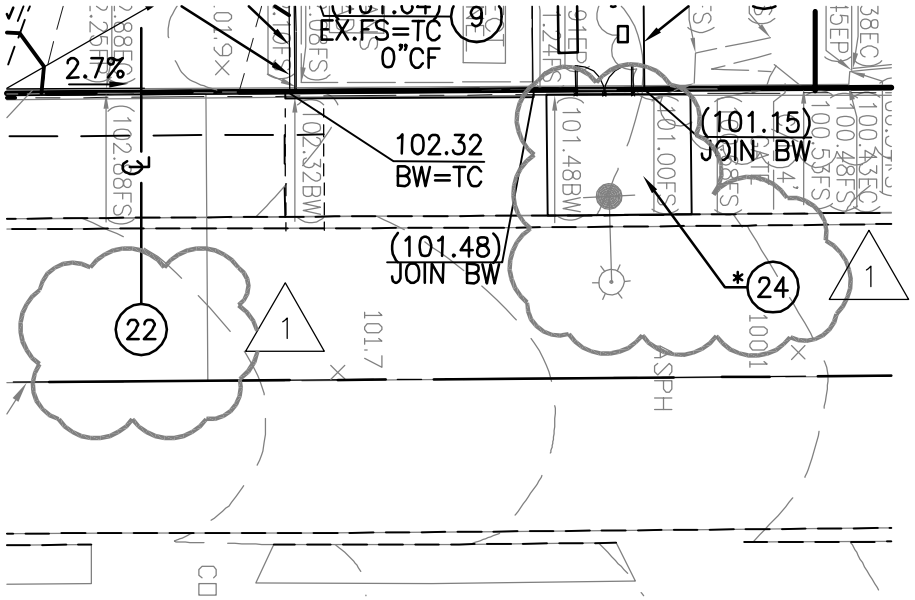
LICENSED ARCHITECT
BARBARA G. HELTZEL
NO. C19188
07-31-11
RENEWAL DATE
STATE OF CALIFORNIA



IBI GROUP ARCHITECTS ENGINEERS PLANNERS SUITE 110, 18401 VON KARMAN AVE. IRVINE, CA. 92612 P: 949-833-5588, F: 949-833-5511	PROJECT TITLE: FERN ELEMENTARY SCHOOL 1314 FERN AVE., TORRANCE, CA 90503 TORRANCE UNIFIED SCHOOL DISTRICT 2335 PLAZA DEL AMO TORRANCE, CA 90509	LICENSED ARCHITECT BARBARA G. HELTON NO. C19188 07-31-11 RENEWAL DATE STATE OF CALIFORNIA

PART OF SHEET(S)	SHEET TITLE:	
C300	FINISH GRADING PLAN	
DATE: 12/17/10	**SCALE:** 1"=20'	**SHEET NUMBER** 3
ISSUE:	**DSA PROJECT NUMBER:** 03-113161	**IBI PROJECT NUMBER:** 24701





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ARCHITECTS ENGINEERS PLANNERS

SUITE 110, 18401 VON KARMAN AVE.
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P: 949-833-5588, F: 949-833-5511

PROJECT TITLE:

FERN ELEMENTARY SCHOOL

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TORRANCE UNIFIED SCHOOL DISTRICT

2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:
C300	FINISH GRADING PLAN

DATE:	SCALE:	SHEET NUMBER
12/17/10	1"=20'	4

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7. CONSTRUCT TRENCH DRAIN PER DETAIL 10 ON SHEET C100.

1

8. LIMIT OF STORMWATER DETENTION AND INFILTRATION SYSTEM. SEE NOTE 22 ON SHEET C400.

9. CONSTRUCT CONCRETE CURB PER DETAIL 12 ON SHEET C100.

10. DECOMPOSED GRANITE PER LANDSCAPE PLAN SHEET L-02.

11. SEE ARCHITECT'S PLAN FOR FENCING ENCLOSURE.

12. CONSTRUCT TRENCH DRAIN IN 40-INCH SEGMENTS PER DETAIL 10 ON SHEET C100.

13. CONSTRUCT MOW STRIP PER DETAIL 11 SHEET C100. W=6" UNLESS OTHERWISE STATED.

14. CONSTRUCT PLANTER AREA DRAIN PER DETAIL 1 ON SHEET C101

1

15. RECONSTRUCT DRIVEWAY PER SPPWC STANDARD PLAN 110-3: W=16'. RADIUS AS SHOWN ON PLAN.

C101.

1

21. REMOVE EXISTING DRIVEWAY AND CONSTRUCT 3½" THICK P.C.C. SIDEWALK, CURB AND GUTTER TO MATCH EXISTING CURB AND GUTTER PER MODIFIED SPPWC STD. PLAN 120-2 AND CITY OF TORRANCE STD. T102. 24" MAKE-UP PAVING. A.C. 1" THICKER THAN EXISTING AND C.A.B. OR C.M.B. 2" THICKER THAN EXISTING.

22. DRIVEWAY PER SPPWC STD. PLAN 110-2; W=30', X=4', Y=9'. DRIVEWAY CONSTRUCTED AS PART OF SEPARATE PROJECT.

23. CONSTRUCT CURB RAMP PER SPPWC STD. PLAN 111-4, CASE A, TYPE 1 (MODIFIED), X=6', Y=9'.

24. RESTORE CONCRETE SIDEWALK PER CITY OF TORRANCE STANDARD PLAN T102-2.

25. RESTORE ASPHALT PAVING PER CITY OF TORRANCE STANDARD PLAN T116.

26. REMOVE EXISTING CURB DRAIN. CONSTRUCT PARKWAY DRAIN PER SPPWC STANDARD PLAN 151-2, S=1.5'.

*OBTAIN SEPARATE PERMIT FROM THE CITY OF TORRANCE FOR WORK WITHIN THE PUBLIC RIGHT OF WAY.

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PART OF SHEET(S)	SHEET TITLE:	
C300	FINISH GRADING PLAN	
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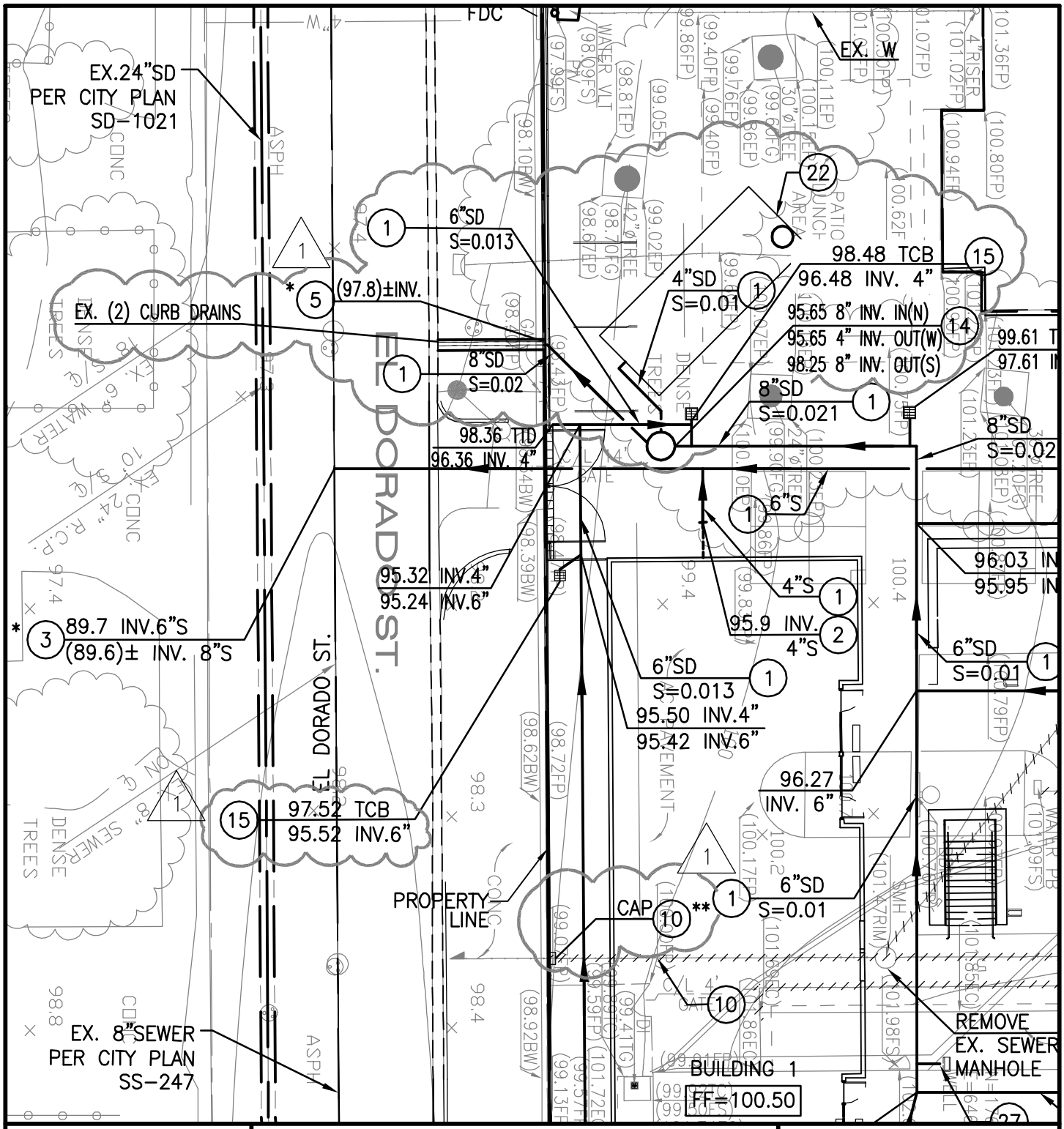

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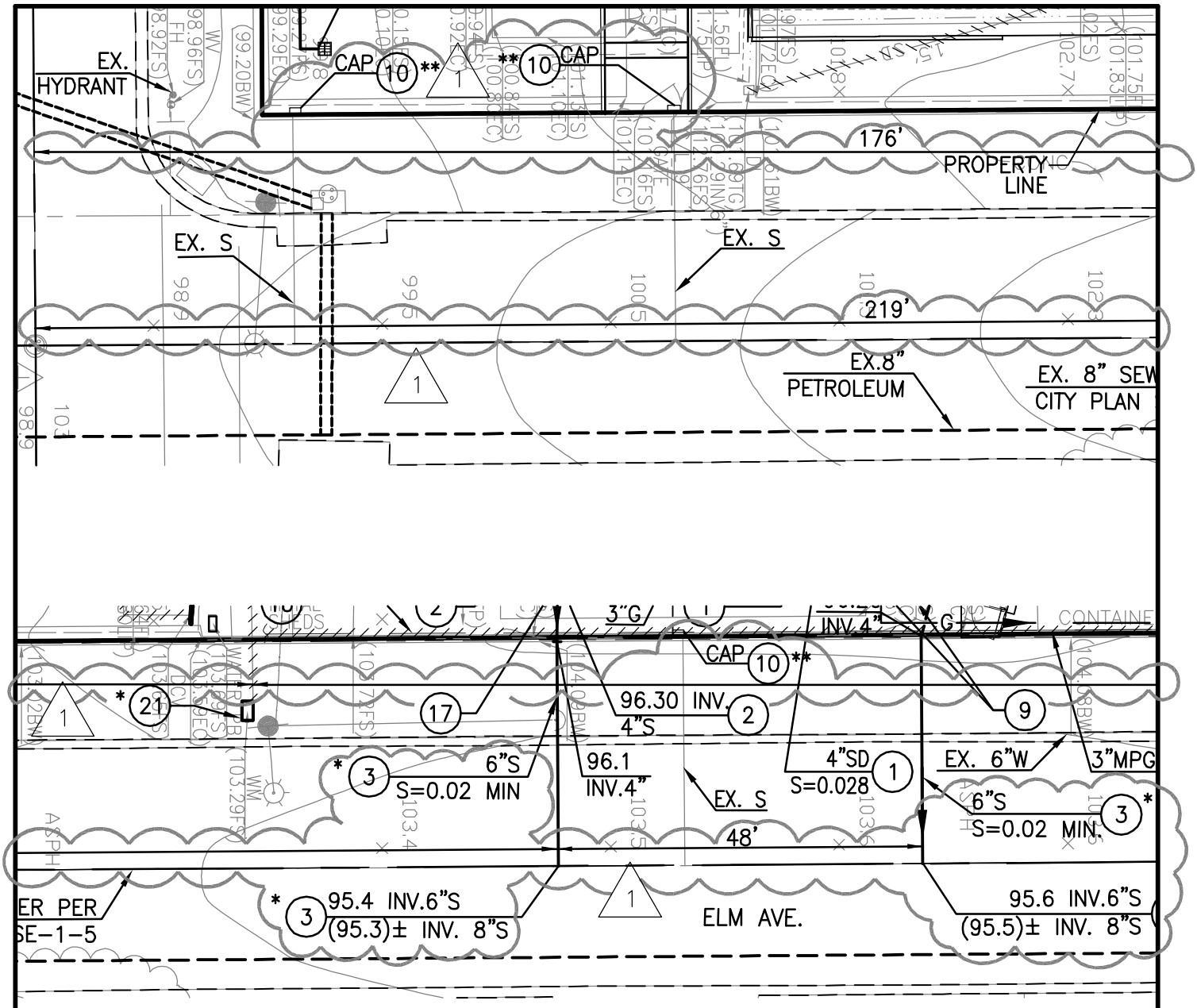
CSK-8



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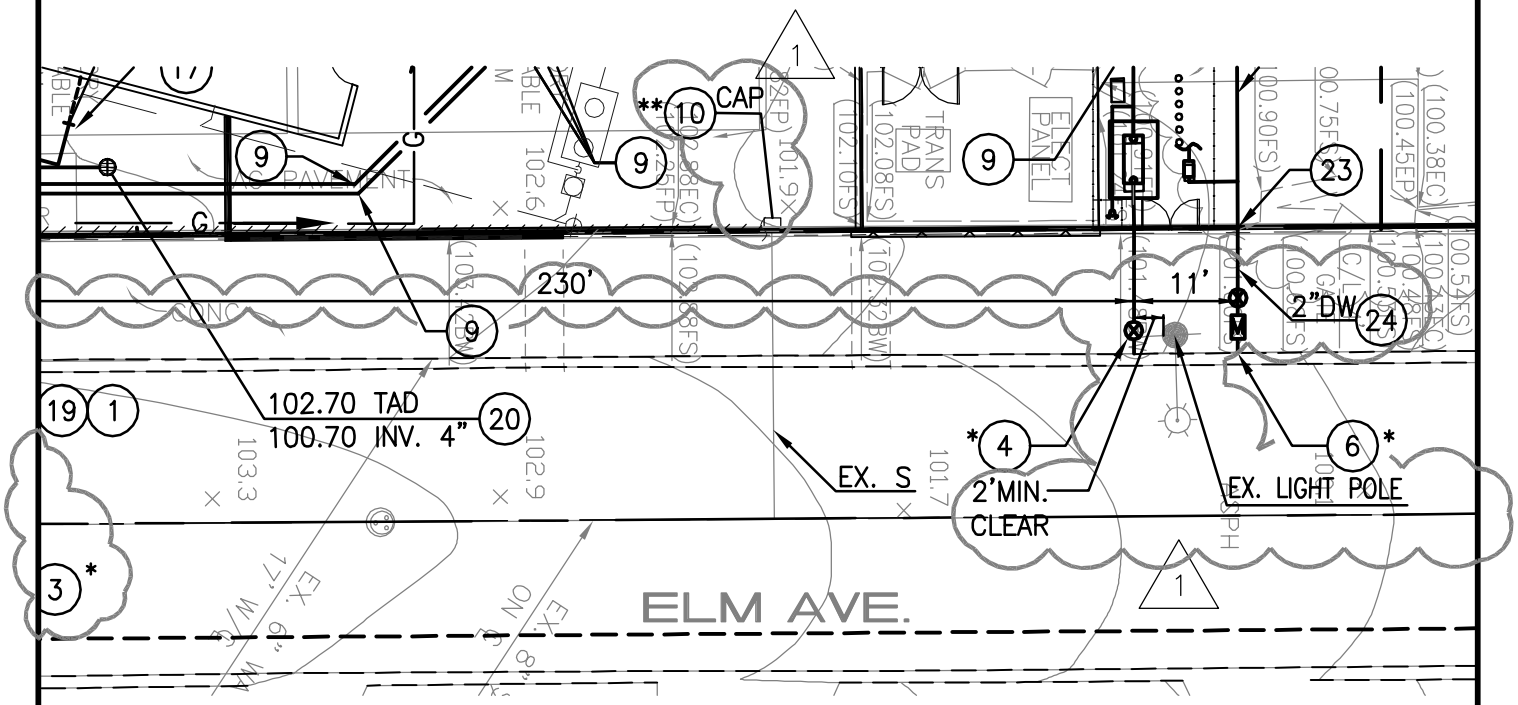

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CSK-10

NECESSARY.

* (3) CONNECT TO EXISTING CITY OF TORRANCE PUBLIC SEWER MAIN WITH 6" VCP PER SPPWC STD. PLAN NO. 222-2 AND CITY OF TORRANCE STANDARD PLAN T116-2. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PERMITS AND SEWER CONNECTION FEES. 1

* (4) INSTALL 4" DOUBLE DETECTOR CHECK ASSEMBLY PER CITY OF TORRANCE STANDARD PLAN NO. T710.

* (5) REMOVE EXISTING CURB FACE DRAIN AND CONSTRUCT PARKWAY DRAIN PER NOTE 26 ON SHEET C300. CONTRACTOR SHALL VERIFY INVERT ELEVATION AND LOCATION.

* (6) CONNECT TO EXISTING MAIN. INSTALL 2" SERVICE WITH 2" COMPOUND METER PER T704.

(7) NOT USED.

SHEET C101.

(14) CONSTRUCT MANHOLE BYPASS STRUCTURE PER SPPWC STANDARD PLAN 321-2. 1

(15) [illegible] PER NOTE 2 ON SHEET C300

* (21) EXISTING WATER METER TO REMAIN UNTIL NEW WATER SERVICE IS OPERATIONAL. WHEN REMOVING EXISTING SERVICE CLOSE CORP. STOP TO DISCONNECT SERVICE LINE. CRIMP SERVICE LINE CLOSED AND PLACE A CAP ON CORP. STOP. REMOVE WATER METER, ANGLE VALVE AND METER BOX. SALVAGE METER TO THE CITY. 1

(22) PROVIDE AND INSTALL CONTECH CMP STORMWATER DETENTION & FILTRATION SYSTEM PER DETAIL 5 ON SHEET C101.

BACK OF METER VAULT.

(25) SEE LANDSCAPE SHEET L-03 FOR FENCING AND IRRIGATION DETAILS. 1

*CONTRACTOR SHALL OBTAIN SEPARATE PERMIT FROM THE CITY OF TORRANCE FOR ITEMS DESIGNATED.

**CITY SHALL INSPECT CAPS ON SEWER LATERALS. 1

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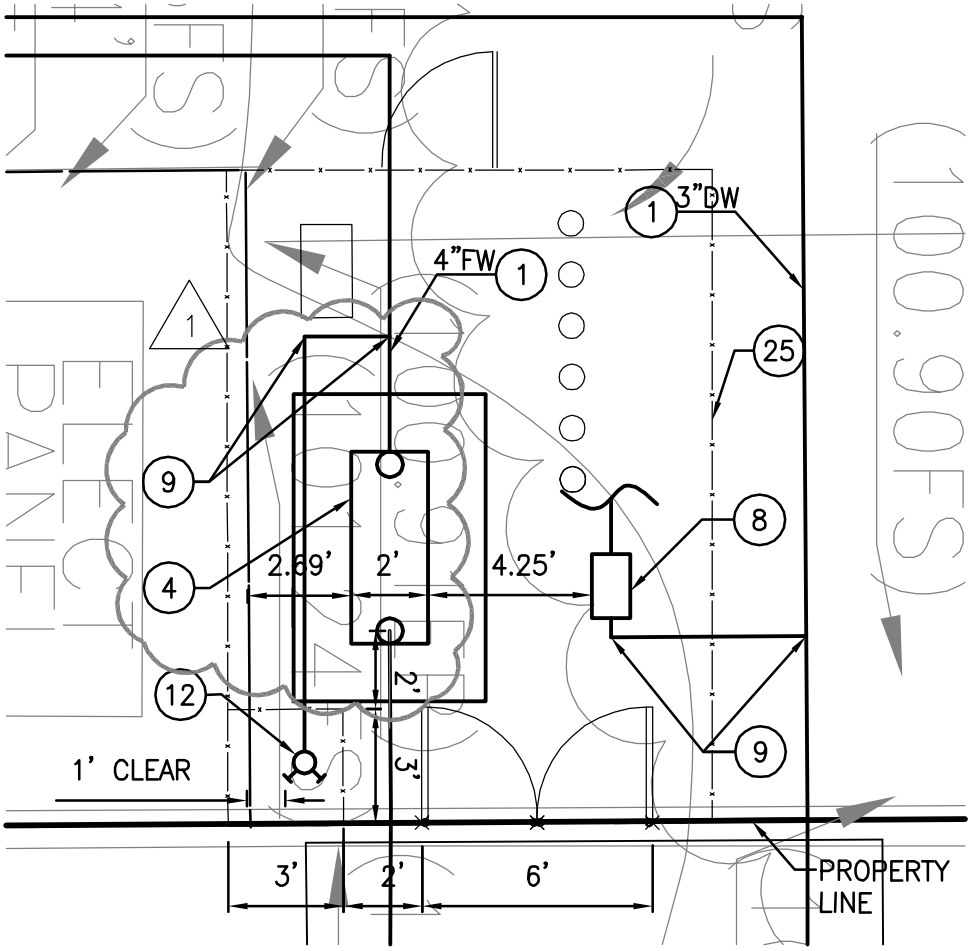

DETAIL A
SCALE: 1"=5'

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CSK-12

SUPERIOR MODEL 3000 NORMALLY CLOSED GLOBE MASTER VALVE. INSTALL 1.5" SIZE. MASTER VALVES TO BE USED FOR DOMESTIC WATER FROM NEW WATER METER. REFER TO POINT OF CONNECTION CALLOUT ON PLANS FOR FURTHER INFORMATION. REFER TO DETAIL. MASTER VALVE SHALL BE INSTALLED ABOVE GRADE IN CHAIN LINK ENCLOSURE - REFER TO PLAN. REFER TO TORRANCE USD SPECIFICATIONS.

2" FEBCO 825Y REDUCED PRESSURE BACKFLOW PREVENTER. BACKFLOW TO BE INSTALLED PER DETAIL IN CHAIN LINK ENCLOSURE. REFER TO PLAN. INSTALL PER LOCAL CODE. REFER TO DETAIL. PROVIDE ISOLATION VALVES WITH BACKFLOW ASSEMBLY. CONTRACTOR SHALL BE RESPONSIBLE FOR CERTIFICATION OF RE-INSTALLED BACKFLOW.

F CALSENSE FMIB SERIES 1" FLOW SENSOR. INSTALL ABOVE GRADE PER DETAIL. FLOW RANGE: 3-50 GPM.

C AUTOMATIC CONTROLLER
CONTROLLER IS A CALSENSE ET2000E-40-EN-RRE/SSE-RR. CONTROLLER ASSEMBLY INCLUDES STAINLESS STEEL ENCLOSURE.
INSTALL PEDESTAL ENCLOSURE ON QUICKPAD ENCLOSURE MOUNTING PAD QP-18. INSTALL PER MAN. SPECIFICATIONS. FINAL LOCATION OF ENCLOSURE SHALL BE APPROVED BY DISTRICT REPRESENTATIVE. POWER FOR CONTROLLER SUPPLIED PER ELECTRICAL ENGINEER'S PLANS. CAT5 CABLE SUPPLIED FOR FUTURE CONTROLLER. PROVIDE AND INSTALL MINI CLIK RAIN SHUT OFF SWITCH. MODEL MINI-CLIK. INSTALL ATOP CHAIN LINK ENCLOSURE AWAY FROM SIGHT WITH CLEAR SKY ABOVE. FINAL LOCATION SHALL BE APPROVED BY SCHOOL DISTRICT REPRESENTATIVE. QUESTIONS REGARDING CALSENSE CONTROLLER SHALL BE FORWARDED TO CALSENSE REPRESENTATIVE MARK HUNTZINGER (760)-580-1827. CONTACT ERIC HANSON AT (714) 553-3681 FOR INSTALLATION CERTIFICATION. CONTACT ERIC HANSON MIN 4 WORKING DAYS PRIOR TO INSPECTION.

1

REFER TO SHEET L-5 FOR CERTIFICATE OF COMPLIANCE REQUIREMENTS FOR INSTALLATION OF CALSENSE AND RELATED EQUIPMENT.

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1314 FERN AVE., TORRANCE, CA 90503
TORRANCE UNIFIED SCHOOL DISTRICT
2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:
L-01	Irrigation Plan

DATE:	SCALE:	SHEET NUMBER
DEC.17, 2010	N.T.S	L-SK-1

ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
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CONTRACTOR SHALL CONTACT MARK HUNTZINGER AT CALSENSE (760) 580-1827 FOR ORDERING OR ANY QUESTIONS REGARDING ANY OF THE CONTROLLER AND CONTROLLER RELATED EQUIPMENT

ERIC HANSON, (CALSENSE) SHALL BE CONTACTED FOR INSTALLATION APPROVAL FOR THE EQUIPMENT LISTED BELOW. CONTRACTOR SHALL CONTACT ERIC HANSON A MINIMUM OF (4) FOUR WORKING DAYS PRIOR TO INSTALLATION. CONTRACTOR SHALL OBTAIN SIGN OFF FROM CAŞEMSE FOR EACH OF THE FOLLOWING ITEMS. CONTRACTOR WILL NOT BE SIGNED OFF TO START MAINTENANCE PERIOD UNTIL PROOF OF APPPROVALS IS EXHIBITED TO SCHOOL DISTRICT AND LANDSCAPE ARCHITECT. CONTRACTOR SHALL FORWARD ALL APPROVALS TO BOTH THE SCHOOL DISTRICT AS WELL AS THE LANDSCAPE ARCHITECT AS CONSTRUCTION PROGRESSES.

1. PRE-CONSTRUCTION MEETING.
2. INSTALLATION OF FLOW SENSOR AND MASTER VALVE ASSEMBLIES.
3. INSTALLATION AND INTEGRITY OF FLOW SENSOR CABLE.
4. INSTALLATION OF CALSENSE CONTROLLER ASSEMBLY.

1

SUBSTANTIAL COMPLIANCE CERTIFICATE.

CONTACT MARK HUNTZINGER WITH CALSENSE WITH ANY QUESTIONS REGARDING INSTALLATION OR ORDERING OF CALSENSE ASSEMBLIES OR RELATED EQUIPMENT. MOBILE (760) 580-1827.

CONTRACTOR SHALL CONTACT ERIC HANSON OF CALSENSE, (714) 553-3681 A MINIMUM OF (4) FOUR BUSINESS DAYS PRIOR TO INSTALLATION OF ALL CALSENSE AND RELATED EQUIPMENT. A CALSENSE REPRESENTATIVE SHALL OBSERVE AND APPROVE THE INSTALLATION OF ALL CALSENSE ASSEMBLIES AND ITS RELATED EQUIPMENT, (CONTROLLER, FLOW SENSOR, COM WIRES, ETC). CONTRACTOR SHALL OBTAIN SUBSTANTIAL COMPLIANCE CERTIFICATE FROM CALSENSE REGARDING ALL CALSENSE AND RELATED EQUIPMENT. COPIES OF THIS CERTIFICATE SHALL BE DISTRIBUTED TO THE SCHOOL DISTRICT AND LANDSCAPE ARCHITECT. CONTRACTOR SHALL NOT BE RELEASED TO
MAINTENANCE PERIOD UNTIL CERTIFICATE OF SUBSTANTIAL CONFORMANCE IS OBTAINED FROM CALSENSE.

IBI GROUP

ARCHITECTS ENGINEERS PLANNERS

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PROJECT TITLE:
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1314 FERN AVE., TORRANCE, CA 90503
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2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:	
L-01	Irrigation Plan	
DATE: DEC.17, 2010	SCALE: N.T.S	SHEET NUMBER L-SK-2
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LICENSED ARCHITECT
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REFER TO TORRANCE UNIFIED SCHOOL DISTRICT CHAIN LINK FENCING SPECIFICATIONS, SECTION 02710.
CONTRACTOR SHALL COORDINATE INSTALLATION OF FENCING POST FOOTINGS WITH IRRIGATION. CHAINLINK ENCLOSURE SHALL HAVE 6' HIGH INSIDE CLEARANCE FROM FINISH GRADE AND SHALL HAVE CHAINLINK TOP. ALL DOOR HINGES SHALL BE HEAVY DUTY AND LOCKABLE LATCHES SHALL BE PROVIDED. CONTRACTOR SHALL COORDINATE WITH SCHOOL DISTRICT ON TYPE AND MODEL OF LOCKS TO BE PROVIDED.
CONTRACTOR SHALL PROVIDE SCHOOL DISTRICT WITH APPROVED PADLOCKS. CONTRACTOR SHALL CONTACT MARK HAMPSON AT TORRANCE USD FACILITIES DEPT. (310) 972-6290.
FINAL LOCATION OF RCV ENCLOSURE SHALL BE APPROVED BY SCHOOL DISTRICT REPRESENTATIVE.
ALL ABOVE GRADE PIPING MAINLINE N ENCLOSURE SHALL BE 2" COPPER UNLESS OTHERWISE NOTED.

1

LEGEND

1. 2" COPPER MAINLINE RISER TO ABOVE GROUND MASTER VALVE, REMOVABLE PIPE SECTION AND VALVE MANIFOLD.
2. EXISTING CHAIN LINK FENCE SURROUNDING EXISTING ELECTRICAL EQUIPMENT. CONSTRUCT ENCLOSURE BESIDE THIS EXISTING CHAINLINK FENCE.

9. LATERAL LINES TO EXTEND INTO FIELD. STUB LINES FOR FUTURE CONNECTION.
10. CONTROLLER IN SS CABINET. REFER TO LEGEND.
11. IFITTINGS ON EITHER SIDE OF STRAIGHT PIPE UPSTREAM AND DOWNSTREAM OF FLOW SENOR. SEE DETAIL FOR INSTALLATION.

1

12. LOCATION OF ABOVE GRADE CALSENSE FM SERIES FLOW SENSOR.
13. ABOVE GRADE MASTER VALVE. REFER TO DETAIL.
14. 2" REDUCED PRESSURE BACKFLOW. REFER TO DETAIL FOR INSTALLATION.
15. CONTRACTOR SHALL INSTALL 2" MAINLINE SUPPLY FROM CIVIL ENGINEER'S STUB OFF BUILDING SUPPLY LINE TO BACKFLOW PREVENTER LOCATION.
16. 2" MAINLINE ROUTED TO PLAYFIELD AND STUBBED WITH ISOLATION VALVE. SEE PLAN. ROUTE 18 EXTRA WIRES PLUS COMMON ALONG MAINLINE. COIL WIRES IN BOX NEXT TO ISOLATION VALVE.

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PART OF SHEET(S)	SHEET TITLE:	
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LEGEND

1. CALSENSE FM SERIES FLOW SENSOR REFER TO IRRIGATION LEGEND FOR SIZE. REFER TO PIPE SIZING CHART FOR PIPE SIZE AND STRAIGHT PIPE REQUIREMENTS.
2. #14 WIRES CONNECTING FLOW SENSOR TO CONTROLLER REFER TO SPECIFICATIONS.
3. COMPACTED SUBGRADE.
4. LAYER OF ¾" GRAVEL. REFER TO IRRIGATION ENCLOSURE DETAIL FOR DEPTH.
5. WATERPROOF CONNECTORS. DO NOT USE PRE-FILLED TYPE CONNECTORS.REFER TO SPECIFICATIONS.
6.
6. COPPER TYPE K MAINLINE FROM ABOVE GRADE MASTER VALVE. REFER TO CHAIN LINK IRRIGATION ENCLOSURE LAYOUT
7. ADAPTERS AS REQUIRED.
8. 3" GALVANIZED PIPE SUPPORT MADE UP OF 2 PIPE SECTIONS, THREADED AT ONE END. INSTALL COUPLING TO ALLOW FINE ADJUSTMENT OF HEIGHT.
9. 3" THREADED COUPLING
10. 12" SQUARE CONCRETE FOOTING.
11. STEEL PLATE WELDED TO TOP OF PIPE.
12. MASTER VALVE. REFER TO LEGEND, AND DETAIL.
13. BLACK WIRE HARNESS.
14. WRAP ALL WIRES/ CONNECTORS IN HEAVY DUTY TAPE TO PROTECT FROM UV RAYS.

1

ABOVE GRADE REMOVABLE PIPE SECTION FOR FUTURE FLOW SENSOR

IBI GROUP

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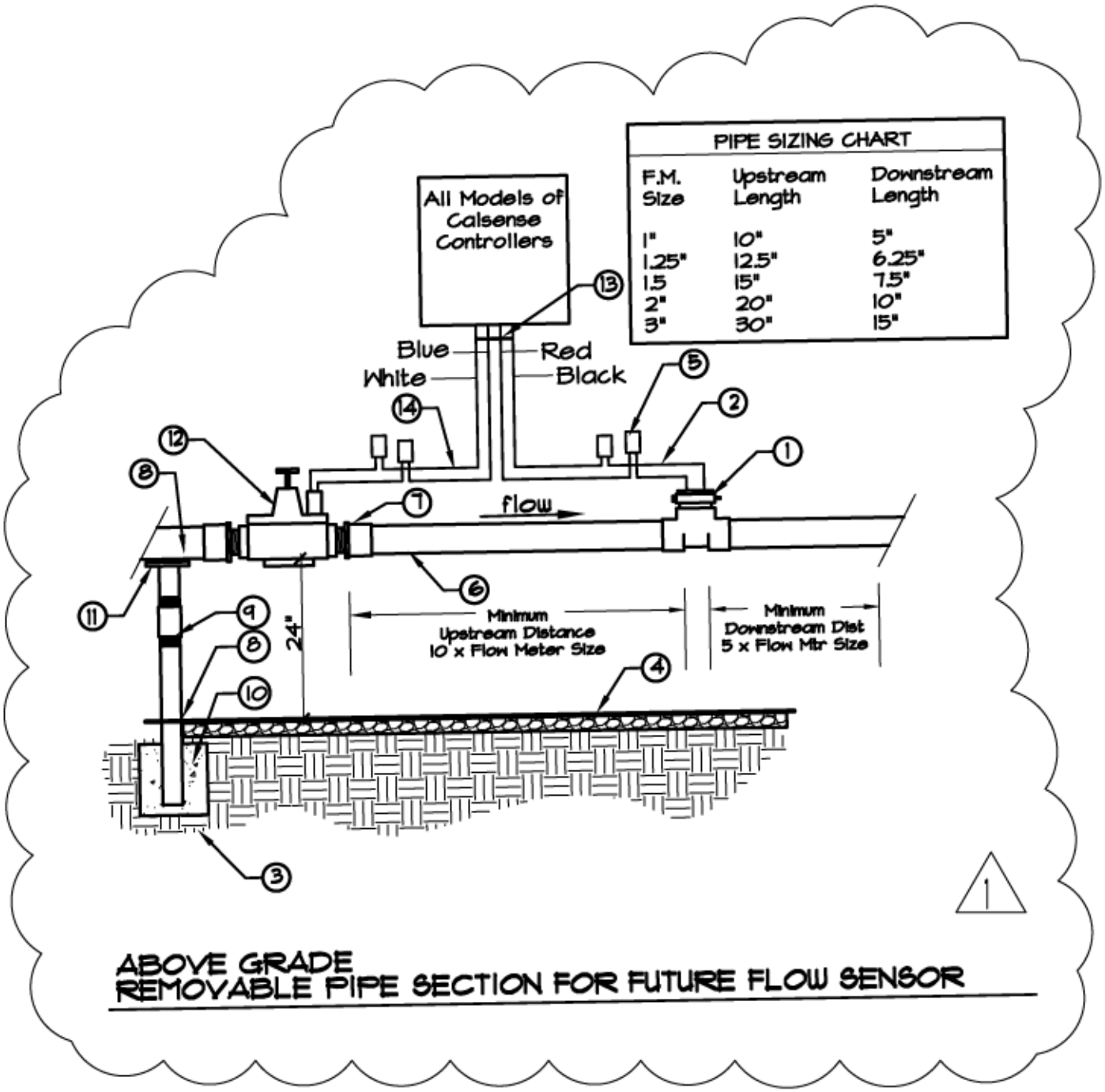

ABOVE GRADE REMOVABLE PIPE SECTION FOR FUTURE FLOW SENSOR

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L-03	Details / Notes

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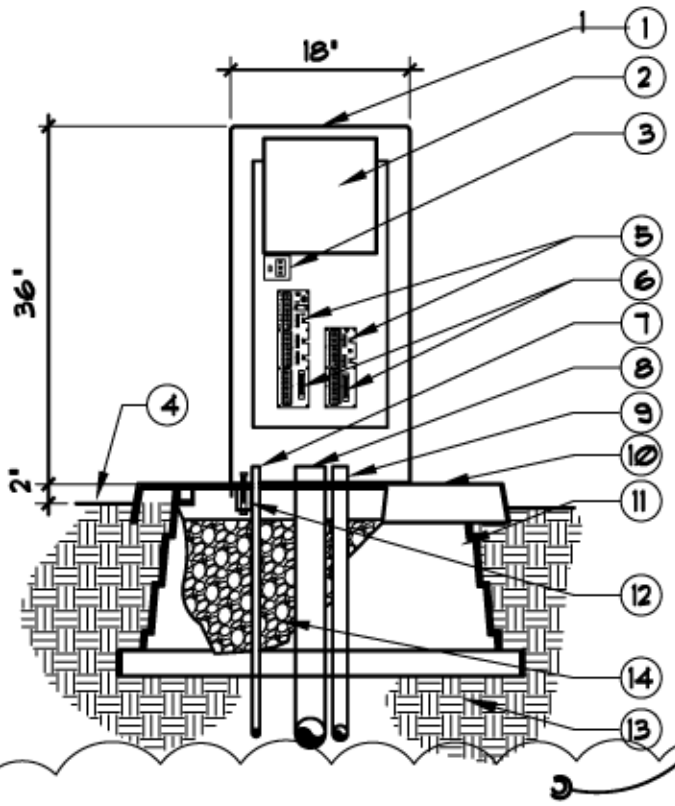

NOTE:
ALL GROUNDING REQUIREMENTS FOR CONTROLLER ASSEMBLY SHALL CONFORM TO ALL LOCAL ELECTRICAL CODES.

1

1. STAINLESS STEEL PEDESTAL MOUNT ENCLOSURE PROVIDED WITH CALSENSE IRRIGATION ASSEMBLY PACKAGE. REFER TO IRRIGATION LEGEND.
2. IRRIGATION CONTROLLER. REFER TO LEGEND
3. POWER SWITCH/ FGI RECEPTACLE.
4. FINISH GRADE. REFER TO IRRIGATION CAGE LAYOUT.
5. TERMINAL BOARD.
6. REMOTE ACCESS CONNECTOR
7. 1" PVC SWEEP CONDUIT FOR 120VAC FROM POWER SUPPLY PROVIDED BY OTHERS.
8. PVC SWEEP CONDUIT FOR REMOTE CONTROL VALVE WIRES. SIZE AS REQUIRED.
9. 1" PVC SWEEP CONDUIT FOR FLOW SENSOR CABLE(S).
10. QUICKPAD ENCLOSURE MOUNTING PAD, QP-18. INSTALL PER MANUFACTURER'S SPECIFICATIONS.
11. QUICKPAD MOUNTING PAD BASE
12. QUICKPAD MOUNTING PAD MOUNTING BRACE.
13. COMPACTED SUB-GRADE.
14. FILL VOIDS WITH ⅜" PEA GRAVEL.
15. GROUND ROD. REFER TO DETAIL. PROVIDE SEPARATE SWEEP ELL UP INTO CONTROLLER

STAINLESS STEEL PEDESTAL ENCLOSURE

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SUITE 110, 18401 VON KARMAN AVE.
IRVINE, CA. 92612
P: 949-833-5588, F: 949-833-5511

PROJECT TITLE:
FERN ELEMENTARY SCHOOL
1314 FERN AVE., TORRANCE, CA 90503
TORRANCE UNIFIED SCHOOL DISTRICT
2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:	
L-04	Irrigation Details	
DATE:	SCALE:	SHEET NUMBER
DEC. 17, 2010	N.T.S.	L-SK-6
ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
Addendum 1	03-113161	24701

LICENSED ARCHITECT
BARBARA G. HELTON
NO. C19188
07-31-11
RENEWAL DATE
STATE OF CALIFORNIA

2.04 ELECTRICAL (LOW-VOLTAGE)

B. Connections between Calsense Controller and flow sensor shall be made with one (1) black and one (1) red #14 AWG irrigation wire. Install no splices.

2.05 AUTOMATIC CONTROLLER

A. Type: (refer to plan for mounting type) fully automatic operation, capable of operating the number of stations and type indicated on Drawings. See plan for pump, flow sensor, master valve, radio remote requirements, etc., if applicable.

1. Controller assembly shall be obtained from Calsense. Contact Mark Huntzinger (760) 580-1827 for information on ordering and lead times.

2.13 FLOW SENSORS

A. Calsense FM series flow sensors manufactured by Data Industrial. Contact: Calsense, (800) 572-8608.

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TORRANCE UNIFIED SCHOOL DISTRICT
2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:	
SECTION 2.00	IRRIGATION SPECS	
DATE: DEC. 17, 2010	SCALE:	SHEET NUMBER L-SK-7
ISSUE: Addendum 1	DSA PROJECT NUMBER: 03-113161	IBI PROJECT NUMBER: 24701

LICENSED ARCHITECT
BARBARA G. HELTON
NO. C19188
07-31-11
RENEWAL DATE
STATE OF CALIFORNIA

3.13 FLOW SENSORS

A. Install per manufacturer's direction, detail on Drawings, and where indicated on plans.

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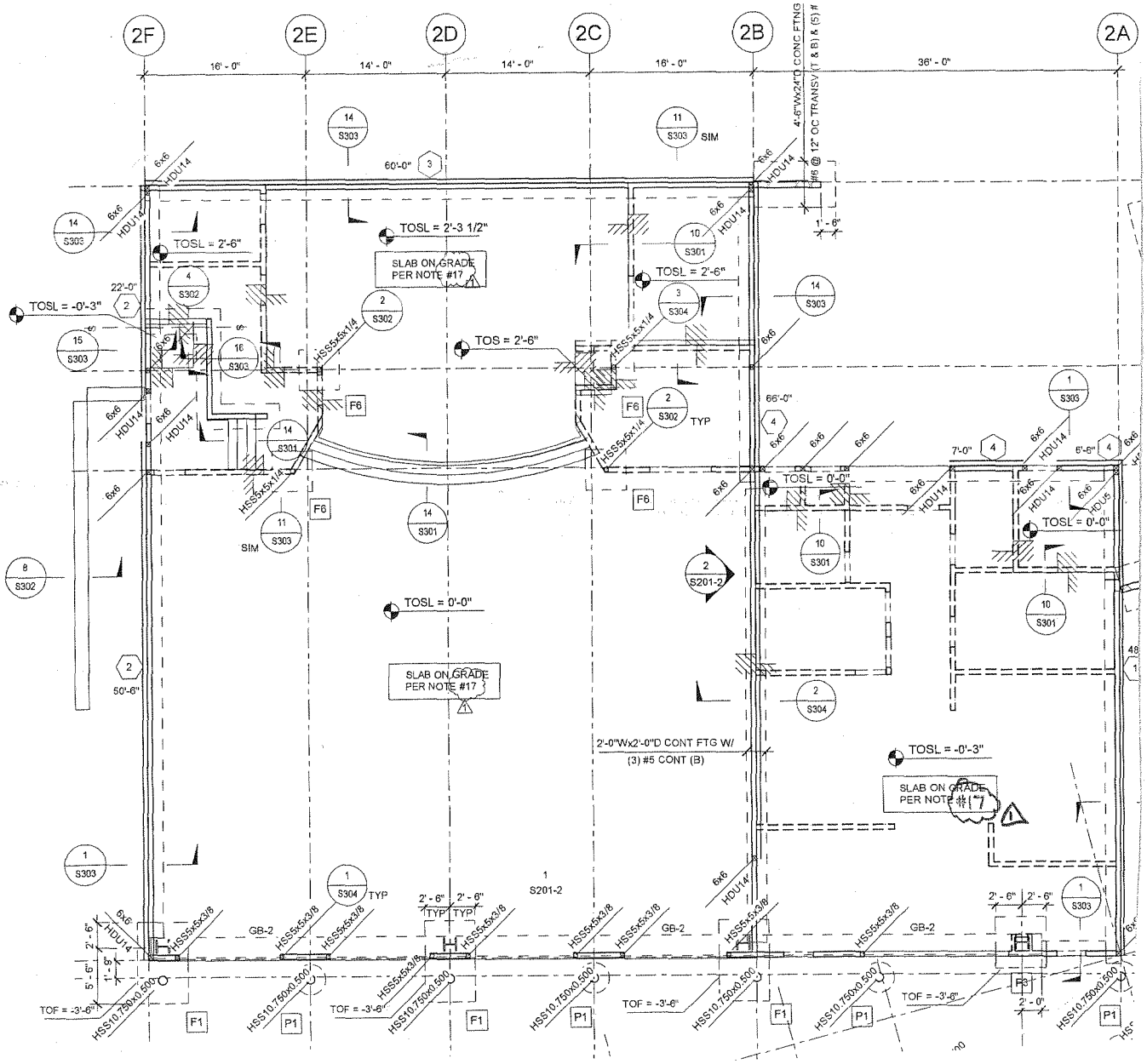
TORRANCE UNIFIED SCHOOL DISTRICT

2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:	
SECTION 3.00	IRRIGATION SPECS	
DATE: DEC. 17, 2010	SCALE:	SHEET NUMBER L-SK-8
ISSUE: Addendum 1	DSA PROJECT NUMBER: 03-113161	IBI PROJECT NUMBER: 24701



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TORRANCE UNIFIED SCHOOL DISTRICT

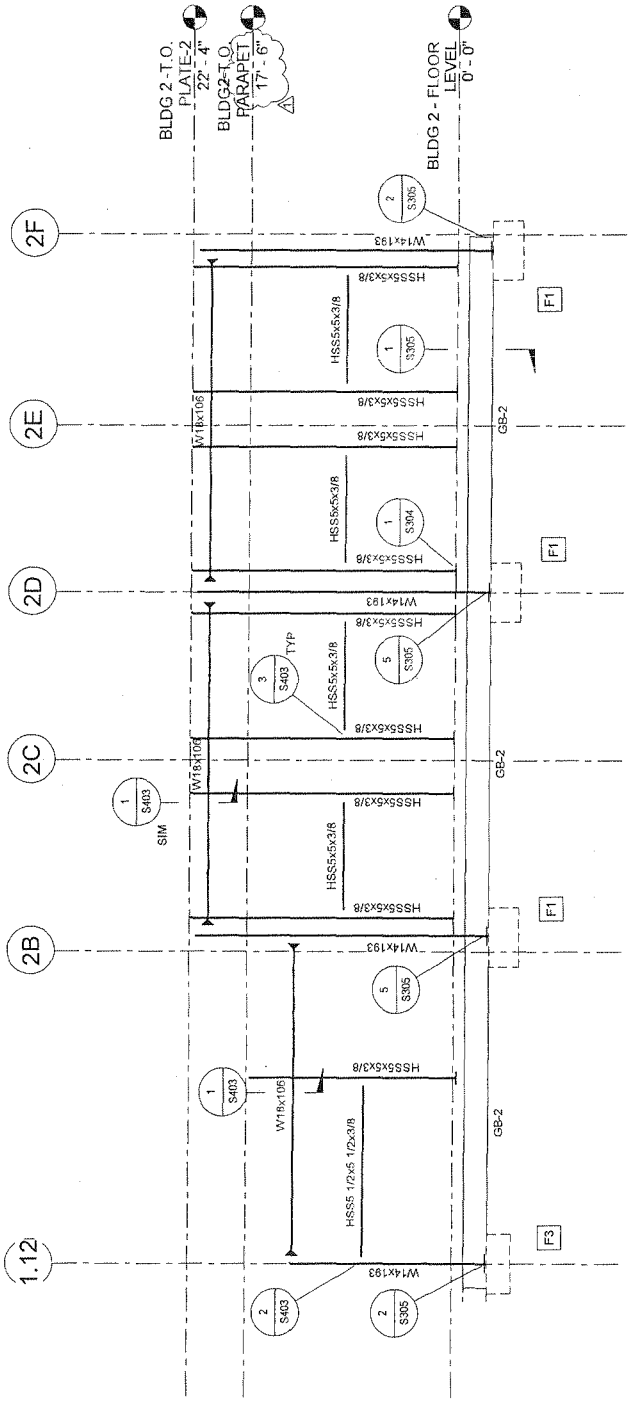
2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:
S101-2	BLDG 2 - FOUNDATION PLAN

DATE:	SCALE:	SHEET NUMBER
12/17/10	1/16"=1'-0"	SSK-1

ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
ADDENDUM	03-113161	24701

REGISTERED PROFESSIONAL ENGINEER
No. S3866
Exp. 3/31/12
STRUCTURAL
STATE OF CALIFORNIA



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PART OF SHEET(S)	SHEET TITLE:
S201-2	BLDG 2 - MOMENT FRAME ELEV.

DATE:	SCALE:	SHEET NUMBER
12/17/10	1/16"=1'-0"	SSK-2

ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
ADDENDUM	03-113161	24701

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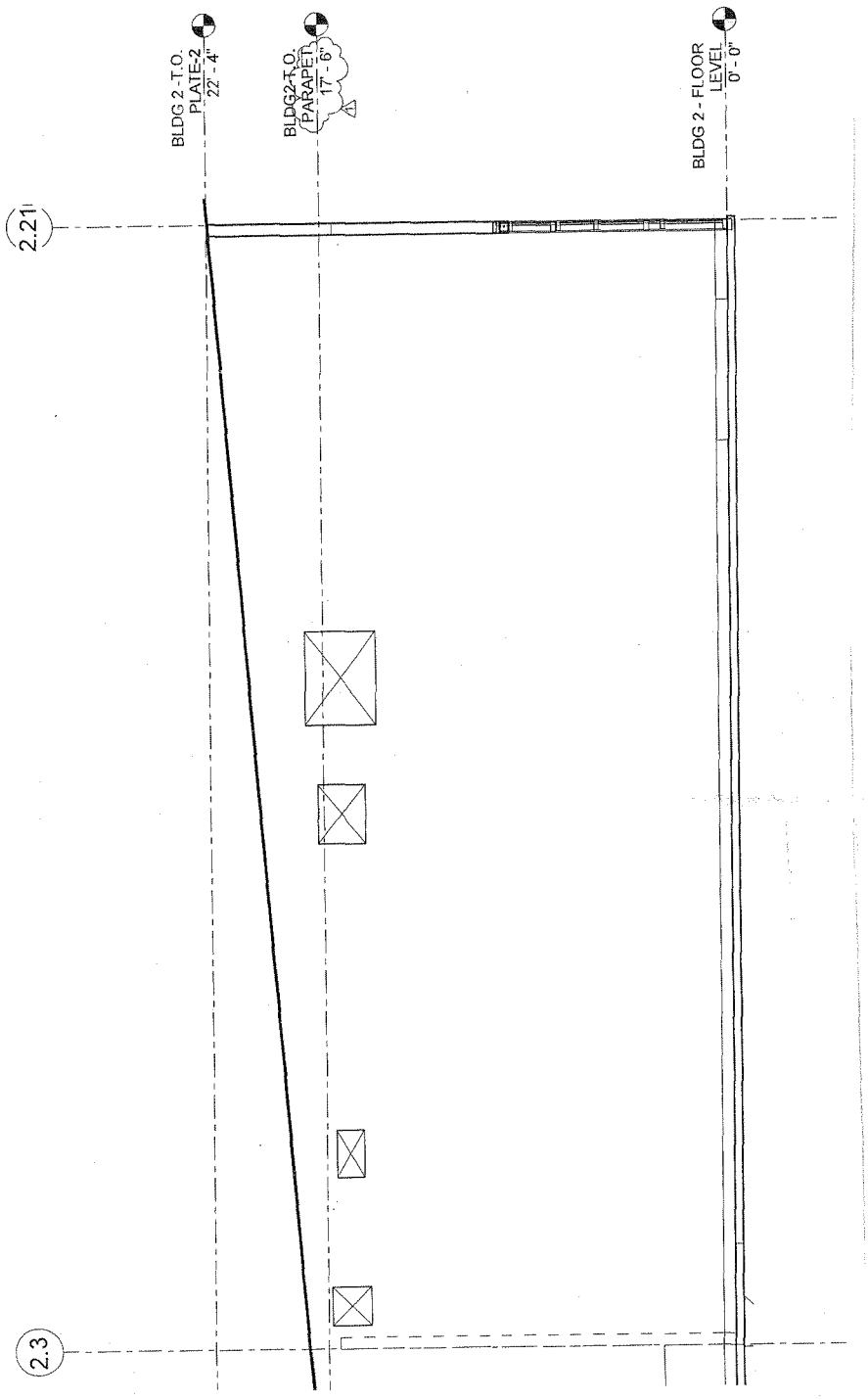
No. S3866
Exp. 3/31/12
STRUCTURAL
STATE OF CALIFORNIA



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PROJECT TITLE:

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TORRANCE UNIFIED SCHOOL DISTRICT

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PART OF SHEET(S)	SHEET TITLE:
S201-2	BLDG 2 - WALL ELEVATION

DATE:	SCALE:	SHEET NUMBER
12/17/10	1/16"=1'-0"	SSK-3

ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
ADDENDUM	03-113161	24701

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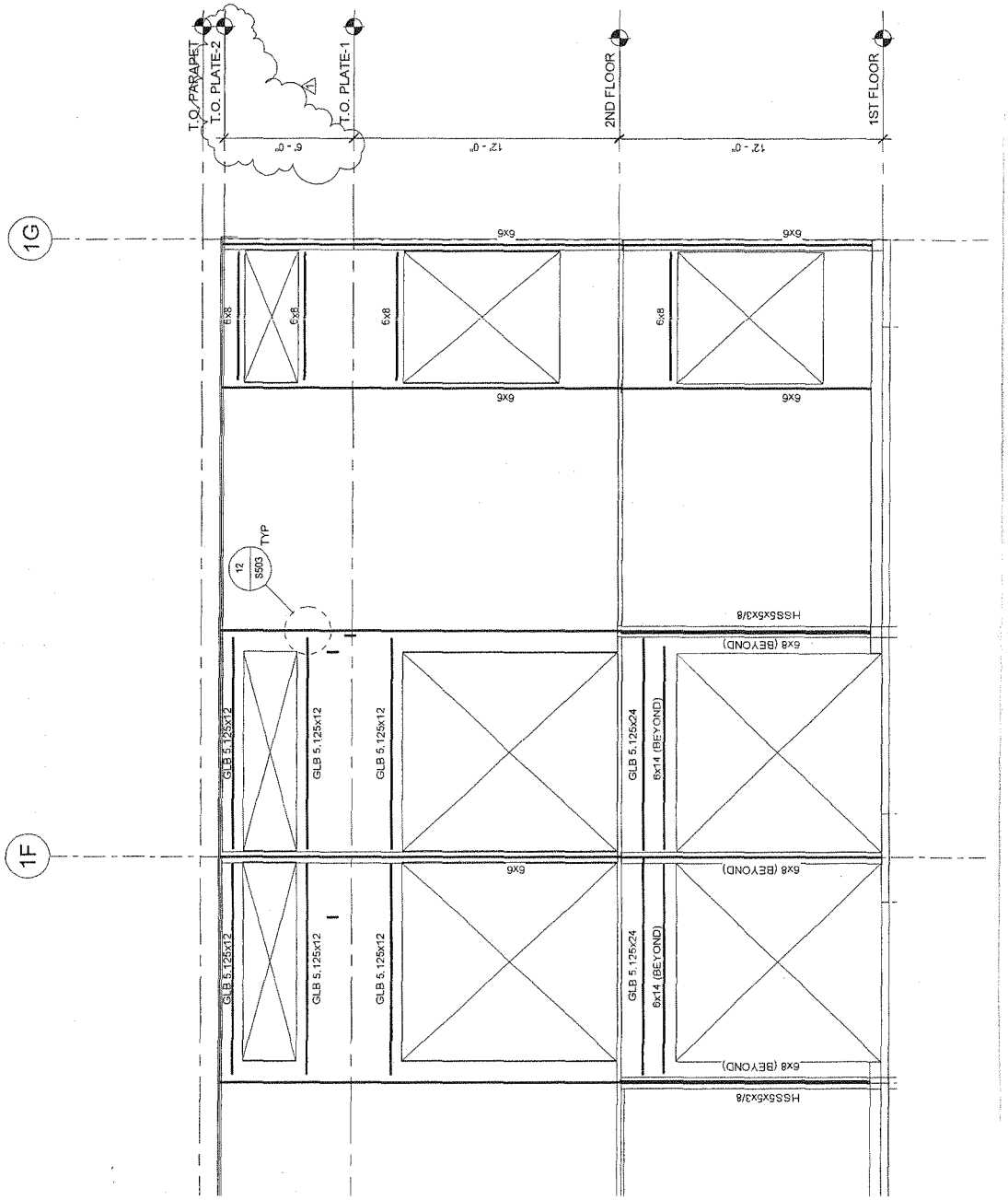

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PART OF SHEET(S)	SHEET TITLE:
S202-1	BLDG 1 - NORTH WALL ELEVATION

DATE:	SCALE:	SHEET NUMBER
12/17/10	1/16"=1'-0"	SSK-4

ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
ADDENDUM	03-113161	24701

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Exp. 3/31/12
STRUCTURAL
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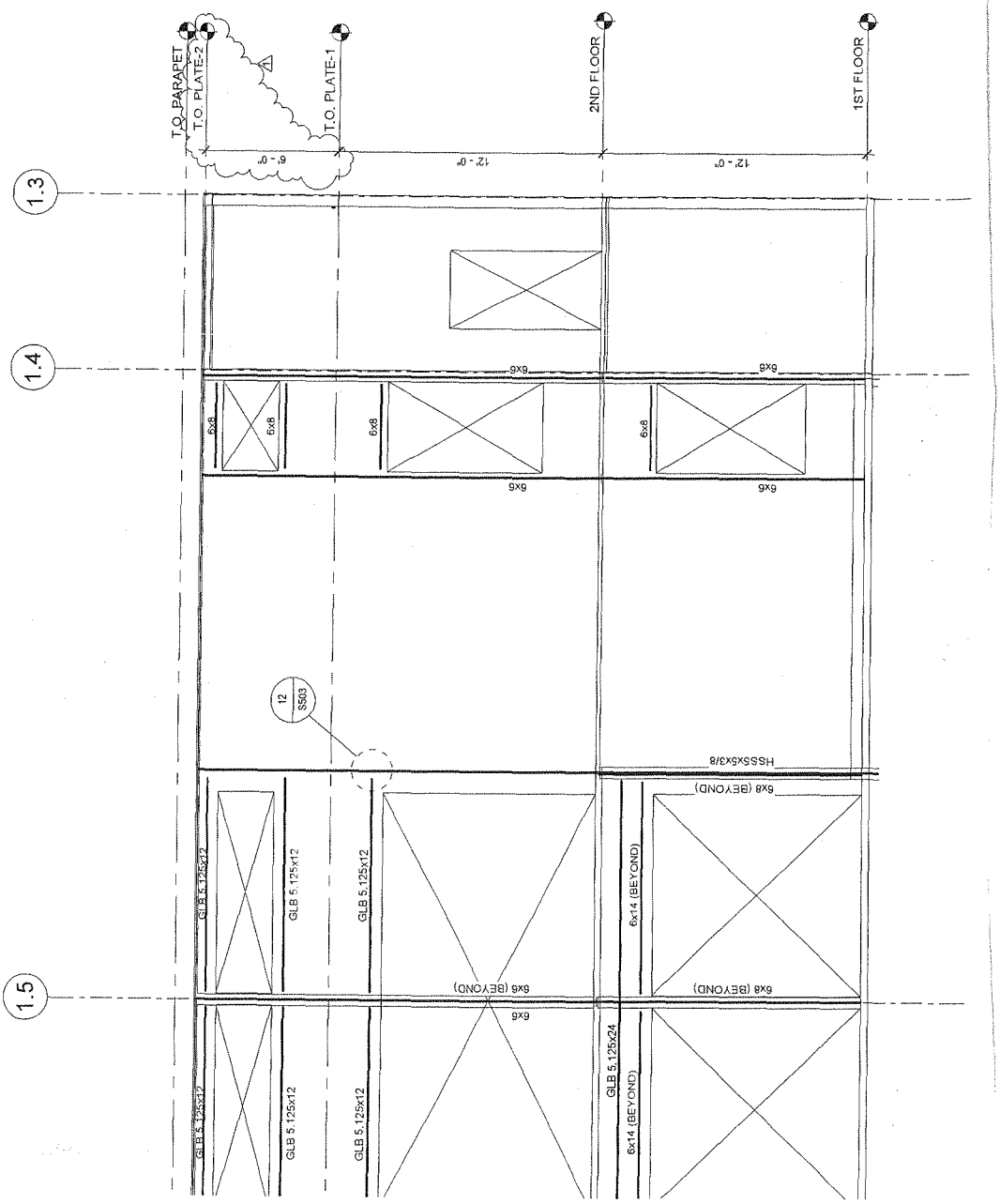

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PROJECT TITLE:

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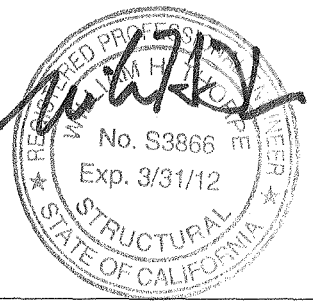
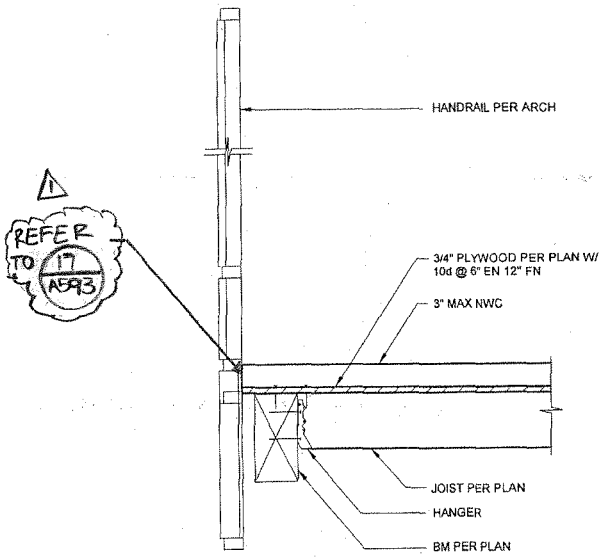
PART OF SHEET(S)	SHEET TITLE:
S202-1	BLDG 1 - WEST WALL ELEVATION

DATE:	SCALE:	SHEET NUMBER
12/17/10	1/16"=1'-0"	SSK-5

ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
ADDENDUM	03-113161	24701





WALKWAY AT SECOND FLOOR 1"=1'-0" | 9

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P: 949-833-5588, F: 949-833-5511

PROJECT TITLE:

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TORRANCE UNIFIED SCHOOL DISTRICT
2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:
S505	WALKWAY AT SECOND FLOOR

DATE:	SCALE:	SHEET NUMBER
12/17/10		SSK-6

ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
ADDENDUM	03-113161	24701

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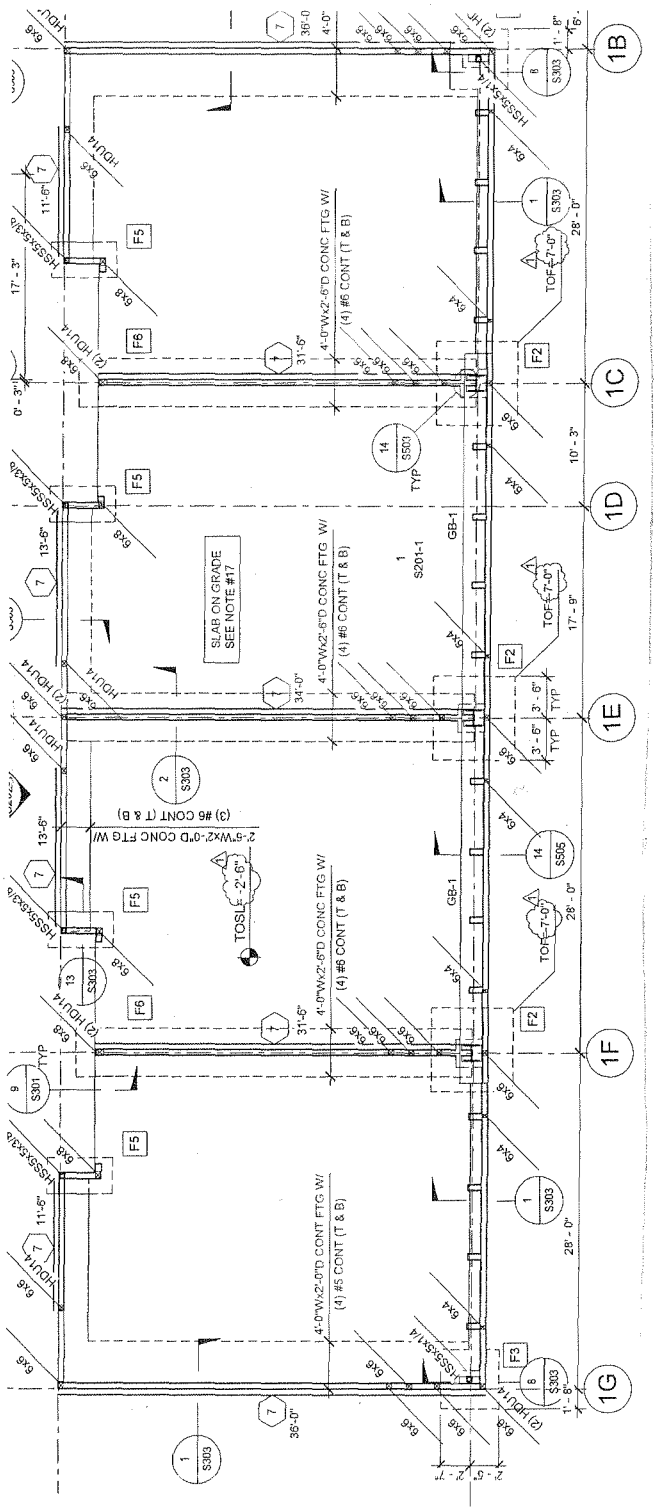
STATE OF CALIFORNIA



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TORRANCE UNIFIED SCHOOL DISTRICT

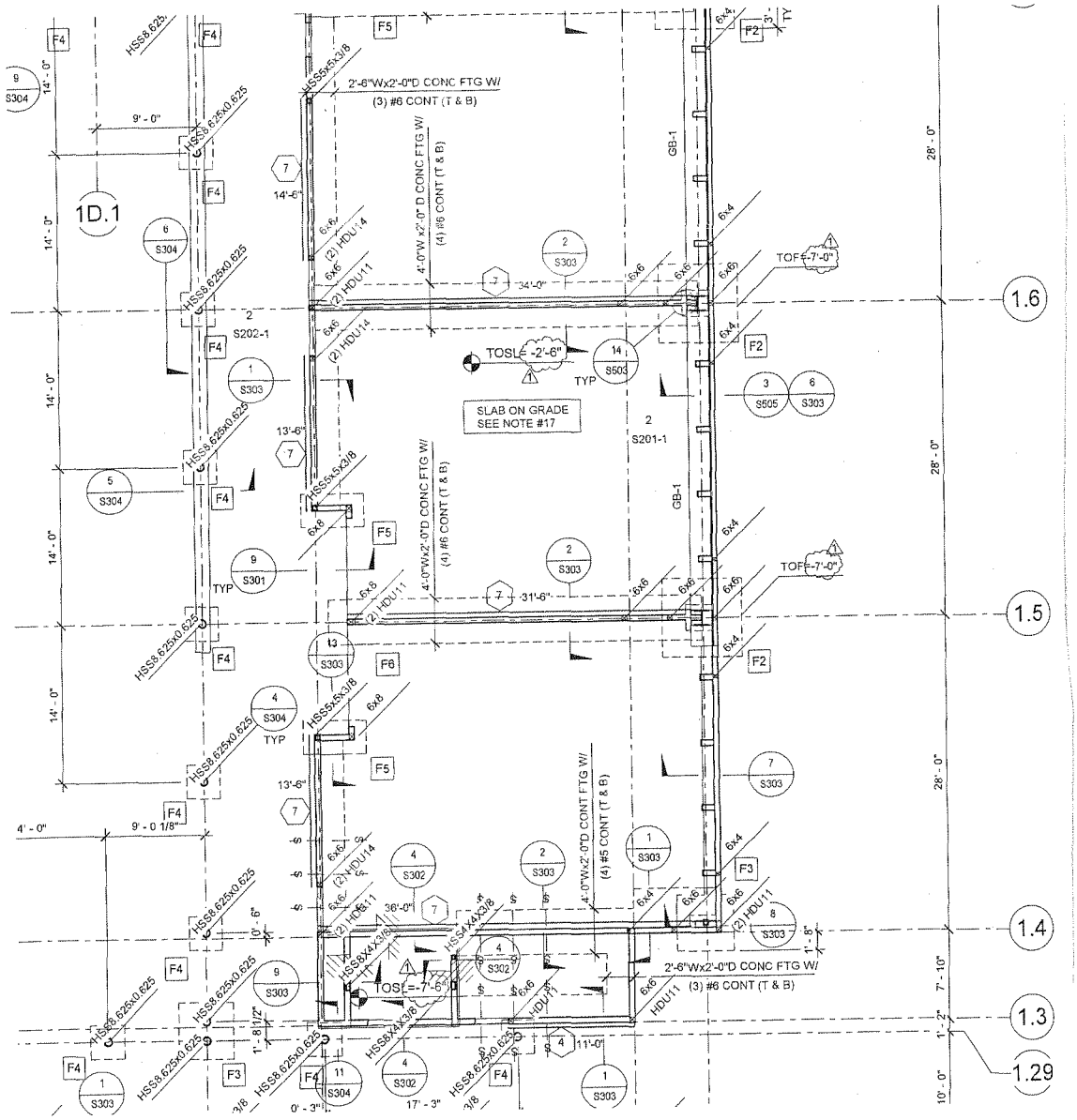
2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:
S101-1	BLDG 1 - PARTIAL FOUNDATION PLAN

DATE:	SCALE:	SHEET NUMBER
12/17/10	1/16"=1'-0"	SSK-7

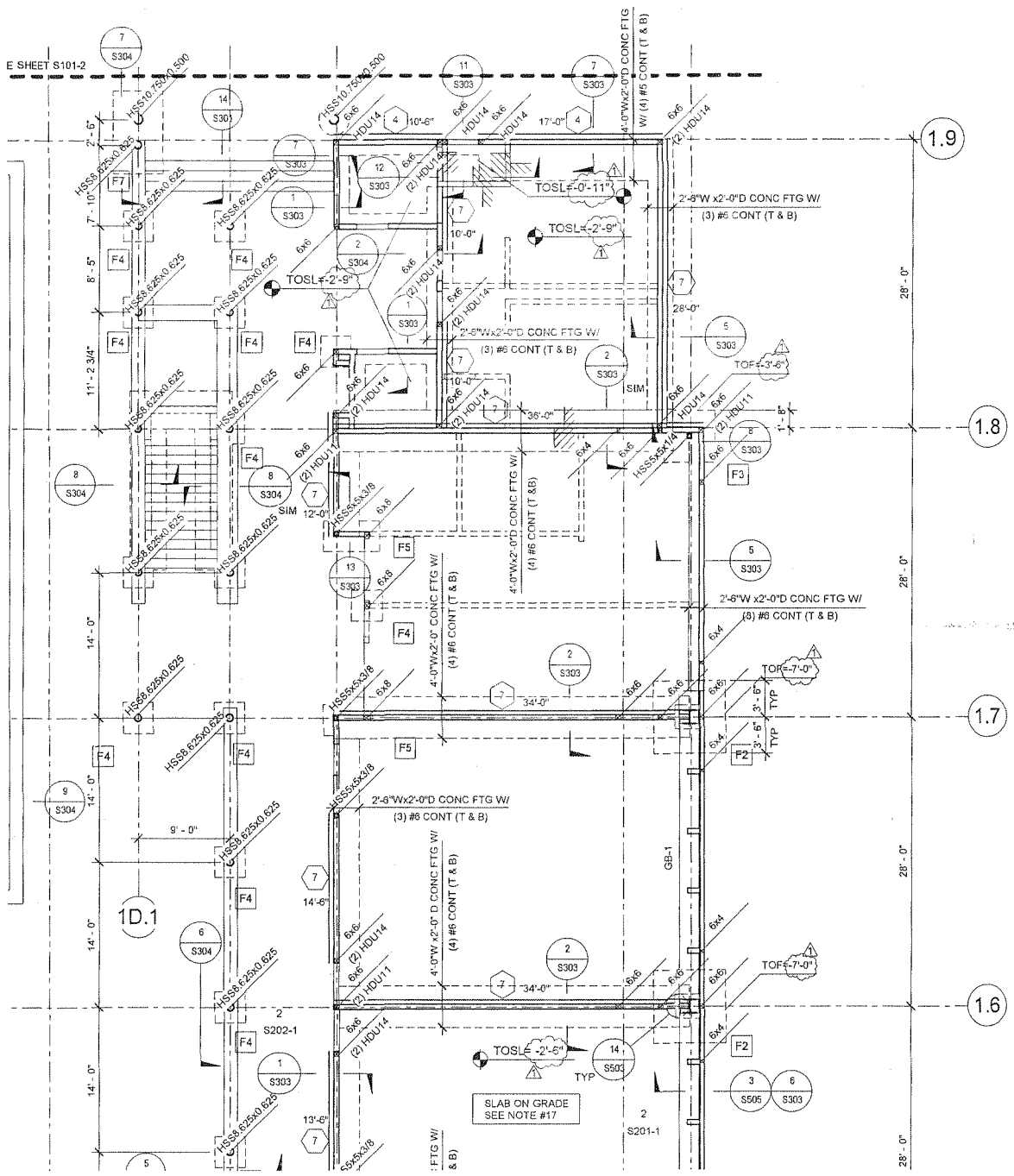
ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
ADDENDUM	03-113161	24701

REGISTERED PROFESSIONAL ENGINEER
WILLIAM H. [illegible]
No. S3866
Exp. 3/31/12
STRUCTURAL
STATE OF CALIFORNIA



IBI GROUP ARCHITECTS ENGINEERS PLANNERS SUITE 110, 18401 VON KARMAN AVE. IRVINE, CA. 92612 P: 949-833-5588, F: 949-833-5511	PROJECT TITLE: **FERN ELEMENTARY SCHOOL** 1314 FERN AVE., TORRANCE, CA 90503 TORRANCE UNIFIED SCHOOL DISTRICT 2335 PLAZA DEL AMO TORRANCE, CA 90509	REGISTERED PROFESSIONAL ENGINEER WILLIAM M. HOPE No. S3866 Exp. 3/31/12 STRUCTURAL STATE OF CALIFORNIA

PART OF SHEET(S)	SHEET TITLE: BLDG 1 -	
S101-1	PARTIAL FOUNDATION PLAN	
DATE: 12/17/10	**SCALE:** 1/16"=1'-0"	**SHEET NUMBER** SSK-8
ISSUE: ADDENDUM	**DSA PROJECT NUMBER:** 03-113161	**IBI PROJECT NUMBER:** 24701



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TORRANCE UNIFIED SCHOOL DISTRICT

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PART OF SHEET(S)	SHEET TITLE: BLDG 1 - PARTIAL FOUNDATION PLAN	
S101-1		
DATE: 12/17/10	SCALE: 1/16"=1'-0"	SHEET NUMBER SSK-9
ISSUE: ADDENDUM	DSA PROJECT NUMBER: 03-113161	IBI PROJECT NUMBER: 24701

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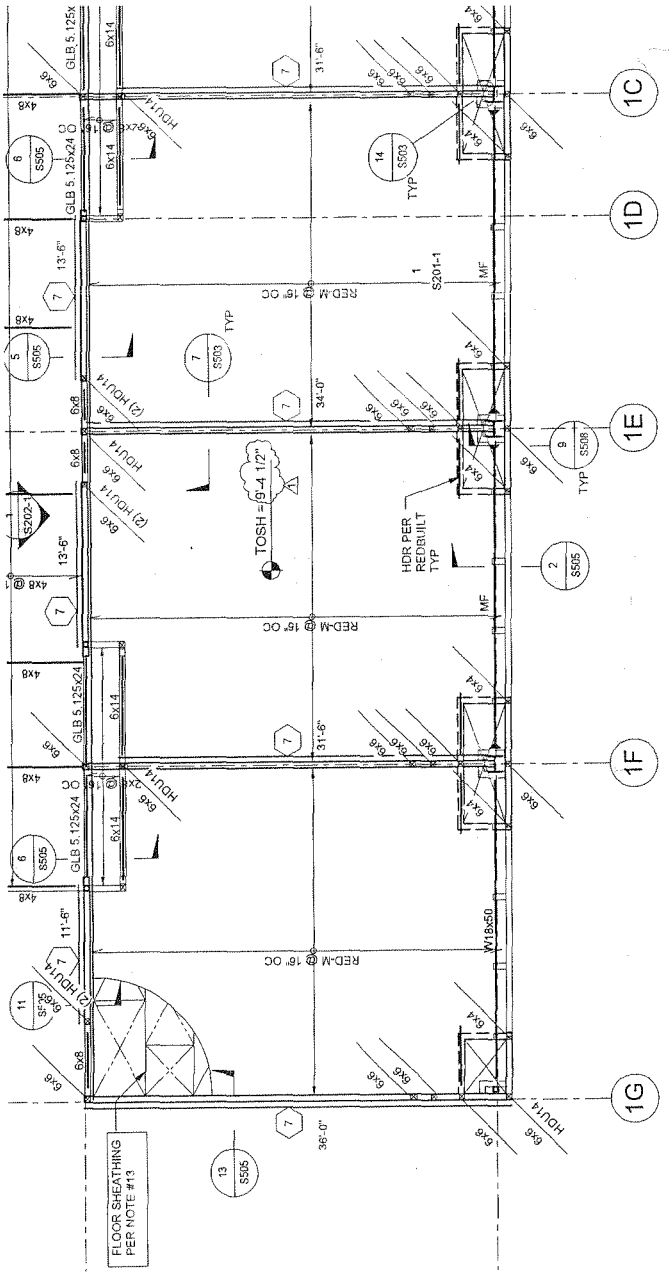

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TORRANCE UNIFIED SCHOOL DISTRICT

2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE: BLDG 1 - PARTIAL 2ND FLOOR FRAMING PLAN
S102-1	

DATE:	SCALE:	SHEET NUMBER
12/17/10	1/16"=1'-0"	SSK-10
ISSUE:	**DSA PROJECT NUMBER:**	**IBI PROJECT NUMBER:**
ADDENDUM	03-113161	24701

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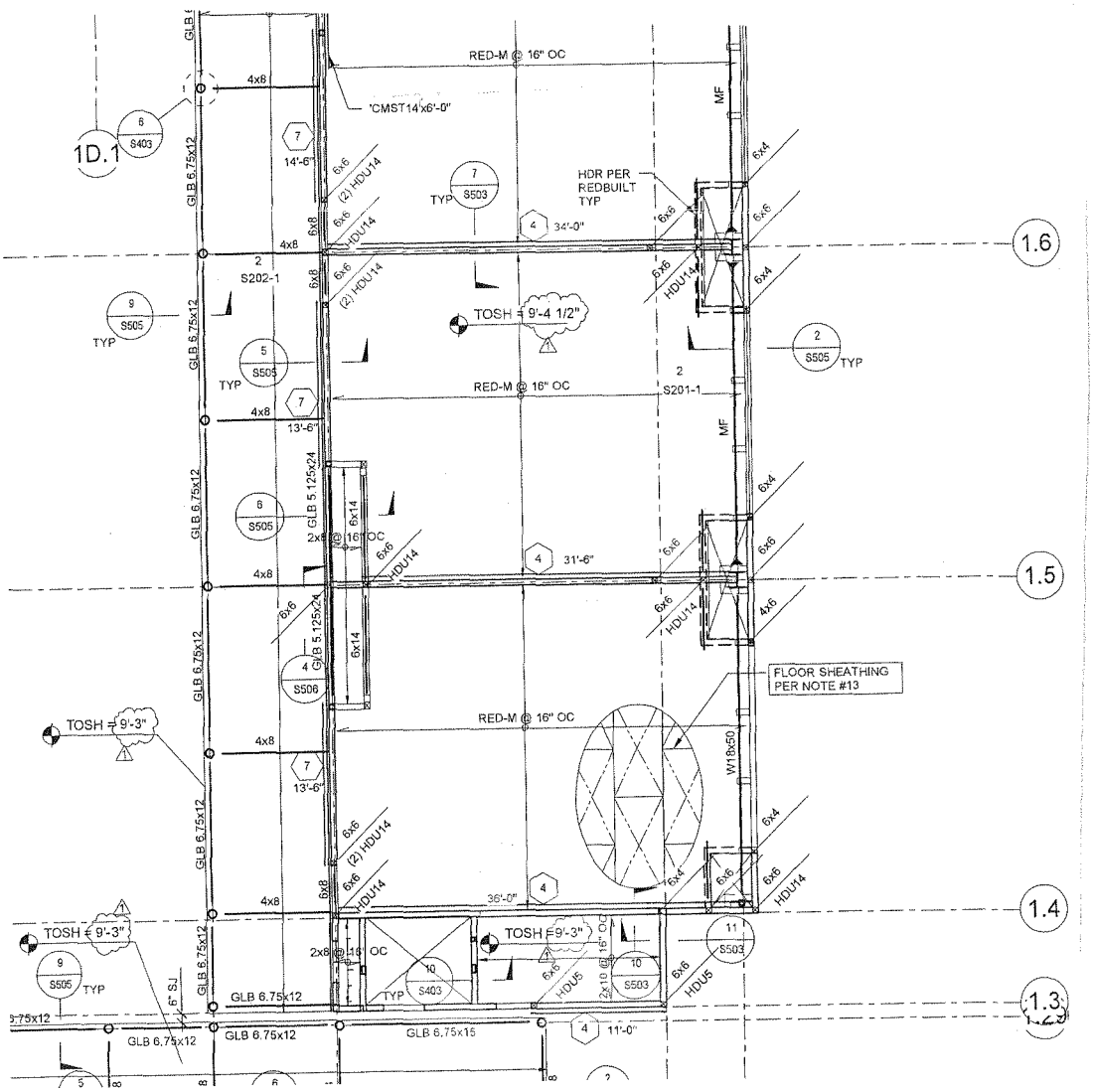
STATE OF CALIFORNIA



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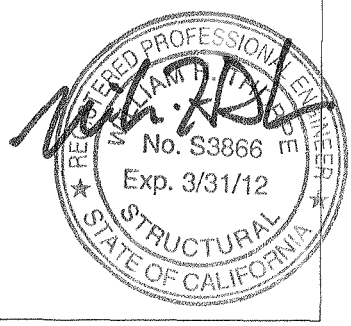
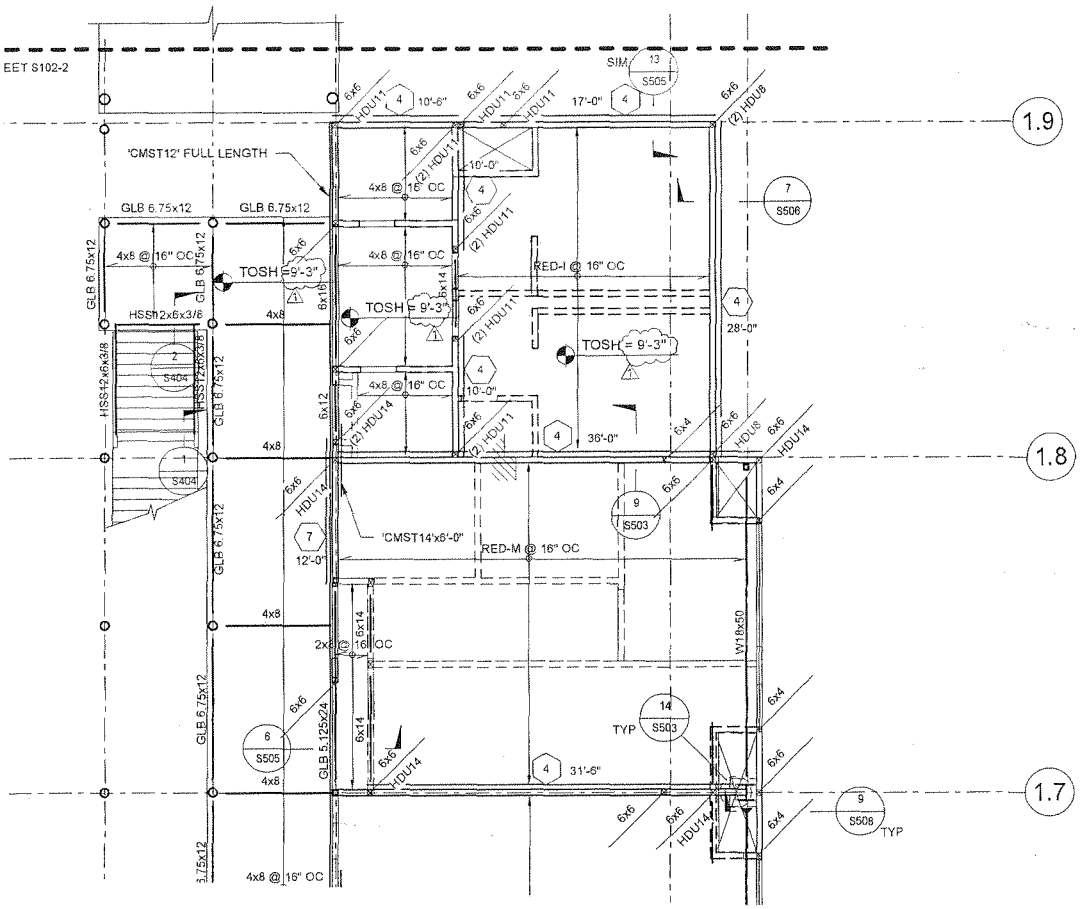
TORRANCE UNIFIED SCHOOL DISTRICT

2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE: BLDG 1 - PARTIAL 2ND FLOOR FRAMING PLAN
S102-1	

DATE:	SCALE:	SHEET NUMBER
12/17/10	1/16"=1'-0"	SSK-11
ISSUE:	**DSA PROJECT NUMBER:**	**IBI PROJECT NUMBER:**
ADDENDUM	03-113161	24701





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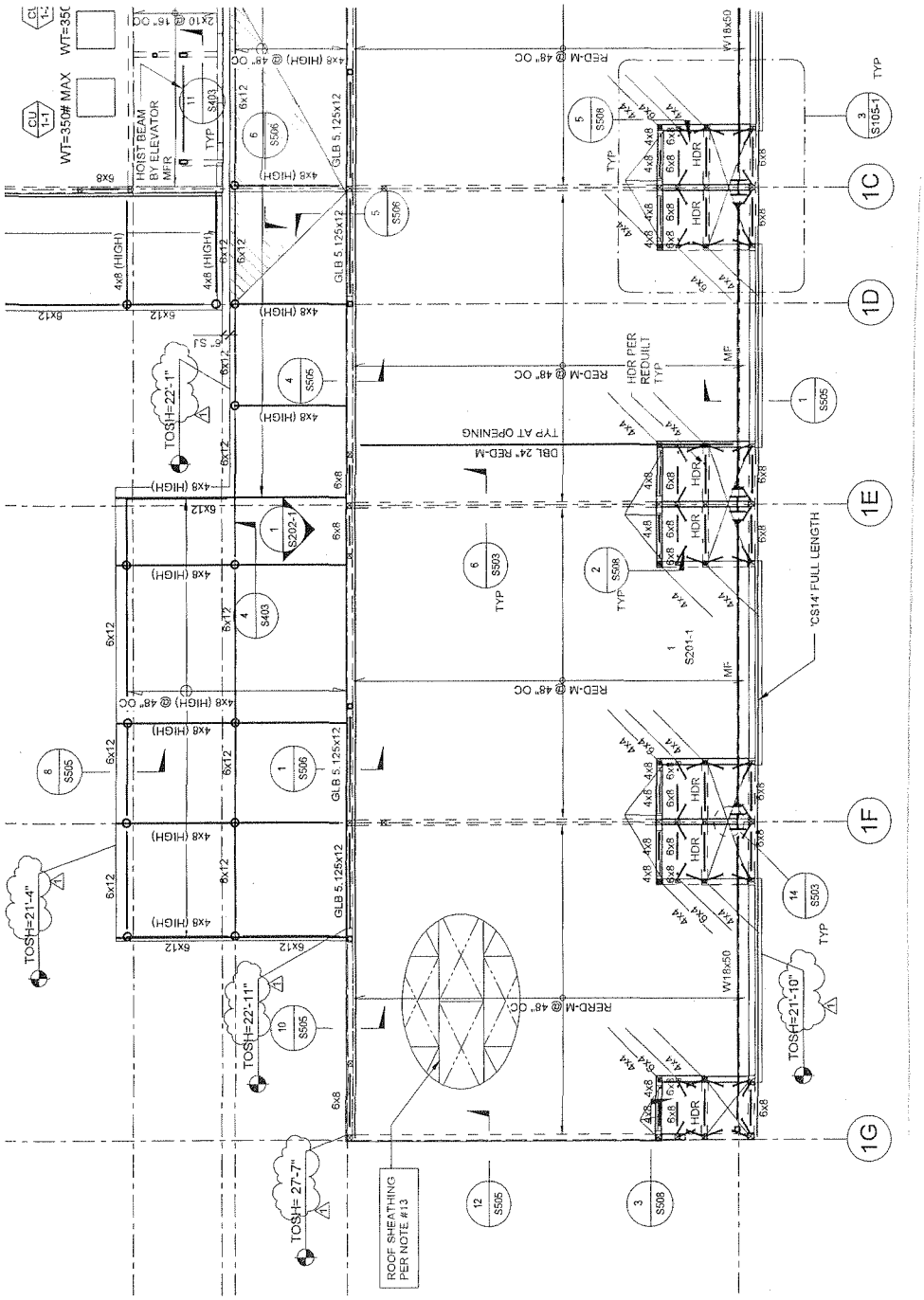
PART OF SHEET(S)	SHEET TITLE: BLDG 1 - PARTIAL 2ND FLOOR FRAMING PLAN
S102-1	

DATE:	SCALE:	SHEET NUMBER
12/17/10	1/16"=1'-0"	SSK-12
ISSUE:	**DSA PROJECT NUMBER:**	**IBI PROJECT NUMBER:**
ADDENDUM	03-113161	24701

REGISTERED PROFESSIONAL ENGINEER
WILLIAM H. HOPE JR.
No. S3866
Exp. 3/31/12
STRUCTURAL
STATE OF CALIFORNIA



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PART OF SHEET(S)	SHEET TITLE: BLDG 1 - PARTIAL ROOF FRAMING PLAN	
S103-1		
DATE: 12/17/10	SCALE: 1/16"=1'-0"	SHEET NUMBER SSK-13
ISSUE: ADDENDUM	DSA PROJECT NUMBER: 03-113161	IBI PROJECT NUMBER: 24701

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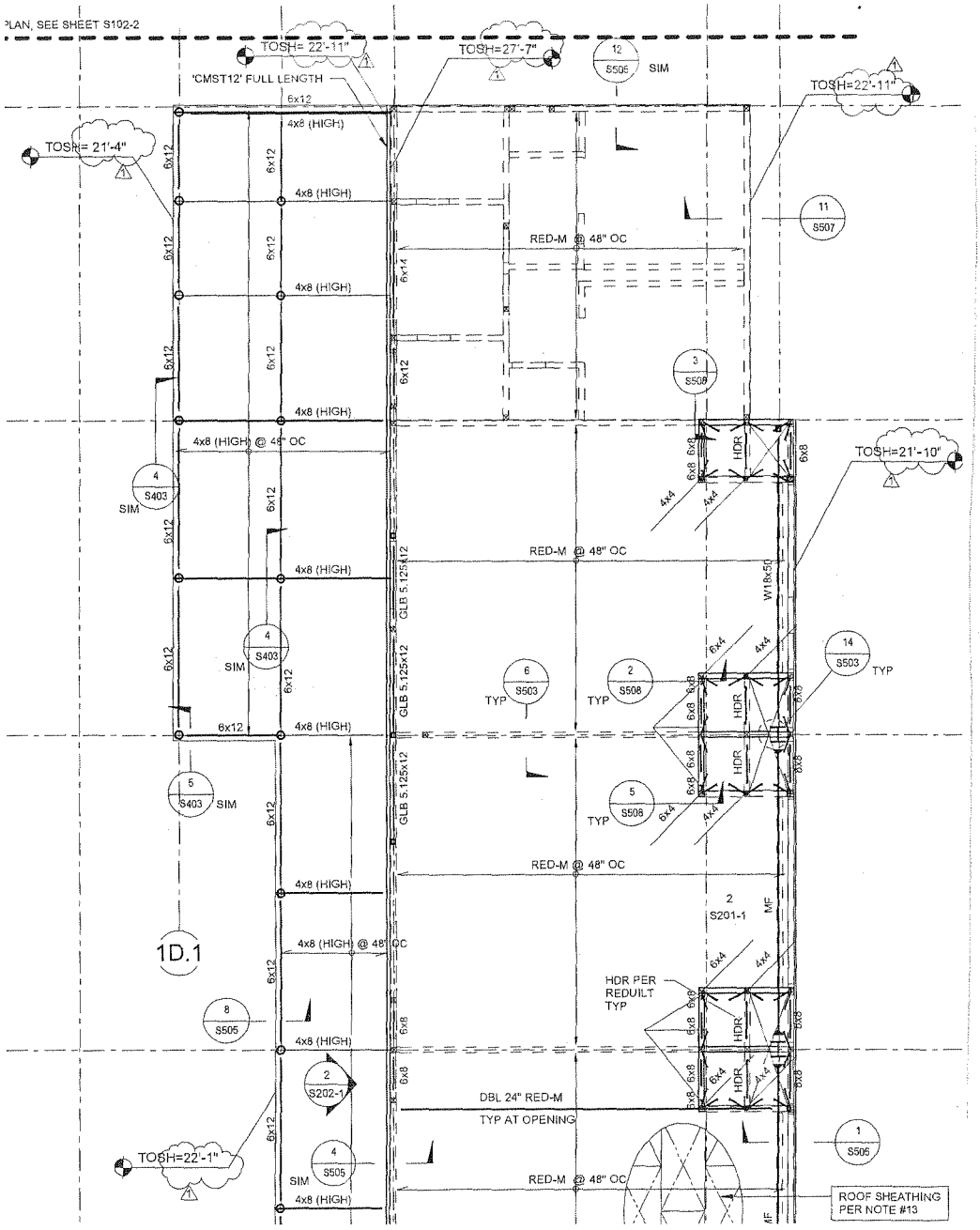

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PART OF SHEET(S)	SHEET TITLE:
S103-1	BLDG 1 - PARTIAL ROOF FRAMING PLAN

DATE:	SCALE:	SHEET NUMBER
12/17/10	1/16"=1'-0"	SSK-14
ISSUE:	**DSA PROJECT NUMBER:**	**IBI PROJECT NUMBER:**
ADDENDUM	03-113161	24701

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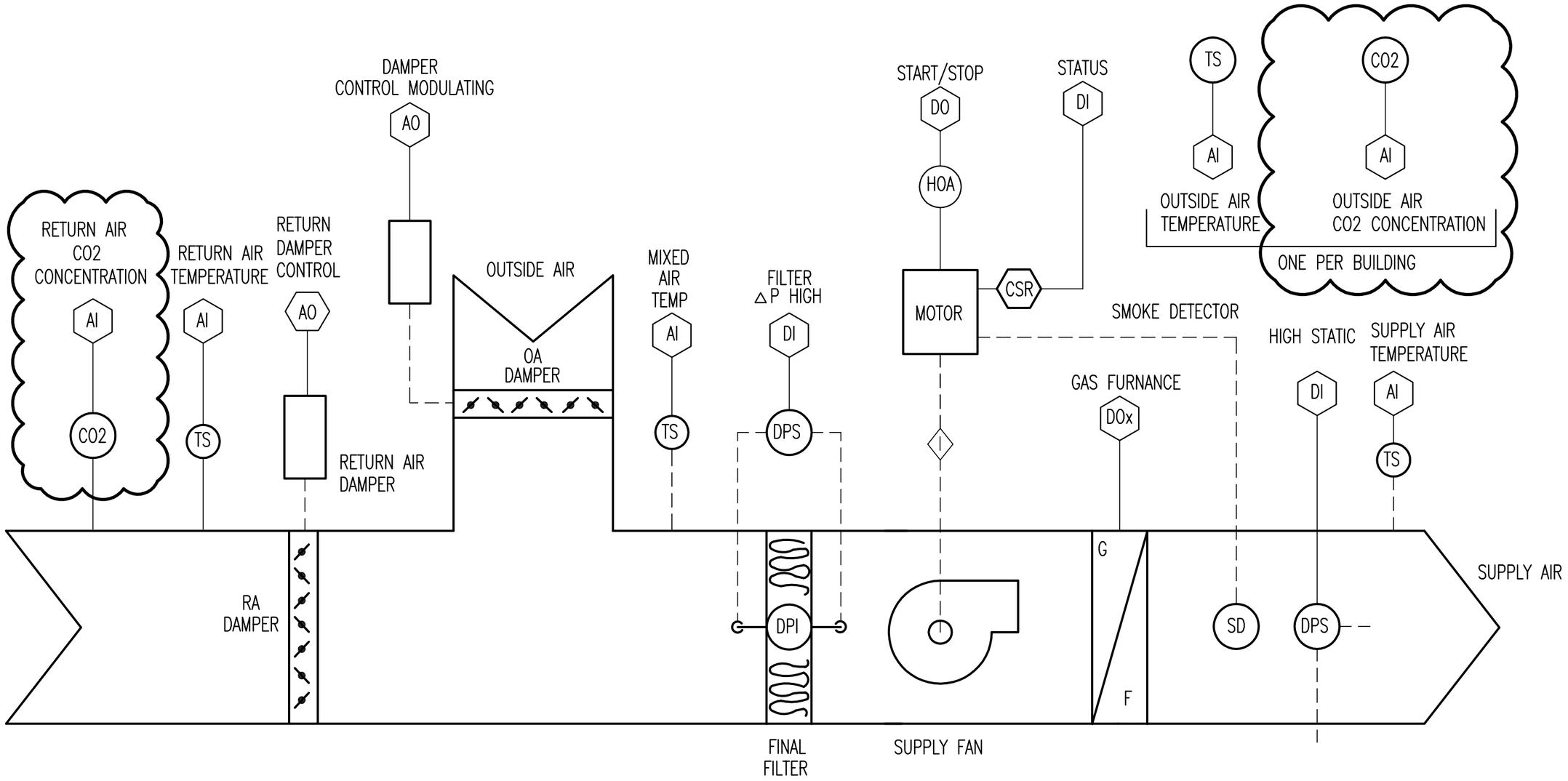

2 CONSTANT VOLUME GAS FIRED HEATING UNIT SYSTEM CONTROL DIAGRAM (HV-2-1, 2-2)

M702

SCALE: NTS

IBI GROUP

ARCHITECTS ENGINEERS PLANNERS

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P: 949-833-5588, F: 949-833-5511

PROJECT TITLE:
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1314 FERN AVE., TORRANCE, CA 90503
TORRANCE UNIFIED SCHOOL DISTRICT
2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:	
M702	MECHANICAL CONTROLS DIAGRAM	
DATE: 12/16/2010	SCALE: NTS	SHEET NUMBER MSK-001
ISSUE: ADDENDUM 1	DSA PROJECT NUMBER: 03-113161	IBI PROJECT NUMBER: 24701

		FACULTY							FAUCET, CHICAGO #802-VE2805-317ABCP (0.5 GPM)
S-1	SINK	CLASSROOM	YES	2"	1-1/2" x 1-1/2"	1-1/2"	3/4"	-	SELF RIMMING STAINLESS STEEL, ELKAY #LFRAD251960. 5" DEEP BOWL FAUCET, CHICAGO FAUCET #445-L9ABCP
REFER TO KITCHEN EQUIPMENT DRAWINGS 15	SINK	KITCHEN BLDG. 2	--	2"	1-1/2" x 1-1/2"	1-1/2"	3/4"	3/4"	THREE COMPARTMENT SINK, REFER TO KITCHEN EQUIPMENT DRAWINGS
REFER TO KITCHEN EQUIPMENT DRAWINGS 32	SINK	KITCHEN BLDG. 2	--	2"	1-1/2" x 1-1/2"	1-1/2"	3/4"	3/4"	SINGLE COMPARTMENT SINK, REFER TO KITCHEN EQUIPMENT DRAWINGS
REFER TO KITCHEN EQUIPMENT DRAWINGS 21	SINK	KITCHEN BLDG. 2	--	2"	1-1/2" x 1-1/2"	1-1/2"	3/4"	3/4"	WALL MOUNT HAND WASH SINK, REFER TO KITCHEN EQUIPMENT DRAWINGS
SS-1	SERVICE SINK	JANITOR CLOSET	--	3"	3"	2"	3/4"	3/4"	CECO SINK # 868, WALL MOUNTED WITH 3" TRAP STANDARD. FAUCET, CHICAGO FAUCET #897-CP
DF-1	DRINKING FOUNTAIN	BLDG 1	YES	2"	1-1/4"	1-1/2"	3/4"	-	DUAL HI-LO, BARRIER FREE FOUNTAIN, WALL MOUNTED, HAWS MODEL 1501
FD-1	FLOOR DRAIN	RESTROOMS	--	2"	2"	2"	-	-	SQUARE GRATE WITH TRAP PRIMER CONNECTION

GAS EQUIPMENT SCHEDULE

EQUIPMENT ID NO.	DESCRIPTION	BUILDING SERVED	SERVICE	CFH LOAD	LOCATION	MANUFACTURER & MODEL NO.	ORIFICE SIZE	BUILDING SYSTEM CONNECTION SIZE	INLET PRESSURE	OUTLET PRESSURE	REMARKS
EQV 1	EARTHQUAKE VALVE	BUILDING 1	NATURAL GAS	N/A	EXTERIOR WALL	CALIFORNIA VALVE MODEL 315 THREADED	N/A	3"	8"WC	8" WC	ANCHORED TO STRUCTURE
EQV 2	EARTHQUAKE VALVE	BUILDING 2	NATURAL GAS	N/A	EXTERIOR WALL	CALIFORNIA VALVE MODEL 315 THREADED	N/A	3"	8"WC	8" WC	ANCHORED TO STRUCTURE

IBI GROUP

ARCHITECTS ENGINEERS PLANNERS

SUITE 110, 18401 VON KARMAN AVE.
IRVINE, CA. 92612
P: 949-833-5588, F: 949-833-5511

PROJECT TITLE:

FERN ELEMENTARY SCHOOL

1314 FERN AVE., TORRANCE, CA 90503

TORRANCE UNIFIED SCHOOL DISTRICT

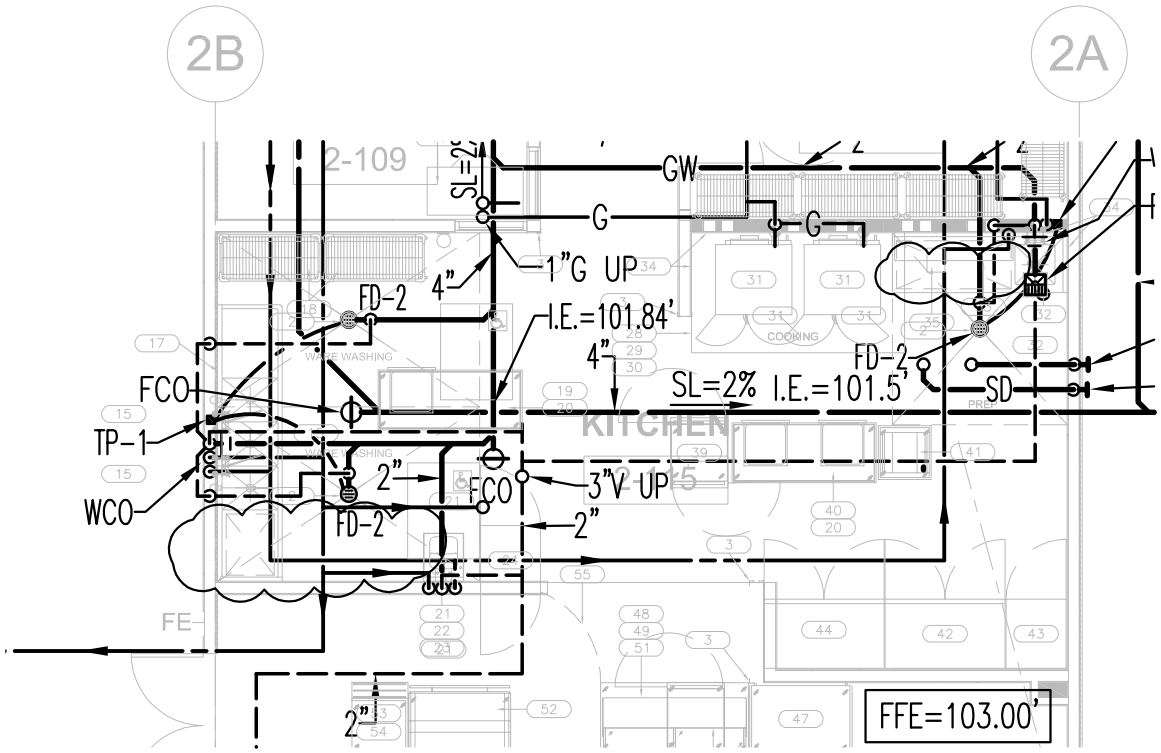
2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:
P002	PLUMBING SCHEDULES

DATE:	SCALE:	SHEET NUMBER
12-17-10	NONE	PSK-001

ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
ADDENDUM 1	03-113161	24701

LICENSED ARCHITECT
BARBARA G. HELTON
NO. C19188
07-31-11
RENEWAL DATE
STATE OF CALIFORNIA



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PART OF SHEET(S)	SHEET TITLE:
P101-2	PLUMBING BLDG 2 FIRST FLOOR PLAN

DATE:	SCALE:	SHEET NUMBER
12-17-10	NONE	PSK-002

ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
ADDENDUM 1	03-113161	24701

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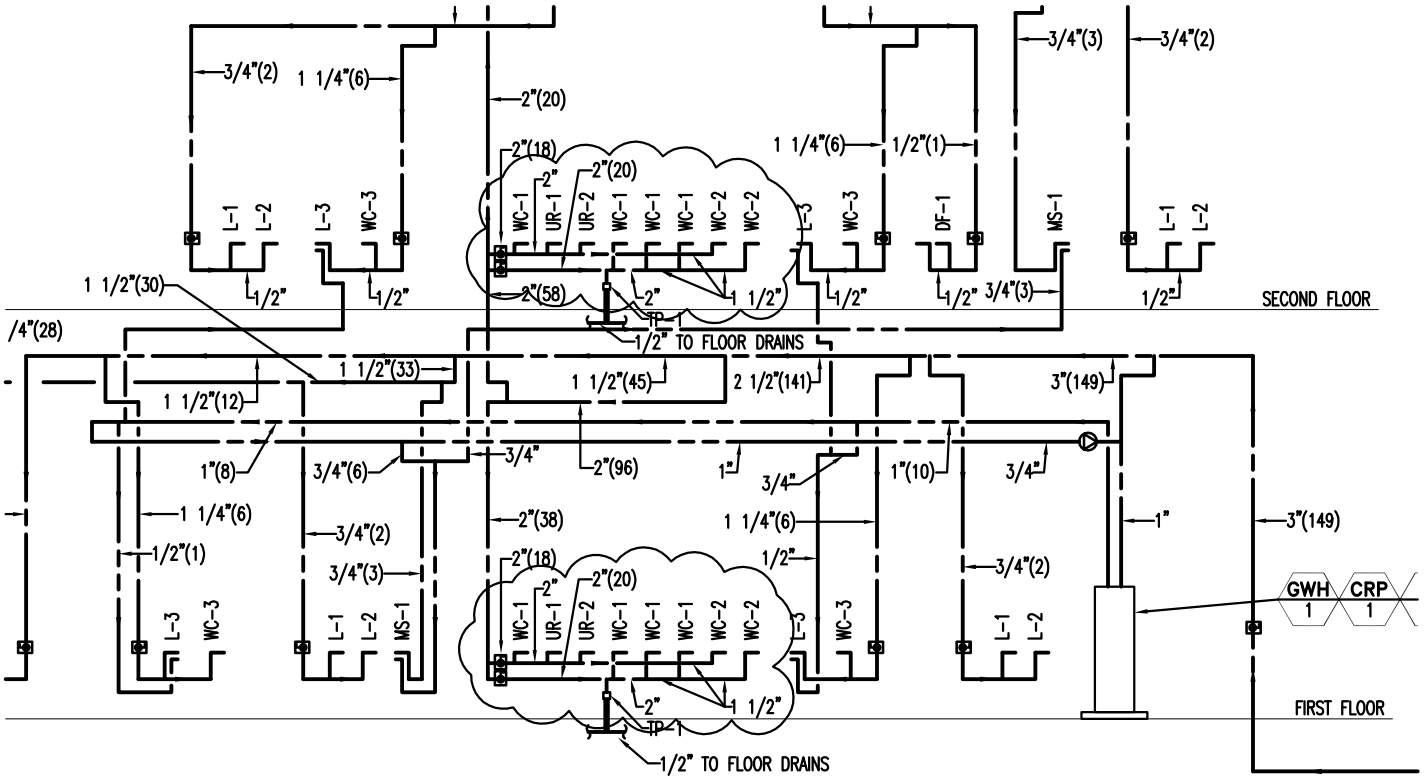

BUILDING "1" DOMESTIC WATER RISER DIAGRAM (1)

NONE

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PROJECT TITLE:

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PART OF SHEET(S)	SHEET TITLE: PLUMBING RISER DIAGRAMS BUILDING 1	
P401		
DATE: 12-17-10	SCALE: NONE	SHEET NUMBER PSK-003
ISSUE: ADDENDUM 1	DSA PROJECT NUMBER: 03-113161	IBI PROJECT NUMBER: 24701

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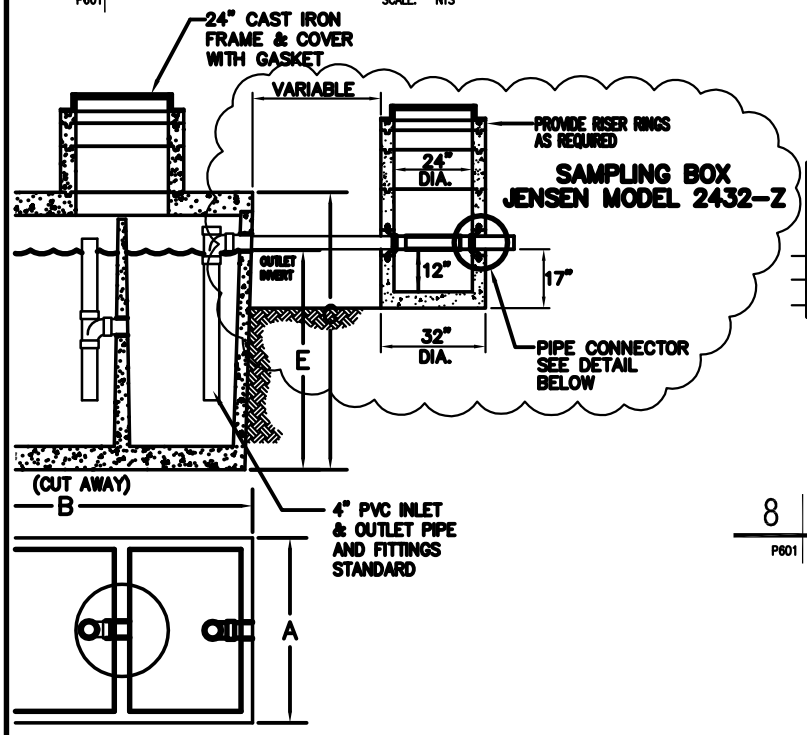
5. FOLLOW MANUFACTURERS RECOMMENDATION.

6 | P601 TYPICAL EXTERIOR WALL PENETRATION WALL GRADE

SCALE: NTS



5 | P601 PENETRATION FIRESTOP METAL SLEEVE THROUGH A CONCRETE

SCALE: NTS

MODEL NUMBER	LIQUID CAPACITY GALLONS	WIDTH "A"	OVERALL LENGTH "B"	TANK HEIGHT "C"	INLET "D"	OUTLET "E"
KJP750G-LA	750	4'-0"	8'-1"	6'-0"	5'-0"	4'-9"
KJP1000G-LA	1000	5'-1"	8'-2"	6'-0"	5'-0"	4'-9"
KJP1200G-LA	1200	5'-9"	8'-6"	6'-0"	5'-0"	4'-9"
KJP1500G-LA	1500	5'-7"	10'-8"	6'-0"	5'-0"	4'-9"

■ TANK DESIGNED FOR H-20 TRAFFIC WHEEL LOAD WITH DF SOIL CONDITIONS (WATER TABLE BELOW TANK)

8 | P601 GREASE INTERCEPTOR WITH SAMPLING BOX DE

SCALE: NTS

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PROJECT TITLE:

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PART OF SHEET(S)	SHEET TITLE:	
P601	PLUMBING DETAILS	
DATE: 12-17-10	SCALE: NONE	SHEET NUMBER PSK-004
ISSUE: ADDENDUM 1	DSA PROJECT NUMBER: 03-113161	IBI PROJECT NUMBER: 24701

LICENSED ARCHITECT
BARBARA G. HELTZEN
NO. C19188
07-31-11
RENEWAL DATE
STATE OF CALIFORNIA

FIXTURE SCHEDULE

TYPE	DESCRIPTION	TOTAL WATTS	LAMP QUAN	LAMP WATTS	LAMP TYPE	MOUNTING	REMARK
2	4'-0" HIGH PERFORMANCE LINEAR DIRECT/ INDIRECT LIGHT FIXTURE WITH 20 GAUGE STEEL HOUSING, PAINTED AFTER FABRICATION WITH PHOSPHATE RUST INHIBITOR PRIMER AND WHITE COAT. PROVIDE MARK-7, 0-10 DIMMING BALLAST AND HIGH REFLECTANCE SPECULAR ALUMINUM REFLECTOR. PRUDENTIAL #PRU15-SP-3TB-04-SPL-TMV-D3-SC	90	3	32	SEE SPEC.	PENDANT	1, 5, 1
2A	THE SAME AS '2' BUT WITH NON DIMMING BALLAST.	90	3	32	SEE SPEC.	PENDANT	1
4	SURFACE MOUNTED HIGH ABUSE LIGHT FIXTURE WITH ONE PIECE 16 GAUGE BASE PLATE WITH WELDED CORNERS, PAINTED AFTER FABRICATION WITH PHOSPHATE RUST INHIBITOR AND WHITE FINISH COAT, COLD FRAMED P12 POLYCARBONATE LENS AND HIGH POWER FACTOR ELECTRONIC BALLAST, U.L. LISTED FOR WET LOCATIONS. MORELITE #MIN-FH-125-1PLT42-2FI-SS-PF-ED-WL	60	2	32	SEE SPEC.	SURFACE	

LIGHTING FIXTURE NOTES

1. SEE DETAIL '9' ON SHEET ED-1.0 FOR MORE INFORMATION.
2. PROVIDE FLANGE KIT FOR HARD CEILING.
3. SEE DETAIL '6' ON SHEET ED-1.0 FOR MORE INFORMATION.
4. THE EXACT LOCATIONS OF EXIT SIGNS SHALL BE IN COMPLIANCE WITH FIRE DEPARTMENT STANDARD AND COORDINATION WITH ARCHITECTURAL DRAWINGS.
5. PENDANT AT 9'-6" IN CLASSROOMS/OFFICES AND AT 15'-0" IN MULTIPURPOSE ROOM.

REGISTERED PROFESSIONAL ENGINEER
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PART OF SHEET(S)	SHEET TITLE:
Partial of E-0.2	FIXTURE SCHEDULE & NOTES

DATE:	SCALE:	SHEET NUMBER
12-16-10	NONE	ESK-1

ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
ADDENDUM #1	03-113161	24701

LICENSED ARCHITECT
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07-31-11
RENEWAL DATE
STATE OF CALIFORNIA

FIXTURE SCHEDULE

TYPE	DESCRIPTION	TOTAL WATTS	LAMP QUAN	LAMP WATTS	LAMP TYPE	MOUNTING	REMARK
5	FLUORESCENT 4'-0" STRIP FIXTURE WITH DIE-FORMED STEEL HOUSING. PAINTED AFTER FABRICATION WITH PHOSPHATE RUST INHIBITOR PRIMER AND WHITE FINISH COAT. U.L. LISTED FOR DAMP LOCATION. 14 GAUGE WIRE GUARD SECURED WITH SIX (6) HINGE CLIPS, DUAL VOLTAGE (120/277) RAPID START ELECTRONIC BALLAST.	30	2	32	SEE SPEC.	SURFACE/WALL	
	1 PRUDENTAL #PT8WG-STD-IT8-XX-BWE-10THD-WG						
5E	THE SAME AS '5' BUT WITH EMERGENCY BATTERY BACK-UP SYSTEM.						
7	FLUORESCENT FIXTURE WITH 4 5/8" DEEP DIE-FORMED STEEL HOUSING PAINTED AFTER FABRICATION WITH PHOSPHATE RUST INHIBITOR PRIMER AND WHITE FINISH COAT, 3/8" DEEP REGRESSED WHITE FINISH EXTRUDED ALUMINUM DOOR FRAME WITH MITERED CORNERS, .156" ACRYLIC PRISMATIC LENS SECURED BY SPRING-LOADED LATCHES HINGED FROM EITHER SIDE OF FIXTURE, DUAL VOLTAGE (120/277) RAPID START ELECTRONIC BALLAST.	90	3	32	SEE SPEC.	RECESSED	2 3
	1 DAYBRITE #2DP-6-5-3-32-FA-12-EB						
7E	THE SAME AS '7' BUT WITH EMERGENCY BATTERY BACK-UP SYSTEM.						

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TORRANCE UNIFIED SCHOOL DISTRICT
2335 PLAZA DEL AMO TORRANCE, CA 90509

PART OF SHEET(S)	SHEET TITLE:	
Partial of E-0.2	FIXTURE SCHEDULE	
DATE: 12-16-10	SCALE: NONE	SHEET NUMBER ESK-2
ISSUE: ADDENDUM #1	DSA PROJECT NUMBER: 03-113161	IBI PROJECT NUMBER: 24701

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FIRE ALARM EQUIPMENT SCHEDULE

DESCRIPTION	SYMBOL	MOUNTING	CATALOG NUMBER	CSFM LISTING NUMBER	NOTES
EXISTING FIRE ALARM CONTROL PANEL 'EFACP'		+48"	SIMPLEX 4020-8001		
FIRE ALARM CONTROL PANEL 'FACP'		+48"	SILENT KNIGHT IFP-2000	7170-0559: 158	
1 ADDRESSABLE MONITOR MODULE	MM	--	SIMPLEX 4090-9001	7300-0026: 223	
ADDRESSABLE MONITOR MODULE	MM	--	SILENT KNIGHT IDP MONITOR	7300-0559: 155	

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PROJECT TITLE:
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PART OF SHEET(S)	SHEET TITLE:	
Partial of E-0.4	FIRE ALARM SCHEDULE	
DATE: 12-16-10	SCALE: NONE	SHEET NUMBER ESK-3
ISSUE: ADDENDUM #1	DSA PROJECT NUMBER: 03-113161	IBI PROJECT NUMBER: 24701

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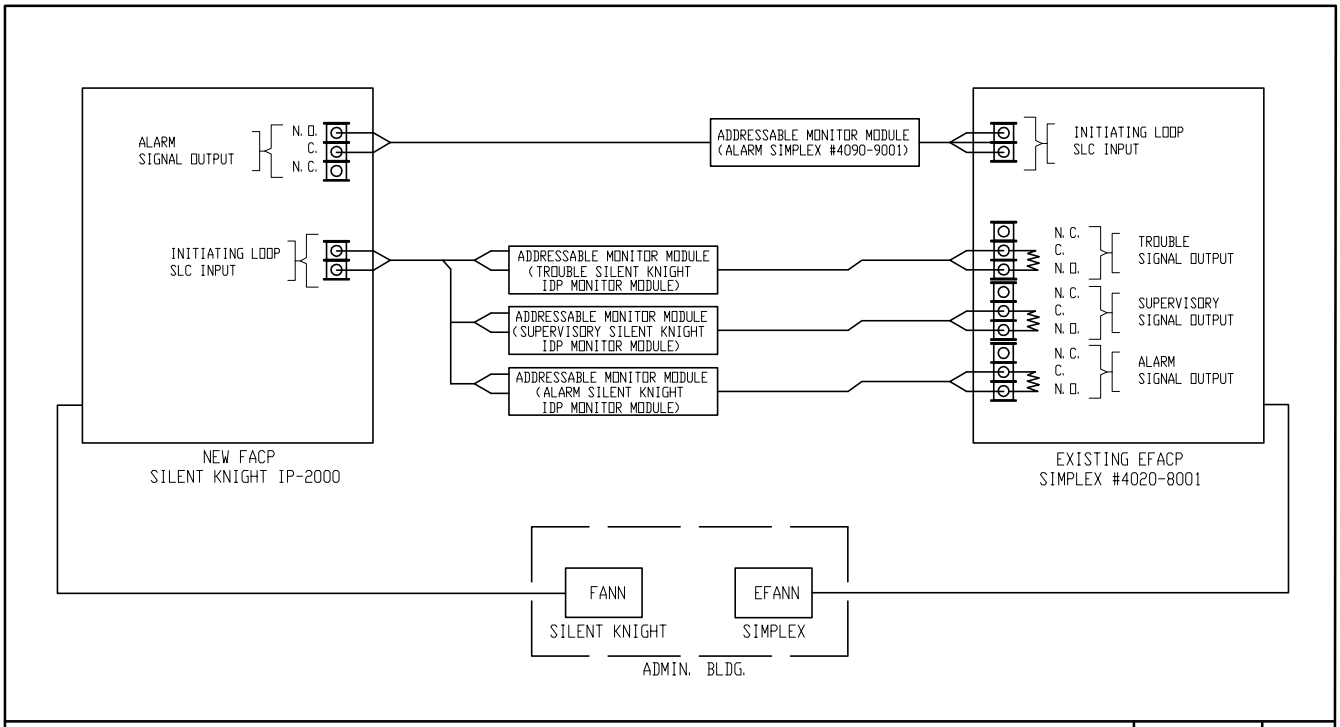
STATE OF CALIFORNIA

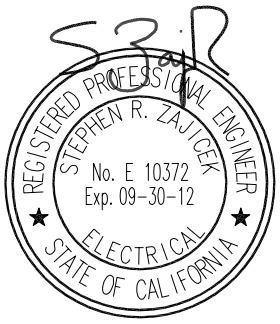


FIRE ALARM CONTROL PANEL INTERCONNECTION DIAGRAM

SCALE: NONE

B

1



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P: 949-833-5588, F: 949-833-5511

PROJECT TITLE:

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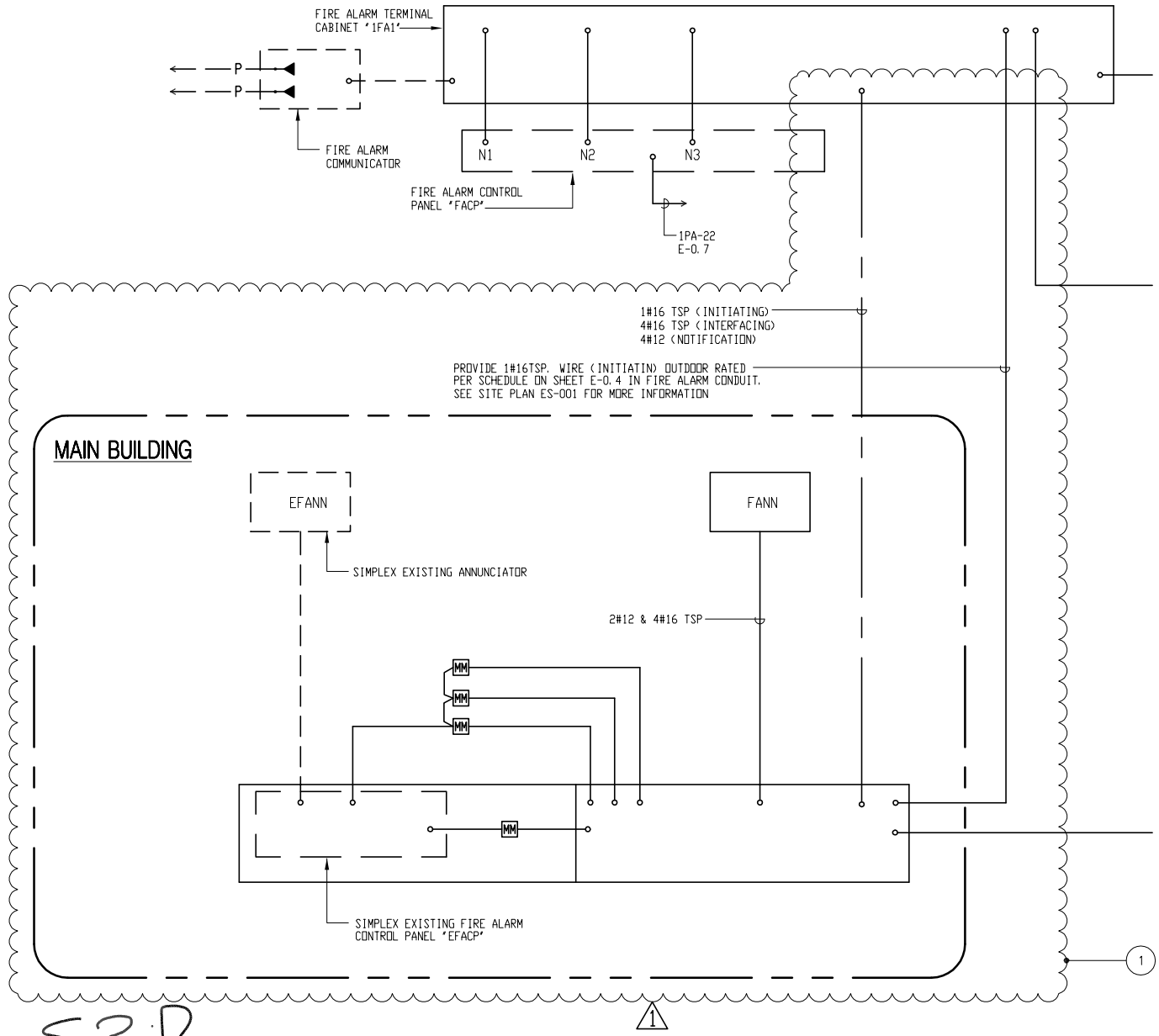
PART OF SHEET(S)	SHEET TITLE:
Partial of E-0.5	FIRE ALARM CONTROL PANEL DIAGRAM

DATE:	SCALE:	SHEET NUMBER
12-16-10	NONE	ESK-4

ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
ADDENDUM #1	03-113161	24701



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1

PLAN NOTES:

1 PROVIDE INTERFACING BETWEEN TWO (2) SYSTEM PER DETAIL "B" THIS SHEET. CONTACT WITH SILENT KNIGHT REPRESENTATIVE FOR MORE INFORMATION.

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PART OF SHEET(S)	SHEET TITLE:	
Partial of E-0.5	FIRE ALARM RISER DIAGRAM	
DATE: 12-16-10	SCALE: NONE	SHEET NUMBER ESK-5
ISSUE: ADDENDUM #1	DSA PROJECT NUMBER: 03-113161	IBI PROJECT NUMBER: 24701

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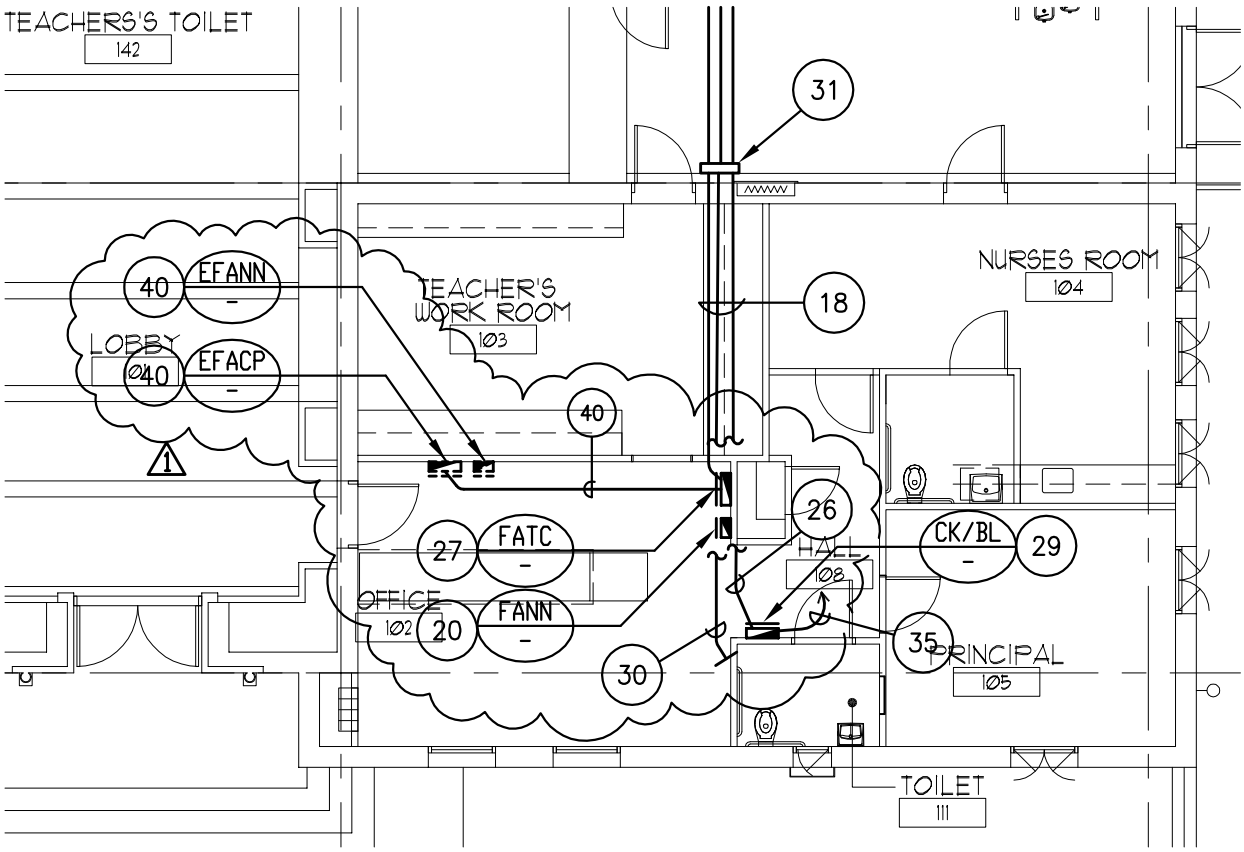

1 (40) INTERFACE NEW FIRE ALARM PANEL IN NEW CLASSROOM BUILDING WITH EXISTING SIMPLEX SYSTEM PER DETAIL "B" ON SHEET E0.5. PROGRAM BOTH SYSTEMS FOR A COMPLETE OPERABLE CONDITION.

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PART OF SHEET(S)	SHEET TITLE:	
Partial of ES-1	FIRST FLOOR SIGNAL SYSTEM CONDUIT ROUTING PLAN	
DATE: 12-16-10	SCALE: 1" = 10'-0"	SHEET NUMBER ESK-6
ISSUE: ADDENDUM #1	DSA PROJECT NUMBER: 03-113161	IBI PROJECT NUMBER: 24701

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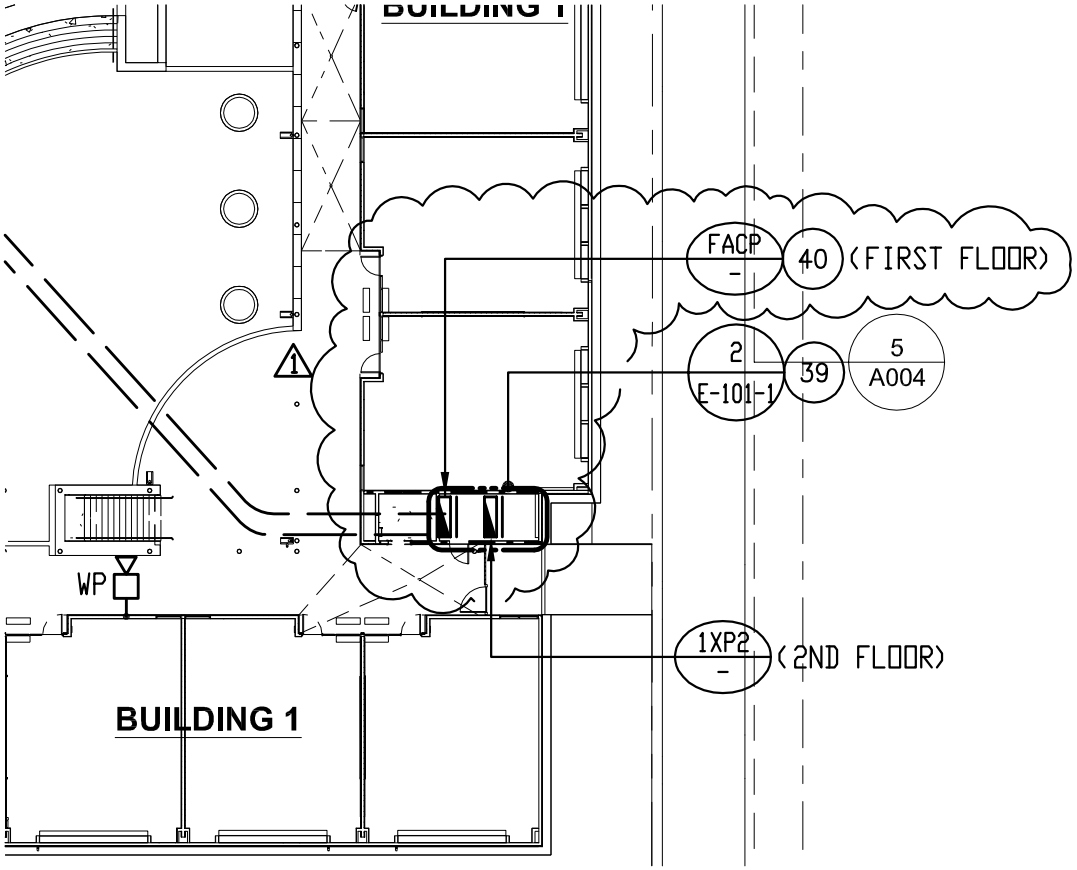

1 (40) INTERFACE NEW FIRE ALARM PANEL IN NEW CLASSROOM BUILDING WITH EXISTING SIMPLEX SYSTEM PER DETAIL "B" ON SHEET E0.5. PROGRAM BOTH SYSTEMS FOR A COMPLETE OPERABLE CONDITION.

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PART OF SHEET(S)	SHEET TITLE:
Partial of ES-1	SITE ELECTRICAL PLAN

DATE:	SCALE:	SHEET NUMBER
12-16-10	1" = 30'-0"	ESK-7

ISSUE:	DSA PROJECT NUMBER:	IBI PROJECT NUMBER:
ADDENDUM #1	03-113161	24701

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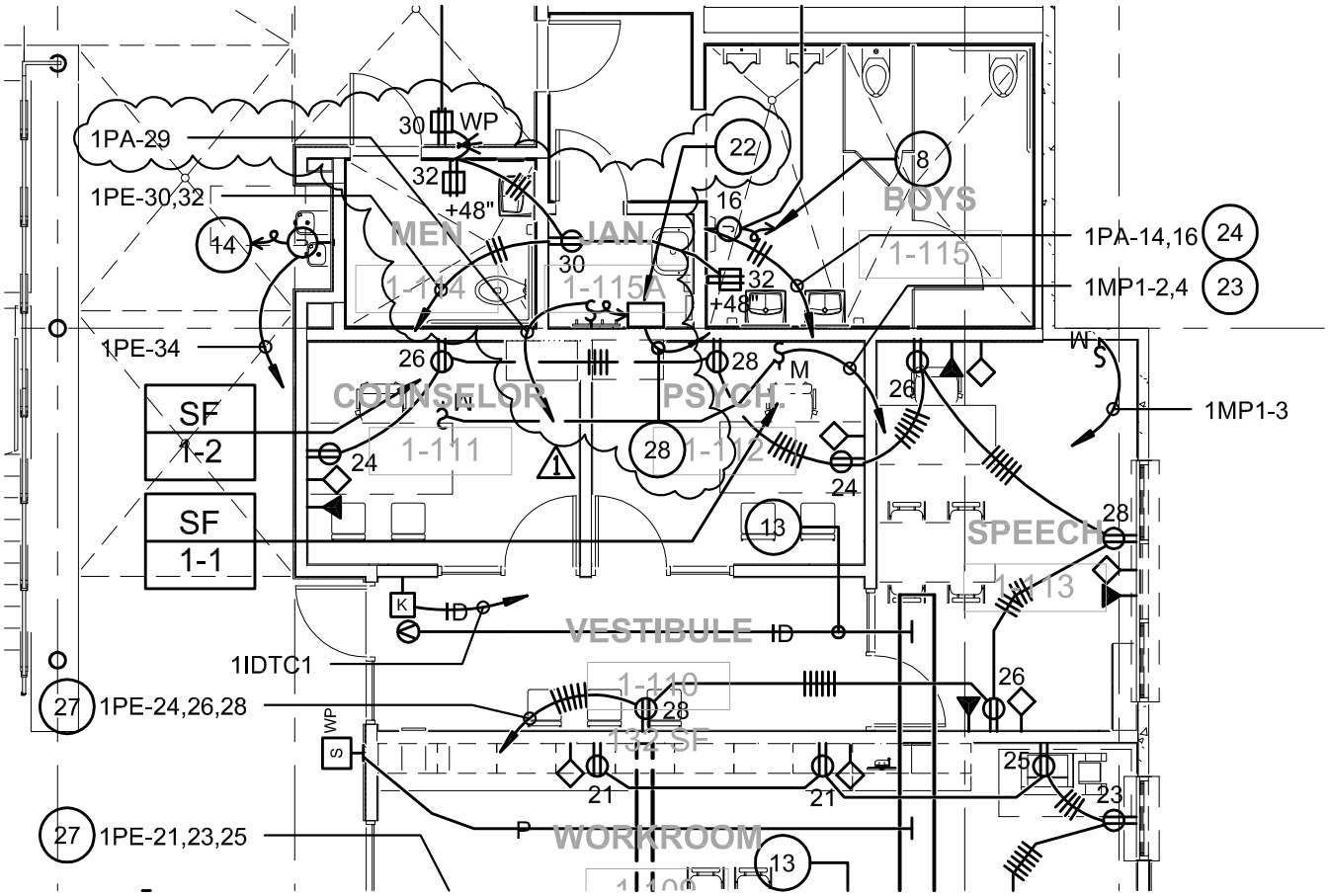

1

22 PROVIDE 120/240V TRANSFORMER TYPE AS INDICATED ON PLUMBING PLAN FOR FAUCET. CONFIRM ALL REQUIREMENTS WITH MANUFACTURER.

28 EXTEND 3/4"C.-2#12 & 1#12 GRD. TO ALL RESTROOM'S ELECTRICAL TYPE FAUCETS. VERIFY LOCATION WITH PLUMBING PLANS.

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PART OF SHEET(S)	SHEET TITLE:	
Partial of E-101-1	BLDG 1 FIRST FLOOR POWER & SIGNAL PLAN	
DATE: 12-16-10	SCALE: 1/8" = 1'-0"	SHEET NUMBER ESK-8
ISSUE: ADDENDUM #1	DSA PROJECT NUMBER: 03-113161	IBI PROJECT NUMBER: 24701

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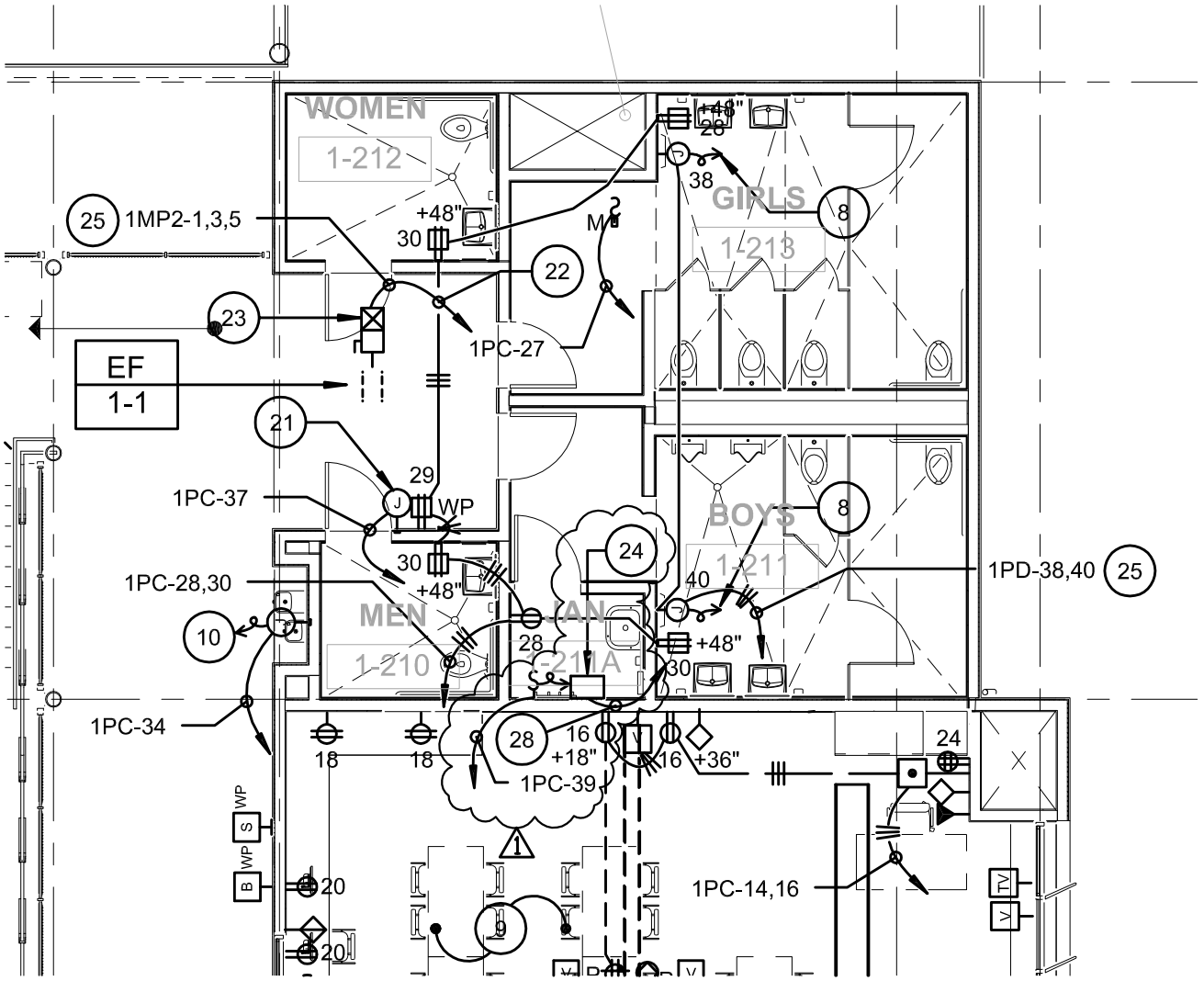

1

24 PROVIDE 120/240V TRANSFORMER TYPE AS INDICATED ON PLUMBING PLAN FOR FAUCET. CONFIRM ALL REQUIREMENTS WITH MANUFACTURER.

28 EXTEND 3/4"C.-2#12 & 1#12 GRD. TO ALL RESTROOM'S ELECTRICAL TYPE FAUCETS. VERIFY LOCATION WITH PLUMBING PLANS.

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PART OF SHEET(S)	SHEET TITLE:	
Partial of E-104-1	BLDG 1 SECOND FLOOR POWER & SIGNAL PLAN	
DATE: 12-16-10	SCALE: 1/8" = 1'-0"	SHEET NUMBER ESK-9
ISSUE: ADDENDUM #1	DSA PROJECT NUMBER: 03-113161	IBI PROJECT NUMBER: 24701

LICENSED ARCHITECT
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RENEWAL DATE
STATE OF CALIFORNIA

SECTION 31 31 16.13 - CHEMICAL TERMITE CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Soil treatment
   2. Wood treatment with termiticide.

B. Related Sections:
   1. Division 06 Section "Rough Carpentry" for wood preservative treatment by pressure process.

1.03 SUBMITTALS

A. Product Data: For each type of termite control product.
   1. Include the EPA-Registered Label for termiticide products.

B. Qualification Data: For qualified Installer.

C. Product Certificates: For termite control products, from manufacturer.

D. Wood Treatment Application Report: After application of termiticide is completed, submit report for Owner's records and include the following:
   1. Date and time of application.
   2. Termiticide brand name and manufacturer.
   3. Quantity of undiluted termiticide used.
   4. Dilutions, methods, volumes used, and rates of application.
   5. Areas of application.

E. Warranties: Sample of special warranties.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located, and who employs workers trained and approved by manufacturer to install manufacturer's products.

B. Regulatory Requirements: Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.

C. Source Limitations: Obtain termite control products from single source from single manufacturer.

1.05 PROJECT CONDITIONS

A. Apply wood treatment after framing, sheathing, and exterior weather protection is completed but before electrical and mechanical systems are installed.

B. Install soil treatment system with termiticide prior to placing concrete slab reinforcement and pouring concrete and after installation and inspection of footings, foundations, and plumbing and electrical pipes and conduits.

1.06 WARRANTY

A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

1. Warranty Period: Five years from date of Substantial Completion.

B. Wood Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied wood termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite damage is discovered during warranty period, repair or replace damage caused by termite infestation and treat replacement wood.
1. Warranty Period: 12 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 SOIL TREATMENT

A. Termiticide: Provide an EPA-Registered termiticide, complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Corporation, Agricultural Products; Termidor.

b. Bayer Environmental Science; Premise 75.

c. FMC Corporation, Baseline® Insecticide, Dragnet® SFR Termiticide.

2. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

2.02 WOOD TREATMENT

A. Borate: Provide an EPA-Registered borate termiticide, complying with requirements of authorities having jurisdiction, in an aqueous solution for spray application and a gel solution for pressure injection, formulated to prevent termite infestation in wood. Provide quantity required for application at the label volume and rate for the maximum diffusible borate concentration allowed for each specific use, according to product's EPA-Registered Label.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Nisus Corp.; Bora-Care, Jecta, Tim-Bor.
   b. NovaGuard Technologies, Inc.; Armor-Guard, Shell-Guard.
   c. Copper Brite, Inc.; Termite Prufe.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.

B. Proceed with application only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

3.03 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.04 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.

1. Slabs-on-Grade: Underground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.

2. Foundations: Adjacent soil, including soil along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

D. Post warning signs in areas of application.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

3.05 APPLYING WOOD TREATMENT

A. Application: Mix wood treatment solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of borate, according to manufacturer's EPA-Registered Label, so that wood framing, sheathing, siding, and structural members subject to infestation receive treatment.
1. Framing and Sheathing: Apply termiticide solution by spray to bare wood for complete coverage.
2. Wood Members More Than 4 Inches Thick: Inject termiticide gel solution under pressure into holes of size and spacing required by manufacturer for treatment.
3. Exterior Uncoated Wood Trim and Siding: Apply termiticide solution to bare wood siding. After 48 hours, apply a seal coat of paint as specified in Division 09 painting Sections.

END OF SECTION

SECTION 07 25 00 - WEATHER BARRIERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:

1. Building wrap.
2. Flexible flashing.

1.03 RELATED SECTIONS

A. Section 07 46 33 - Siding.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.

PART 2 - PRODUCTS

2.01 WATER-RESISTIVE BARRIER

A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.

1. Basis of Design Product: GreenGuard RainDrop as manufactured by Pactiv, Inc.
2. Other Acceptable Products:
    a. Dow Chemical Company (The); Styrofoam Weathermate Plus Brand Housewrap.
    b. DuPont (E. I. du Pont de Nemours and Company); Tyvek StuccoWrap.
3. Water-Vapor Permeance: Not less than 10 g through 1 sq. m of surface in 24 hours per ASTM E 96/E 96M, Desiccant Method (Procedure A).

B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.02 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than.040 inch (1.0 mm).

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. DuPont (E. I. du Pont de Nemours and Company); DuPont Flashing Tape.

b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Butyl Self Adhered Flashing.

c. Protecto Wrap Company; BT-25 XL.

d. Advanced Building Products Inc.; Wind-o-wrap.

e. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.

f. Fortifiber Building Systems Group; Fortiflash 40.

g. MFM Building Products Corp.; Window Wrap.

B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

C. Nails and Staples: ASTM F 1667.

PART 3 - EXECUTION

3.01 WATER-RESISTIVE BARRIER INSTALLATION

A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.

B. Cover sheathing with water-resistive barrier as follows:

1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.

2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap unless otherwise indicated.

C. Building Wrap: Comply with manufacturer's written instructions.

1. Insure proper orientation of material per manufacturer.

2. Seal seams, edges, fasteners, and penetrations with tape.

3. Extend into jambs of openings and seal corners with tape.

3.02 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches (100 mm) except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over water-resistive barrier at bottom and sides of openings.
4. Lap water-resistive barrier over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 07 25 00

SECTION 09 06 00 - COLOR & MATERIAL SCHEDULE

SCHEDULE A: EXTERIOR ITEMS – PRE-FINISHED		
#	ITEM	MATERIAL/COLOR
1.	Permeable Concrete Pavers	Color 1: Sand/Stone/Mocha (standard blend); Color 2: Stone (solid standard).
2.	Concrete, natural, exposed	Grey, standard natural color. Provide sandblasting and other textural finishes where specified. All corrective work (sacking, etc.) shall exactly match natural concrete finish.
3.	Sealant integral to Site Concrete	Color to closely match standard grey concrete. See Site-Finished category for natural concrete to receive applied clear sealer
4.	Asphalt Paving	Standard black
5.	Site (exterior) Signage	Custom colors as selected by Architect or as specified in Section 10 14 00.
6.	Membrane Roofing, Capsheet	Building #1: Energy Smart Tan (main roof, canopies); Lead Gray (solar chimney roof). Building #2: Energy Smart Tan (main roof, canopies); Energy Smart White (Kitchen roof).
7.	Roof Perimeter Edge Flashing	Standard color PVC -clad metal to match roofing membrane.
8.	Joint Sealants	Match adjacent and/or integral finish/color
9.	Aluminum Door Frames	Acrylic finish, baked: Custom color as selected by Architect.
10.	Aluminum Storefronts and Windows	Acrylic finish, baked: Custom color as selected by Architect.
11.	Finish Hardware	As specified in Section 08 71 00.
12.	Glass, 1-inch insulating glass	Exterior tinted glass “Caribia” (aqua-green) and interior clear. All other glazing shall be clear unless noted otherwise.
13.	Signage and Graphics	As specified in Section 10 14 00.
14.	Roof Access Scuttle (Hatch)	Hatch cover: match roofing material color.
15.	Roof-mounted Mechanical Equipment, ducting, piping and miscellaneous components	Natural, non-corrosive metal finish or factory painted finish as selected by Architect from manufacturer’s standard colors. Field-painting, including touch-up, to match shop painting, where required.
16.	Exposed Electrical Devices, Light Fixtures and Components	Natural, non-corrosive metal finish or factory painted finish as available and selected by Architect. Code devices, such as fire alarm components, shall be required color(s) per code.
17.	Concrete Masonry Units (CMU)	Colors as shown on drawings.
18.	Chain Link Fencing and Gates	Polymer-coated, black.
19.	Ornamental Steel Fencing and Gates	Electrostatic applied polyester color coat: black
20.	Downspouts and Gutters	Standard pre-weathered zinc (Graphite Gray) factory coating.
21.	Metal Lockers	Manufacturer’s standard finish as selected by Architect.
22.	Exterior Sun Control Devices	Aluminum with fluorocarbon coating as selected by Architect.
23.	Tactile Warning Surface Tile	Federal Yellow (Federal Color No. 33538).

SCHEDULE B: EXTERIOR ITEMS – SITE-FINISHED		
#	ITEM	MATERIAL/COLOR
1.	Concrete, exposed	Grey, standard natural color.
2.	Pavement Markings	As specified in Section 32 94 00.
3.	CMU Mortar	Standard manufacturer's colors as selected by Architect
4.	Structural Steel Pipe Columns	Field-painted, custom color as selected by Architect.
5.	Wood T & G Soffits	Field-painted, custom color as selected by Architect.
6.	Exposed Flashing and Sheetmetal	Field-painted, custom color to match adjacent finish(es).
7.	Hollow Metal Doors and Frames	Field-painted, custom color as selected by Architect.
8.	Metal Access Doors	Field-painted, custom color to match adjacent finish(es).
9.	Exterior Plaster	Integral custom plaster color as referenced in Section 09 24 00 as selected by Architect with field painted finish per Section 09 90 00.
10.	Metal Louvers	Custom color as selected by Architect to match adjacent finish.
11.	Exposed Plumbing and Mechanical Piping and Related Appurtenances, non-factory finished	Custom color as selected by Architect.

SCHEDULE C: INTERIOR ITEMS – PRE-FINISHED		
#	ITEM	MATERIAL/COLOR
1.	Exposed Concrete	Natural grey finish (see Interior Items - Site Finished for clear sealer as specified in Section 03 35 23). Joint Sealant: Match adjacent concrete.
2.	Structural Steel, non-exposed	Factory-primed where specified.
3.	Plastic Laminate Cabinets and Countertops	Manufacturer's custom colors as selected by Architect.
4.	Solid Surface Countertops	Manufacturer's custom colors as selected by Architect.
5.	Joint Sealants	Colors to closely match adjacent natural finishes where occurs
6.	Aluminum Door /Window Frames	Acrylic finish, baked: Custom color as selected by Architect.
7.	Wood Doors	Clear stain, light maple as selected by Architect.
8.	Metal Access Doors	Stainless steel at ceramic tile surfaces.
9.	Metal Door Louvers at Wood Doors	Factory painted finish per Architect's custom color.
10.	Metal Door Louvers at Steel Hollow Metal Doors	Factory-painted to match custom door color.
11.	Aluminum Windows	Acrylic finish, baked: Custom color as selected by Architect
12.	Finish Hardware	As specified in Section 08 71 00.
13.	Glass	Clear. Custom texture where specified.
14.	Unglazed Ceramic Mosaic Floor Tile	Colors as selected by Architect from manufacturer's color groups as specified in Section 09 30 00.
15.	Glazed Wall Tile	Colors as selected by Architect from manufacturer's color groups as specified in Section 09 30 00.
16.	Ceramic Tile Trim	Colors as selected by Architect from manufacturer's color groups as specified in Section 09 30 00.
17.	Kitchen Quarry Tile	Colors as referenced in Section 09 30 00 (Arid Grey Q42)
18.	Acoustical Ceilings	White, manufacturer's standard colors.
19.	Tile Carpeting	Color(s) and pattern(s) as selected by Architect from manufacturer's standard colors and patterns. Refer to Section 09 68 13.
20.	Resilient Tile Flooring	Manufacturer's custom colors as selected by Architect
21.	Resilient Base	Manufacturer's custom colors as selected by Architect
22.	Markerboards	White with anodized aluminum, clear trim/frame per manufacturer's standard finishes.
23.	Dry Erase Wallcovering	Just-Rite White.
24.	Tackable Wallcovering	Standard manufacturer's colors as selected by Architect.
25.	Toilet Partitions	Solid color reinforced composite: Manufacturer's standard colors as selected by Architect
26.	Toilet Room Accessories	As specified in Section 10 28 13.
27.	Corner Guards	Custom color and texture as selected by Architect.
28.	Metal Lockers	Manufacturer's standard finish as selected by Architect
29.	Signage and Graphics	Custom colors as selected by Architect or as specified in Section 10 14 00.
30.	Kitchen Equipment	As shown on the Drawings and as specified in Section 11 40 00.
31.	Fire Extinguisher Cabinets	As specified in Section 10 44 16..
32.	Platform Curtains	Manufacturer's custom colors as selected by Architect
33.	Ladders	Galvanized steel.
34.	Sink Accessories:	Stainless steel.
35.	Exposed Mechanical Ducting	Galvanized, all joint compound shall be matching grey.

SCHEDULE C: INTERIOR ITEMS – PRE-FINISHED		
#	ITEM	MATERIAL/COLOR
36.	Mechanical Grilles and Registers	Manufacturer's standard white where occurs in acoustical ceilings.
37.	Exposed, surface-mounted Electrical Plates/Covers:	Stainless Steel. Outlets: White covers and white outlets at painted gypsum board walls. Colored plates where required for Tel/Data and similar.
38.	Miscellaneous Exposed Electrical Products	Natural finish, aluminum, stainless steel or plastic color to match adjacent finish as selected by Architect.

SCHEDULE D: INTERIOR ITEMS – SITE-FINISHED		
#	ITEM	MATERIAL/COLOR
1.	Exposed Concrete Floor/slab and Curbs	Clear sealer, two (2) coat process
2.	Exposed Aggregate Concrete Floor	As specified in Section 03 35 23.
3.	Wood Beams and Trusses	Transparent coating: custom color as selected by Architect.
4.	Countertop Supports (cantilevered from wall)	Galvanized, no other finish.
5.	Metal Decking	Field-painted: custom color as selected by Architect.
6.	Steel Railings and Miscellaneous Metal Fabrications	Custom color as selected by Architect.
7.	Hollow Metal Frames and Doors on Exterior Walls	Match adjacent wall surface (painted gyp. board); exterior and interior sides (separate colors), custom colors as selected by Architect, frame painted to outside corner of door stop/frame.
8.	Miscellaneous Metal Trim and Flashings	Custom color(s) as selected by Architect to match adjacent finishes.
9.	Hollow Metal Frames and Doors on Interior Walls	Custom color(s) as selected by Architect.
10.	Metal Access Doors	Field-painted, custom color to match adjacent finish(es).
11.	Gypsum Board Walls and Ceilings	Custom color(s) as selected by Architect.
12.	Joint Sealants	Match adjacent and/or integral finish/color
13.	Exposed Plumbing and Mechanical Piping	All piping shall be painted custom color(s) to match adjacent ceilings and walls
14.	Electrical and Mechanical Access Doors and Plates, Grilles, Registers, Vents, etc.	Shall be painted to match where occurs in interior plaster/gypsum board partitions and ceilings.

END OF SECTION

SECTION 22 40 00

PLUMBING FIXTURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following conventional plumbing fixtures and related components

1. Faucets.
2. Laminar-flow faucet-spout outlets.
3. Flushometers.
4. Toilet seats.
5. Protective shielding guards.
6. Fixture supports.
7. Disposers.
8. Water closets.
9. Urinals.
10. Lavatories.
11. Commercial sinks.
12. Service sinks.

B. Related Sections include the following:

1. Division 10 Section, "Toilet, Bath, and Laundry Accessories".
2. Division 22 Section "Domestic Water Piping Specialties" for backflow preventers, floor drains, and specialty fixtures not included in this Section.
3. Division 22 Section "Drinking Fountains and Water Coolers".

1.03 DEFINITIONS

A. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.

B. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included to isolate fixtures or group of fixtures.

1.04 SUBMITTALS

A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.

D. Warranty: Special warranty specified in this Section.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.

1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.

D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act", about water flow and consumption rates for plumbing fixtures.

E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects", for fixture materials that will be in contact with potable water.

F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

G. Comply with the following applicable standards and other requirements specified for plumbing fixtures

1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
2. Vitreous-China Fixtures: ASME A112.19.2M.
3. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.

H. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets

1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.
2. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.
3. Diverter Valves for Faucets with Hose Spray: ASSE 1025.
4. Faucets: ASME A112.18.1.
5. Hose-Connection Vacuum Breakers: ASSE 1011.

6. Hose-Coupling Threads: ASME B1.20.7.
7. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
8. Pipe Threads: ASME B1.20.1.
9. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
10. Supply Fittings: ASME A112.18.1.
11. Brass Waste Fittings: ASME A112.18.2.

I. Comply with the following applicable standards and other requirements specified for miscellaneous fittings

1. Atmospheric Vacuum Breakers: ASSE 1001.
2. Brass and Copper Supplies: ASME A112.18.1.
3. Manual-Operation Flushometers: ASSE 1037.
4. Plastic Tubular Fittings: ASTM F 409.
5. Brass Waste Fittings: ASME A112.18.2.
6. Sensor-Operation Flushometers: ASSE 1037 and UL 1951.

J. Comply with the following applicable standards and other requirements specified for miscellaneous components

1. Disposers: ASSE 1008 and UL 430.
2. Flexible Water Connectors: ASME A112.18.6.
3. Floor Drains: ASME A112.6.3.
4. Grab Bars: ASTM F 446.
5. Hose-Coupling Threads: ASME B1.20.7.
6. Hot-Water Dispensers: ASSE 1023 and UL 499.
7. Off-Floor Fixture Supports: ASME A112.6.1M.
8. Pipe Threads: ASME B1.20.1.
9. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.06 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace components of whirlpools that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures of unit shell.
   b. Faulty operation of controls, blowers, pumps, heaters, and timers.
   c. Deterioration of metals, metal finishes, and other materials beyond normal use.
2. Warranty Period for Commercial Applications: Three year(s) from date of Substantial Completion.

1.07 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.
3. Flushometer Valve, Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than 12 of each type.

4. Provide hinged-top wood or metal box, or individual metal boxes, with separate compartments for each type and size of extra materials listed above.
5. Flushometer Tank, Repair Kits: Equal to 5 percent of amount of each type installed, but no fewer than 2 of each type.
6. Toilet Seats: Equal to 5 percent of amount of each type installed.

PART 2 - PRODUCTS

2.01 FIXTURE SUPPORTS

A. 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:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Josam Company.
2. MIFAB Manufacturing Inc.
3. Smith, Jay R. Mfg. Co.
4. Zurn Plumbing Products Group; Specification Drainage Operation.

C. Water-Closet Supports: Description: Combination carrier designed for accessible and standard mounting height of wall-mounting, water-closet-type fixture. Include single or double, vertical or horizontal, hub-and-spigot or hubless waste fitting as required for piping arrangement; faceplates; couplings with gaskets; feet; and fixture bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

D. Urinal Supports

1. Description: Type [I, urinal carrier with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture] [II, urinal carrier with hanger and bearing plates] for wall-mounting, urinal-type fixture. Include steel uprights with feet.
2. Accessible-Fixture Support: Include rectangular steel uprights.

E. Lavatory Supports

1. Description: Type I, lavatory carrier with exposed arms and tie rods for wall-mounting, lavatory-type fixture. Include steel uprights with feet.
2. Accessible-Fixture Support: Include rectangular steel uprights.

F. Sink Supports: Description: Type II, sink carrier with hanger plate, bearing studs, and tie rod for sink-type fixture. Include steel uprights with feet.

2.02 PLUMBING FIXTURES

A. Water Closets

1. WC-1: Wall hung back outlet, white, siphon jet water closet with elongated bowl, 1-1/2" top spud, 1.6~~28~~ gallon per flush.
   a. Fixture: American Standard “Afwall ~~Flowise~~”, No. 2257.103~~3351.128~~ or equal.

b. Flush Valve: Sloan ~~Optima~~ model Royal 111-SMO -1.6~~28ES-S,~~ 1.6~~28~~ gallons per flush ~~per gallon, hard wired with EL-154 transformer one per three toilet fixtures, 120 VAC/24 VAC~~battery operated, or equal.
c. Seat: Open front elongated, white, solid plastic, less cover and with concealed check hinge Olsonite 10CC or equal.
d. Carrier: Smith 210L commercial grade adjusted for 15" bowl height

2. WC-2: Same as WC-1, ADA compliance.
3. WC-3: Floor Mounted, white, 16-1/2" high bowl, elongated for secondary school students and adult use, 1.6~~28~~ gallon per flush.
   a. Fixture: American Standard "Madera ~~Flowise~~" No. 3461.160~~28~~ or equal.
   b. Flush Valve: Sloan ~~Optima~~ model Royal 111-SMO-1.6~~28ES-S~~, 1.6~~28~~ gallons per flush, ~~per gallon, hard wired with EL-154 transformer one per three toilet fixtures, 120 VAC/24 VAC~~battery operated, or equal.
   c. Seat: Open front elongated, solid plastic, less cover and with concealed check hinge Olsonite 10CC AM FR, Bemis 1955 SSC, or equal

B. Urinals
1. UR-1: Wall mount, white, vitreous china
   a. Wall hung with replaceable trap cartridge or integral liquid seal trap, provided with biodegradable liquid seal in compliance with the California Building Code and maintains a sanitary and odor free environment. Furnish complete with hander brackets, fasteners, gaskets and drain line connections.
   b. Fixture: Sloan Water-Free WES-1000 fixture~~American Standard Washbrook Flo-Wise 6590.525 fixture and flush valve (0.125 GPF) or equal~~.
   c. Fixtures shall comply with the following requirements:
      1) Shall meet performance, testing, and labeling requirements for American National Standards Institute (ANSI).
   d. Trap shall permit the uninhibited flow of waste through the Urinal to the sanitary drainage system.
   e. Provide accessible clean-out above each urinal.
   f. Provide 1" capped water line in wall behind fixture for future.
2. UR-2: Same as UR-1, except install for ADA compliance

Formatted: Bullets and Numbering

C. Lavatories
1. Access compliant faucets for Lavatories: Force to activate controls shall be no greater than 5lbs. Self closing metering, when specified, to remain open 10 seconds minimum when activated.
2. Exposed trim shall be free from sharp edges or points. Fixture shall be furnished with other listed manufacturer specified trim. Instead of solid supply pipe, polished chrome-plated risers, 3/8 inch outside diameter with ferrule stop end and metal nosepiece may be furnished.
3. Insulate cold water, hot water and drain lines under all access compliant lavatories with approved type insulation.
4. Provide tempered hot water (THW, maximum 110-deg F) at all Staff toilet rooms, Kitchen sinks and lavs, Nurse location and Staff lunch room/lounges teacher's workrooms. Provide hot water (HW, 120-130-deg F) at Custodian Rooms and at specialty locations as requested by the district or required for programmatic or functional performance. Provide as required for licensing requirements at Childcare / Preschool facilities. Tempered water shall be supplied through a water temperature limiting device that conforms to ASSE 1070 and shall limit the tempered water to a maximum of 110ºF.

5. L-1: Wall Hung Lavatories: White Vitreous China, size 20” x 18”, cold water.
   a. Fixture: American Standard Comrade model 0124.131 three-hole center faucet for concealed arm support.
   b. Faucet: “Sloan Optima ETF-600-P” hardwired sensor faucets with EL-154 transformer. Cold water only. Single level, 4” on centers, 1/2” connection and back checks at cold water supply.
   c. Drain: American Standard chrome plated Grid Drain and 13" tailpiece.
   d. Trap: 1-1/4"x1-1/2" 17 ga. cast brass trap and tubular wall bend.
   e. Supplies & Stops: Brasscraft HSR1712A-C.
6. L-2: Wall Hung Lavatories: White Vitreous China, size 20 x 18”, cold water.
   a. Fixture: American Standard Comrade model 0124.131 three-hole center faucet for concealed arm support.
   b. Faucet: “Sloan Optima ETF-600-P” hardwired sensor faucets with EL-154 transformer. Cold water only. Single level, 4” on centers, 1/2” connection and back check at hot and cold water supplies.
   c. Drain: American Standard chrome plated Grid Drain and 13" tailpiece.
   d. Trap: 1-1/4"x1-1/2" 17 ga. cast brass trap and tubular wall bend.
   e. Supplies & Stops: Brasscraft HSR1712A-C.
   f. Install unit to comply with ADA requirements.
7. L-3: Wall Hung Lavatories: White Vitreous China, size 20 x 18”, hot and cold water.
   a. Fixture: American Standard Lucerne model 0355.012, three-hole center faucet for wall hanger or concealed arms support.
   b. Faucet: “Chicago Faucet 802-VE2805-317ABCP” with lever handle. Provide Sloan MIX-60-A mixing valve. Single level, 4” on centers, 1/2” connection and back check at hot and cold water supplies.
   c. Drain: American Standard chrome plated Grid Drain and 13" tailpiece.
   d. Trap: 1-1/4"x1-1/2" 17 ga. cast brass trap and tubular wall bend.
   e. Supplies & Stops: Brasscraft HSR1712A-C.
   f. Cover trap and hot water supply with one piece insulation. Install unit to comply with ADA requirements.

D. Sinks
1. Commercial Sinks: Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
   a. Elkay Manufacturing Co.
   b. Just Manufacturing Company.
   c. American Standard; Chicago; Delta Faucets and Bubblers
   d. Or approved equal.
2. S-1: Cold water only. Counter-mounted, single-compartment, self-rimming, 304-stainless-steel commercial sink. Refer to Drawings for accessible locations.
   a. Style: Elkay LFRAD-251960, 18-gauge.
   b. Compartment Size: 25” L. by 19” W. by 5” D.
   c. Faucet: Chicago 445-L8ABCP wall mounted, swing spout, 2.2 GPM Aerator, lever handle, cold water (CW) only. Provide soap dispenser as specified in Division 10 section.
   d. Drain, Supplies and Stops: Chrome-plated copper by manufacturer.
   e. Trap: 1-1/2” by 1-1/2” 17-gauge. chrome-plated cast-brass P-trap and tubular wall bend and wall escutcheon.
   f. Install to CBC compliance.
3. Sinks references on floor plan 15, 21 and 32 refer to kitchen equipment drawings for fixture specifications.

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E. Service Sinks

1. S~~M~~S-1: Wall mounted ~~Floor mounted corner type~~ service sink. 3" ~~floor~~ outlet with trap standard, enameled cast iron, Commercial Enameling Co., Model 8687~~1~~ and rim guard. Trap standard, cast iron with removable perforated grid strainer, floor flange, 3" female threads. Supply combination faucet with integral stops, wall brace, vacuum breaker, 2.75 flow control, escutcheons and spout with hose outlet, rough chrome finish (Chicago Faucet No. 897 CP).

2.03 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers

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:
   a. Plumberex Specialty Products Inc.
   b. TRUEBRO, Inc.
3. Description: Manufactured plastic wraps for covering plumbing fixture [hot-water supply] [hot- and cold-water supplies] and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.

B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.

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

3.02 INSTALLATION

A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.

1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.

C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.

D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.

E. Install wall-mounting fixtures with tubular waste piping attached to supports.

F. Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.

G. Install counter-mounting fixtures in and attached to casework.

H. Install fixtures level and plumb according to roughing-in drawings.

I. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping".

J. Install water-supply piping with shutoff valve on supply to each isolated fixture or group of fixture to be connected to water distribution piping. Use ball, gate, or globe valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping". Provide access panel and coordinate location accordingly

K. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

L. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

M. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

N. Install toilet seats on water closets.

O. Install trap-seal liquid in dry urinals.

P. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

Q. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.

R. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

S. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.
2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

T. Install disposer in outlet of each sink indicated to have disposer. Install switch where indicated or in wall adjacent to sink if location is not indicated.

U. Install hot-water dispensers in back top surface of sink or in countertop with spout over sink.

V. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Common Work Results for Plumbing".

W. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants".

3.03 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems".

D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables".

3.04 FIELD QUALITY CONTROL

A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.

B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

E. Install fresh batteries in sensor-operated mechanisms.

3.05 ADJUSTING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Replace washers and seals of leaking and dripping faucets and stops.

C. Install fresh batteries in sensor-operated mechanisms.

3.06 CLEANING

A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
2. Remove sediment and debris from drains.

B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.07 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 40 00

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SECTION 23 09 00

INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.

B. Related Sections include the following:

1. Division 23 Section "Meters and Gages for HVAC Piping" for measuring equipment that relates to this Section.
2. Division 23 Section "Sequence of Operations for HVAC Controls" for requirements that relate to this Section.

1.03 DEFINITIONS

A. DDC: Direct digital control.

B. I/O: Input/output.

C. LonWorks: A control network technology platform for designing and implementing interoperable control devices and networks.

D. MS/TP: Master slave/token passing.

E. PC: Personal computer.

F. PID: Proportional plus integral plus derivative.

G. RTD: Resistance temperature detector.

1.04 SYSTEM PERFORMANCE

A. Comply with the following performance requirements

~~1.Graphic Display: Display graphic with minimum 20 dynamic points with current data within 10 seconds.~~

~~2.Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 8 seconds.~~
~~3.Object Command: Reaction time of less than two seconds between operator command of a binary object and device reaction.~~
~~4.Object Scan: Transmit change of state and change of analog values to control units or workstation within six seconds.~~
~~5.Alarm Response Time: Annunciate alarm at workstation within 45 seconds. Multiple workstations must receive alarms within five seconds of each other.~~

~~6.~~1. Program Execution Frequency: Run capability of applications as often as five seconds, but selected consistent with mechanical process under control.

~~7.~~2. Performance: Programmable controllers shall execute DDC PID control loops, and scan and update process values and outputs at least once per second.

~~8.~~3. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows

~~a.Water Temperature: Plus or minus 1 deg F.~~
~~b.Water Flow: Plus or minus 5 percent of full scale.~~
~~c.Water Pressure: Plus or minus 2 percent of full scale.~~
~~d.~~a. Space Temperature: Plus or minus 1 deg F.
~~e.~~b. Ducted Air Temperature: Plus or minus 1 deg F.
~~f.~~c. Outside Air Temperature: Plus or minus 2 deg F.
~~g.~~d. Dew Point Temperature: Plus or minus 3 deg F.
~~h.~~e. Temperature Differential: Plus or minus 0.25 deg F.
~~i.~~f. Relative Humidity: Plus or minus 5 percent.
~~j.~~g. Airflow (Pressurized Spaces): Plus or minus 3 percent of full scale.
~~k.~~h. Airflow (Measuring Stations): Plus or minus 5 percent of full scale.
~~l.~~i. Airflow (Terminal): Plus or minus 10 percent of full scale.
~~m.~~j. Air Pressure (Space): Plus or minus 0.01-inch wg.
~~n.~~k. Air Pressure (Ducts): Plus or minus 0.1-inch wg.
~~o.Carbon Monoxide: Plus or minus 5 percent of reading.~~
~~p.~~l. Carbon Dioxide: Plus or minus 50 ppm.
~~q.~~m. Electrical: Plus or minus 5 percent of reading.

1.05 SUBMITTALS

A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.

1. DDC System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for operator workstation equipment, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment.
2. Control System Software: Include technical data for operating system software, operator interface, color graphics, and other third-party applications.
3. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Bill of materials of equipment indicating quantity, manufacturer, and model number.
2. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.

3. Wiring Diagrams: Power, signal, and control wiring.
4. Details of control panel faces, including controls, instruments, and labeling.
5. Written description of sequence of operation.
6. Schedule of dampers including size, leakage, and flow characteristics.
7. Schedule of valves including flow characteristics.
8. DDC System Hardware
    a. Wiring diagrams for control units with termination numbers.
    b. Schematic diagrams and floor plans for field sensors and control hardware.
    c. Schematic diagrams for control, communication, and power wiring, showing trunk data conductors and wiring between operator workstation and control unit locations.
9. Control System Software: List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.
10. Controlled Systems
    a. Schematic diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
    b. Scaled drawings showing mounting, routing, and wiring of elements including bases and special construction.
    c. Written description of sequence of operation including schematic diagram.
    d. Points list.

C. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with ASHRAE 135.

~~D.Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with LonWorks.~~

~~E.~~D. Software and Firmware Operational Documentation: Include the following:

1. Software operating and upgrade manuals.
2. Program Software Backup: On a magnetic media or compact disc, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.
5. Software license required by and installed for DDC workstations and control systems.

~~F.~~E. Software Upgrade Kit: For Owner to use in modifying software to suit future systems revisions or monitoring and control revisions.

~~G.~~F. Qualification Data: For Installer and manufacturer.

~~H.~~G. Field quality-control test reports.

~~I.~~H. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Maintenance instructions and lists of spare parts for each type of control device and compressed-air station.
2. Interconnection wiring diagrams with identified and numbered system components and devices.
3. Keyboard illustrations and step-by-step procedures indexed for each operator function.

4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
5. Calibration records and list of set points.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Automatic control system manufacturer's authorized representative who is trained and approved for installation of system components required for this Project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with ASHRAE 135 for DDC system components.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.

B. System Software: Update to latest version of software at Project completion.

1.08 COORDINATION

A. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.

B. Coordinate equipment with Division 28 Section "Intrusion Detection" to achieve compatibility with equipment that interfaces with that system and with building master clock.

C. Coordinate equipment with Division 28 Section "Access Control" to achieve compatibility with equipment that interfaces with that system.

D. Coordinate equipment with Division 27 Section "Clock Systems" to achieve compatibility with equipment that interfaces with that system.

E. Coordinate equipment with Division 28 Section "PLC Electronic Detention Monitoring and Control Systems" to achieve compatibility with equipment that interfaces with that system.

F. Coordinate equipment with Division 26 Section "Network Lighting Controls" to achieve compatibility with equipment that interfaces with that system.

G. Coordinate equipment with Division 28 Section "Fire Detection and Alarm" to achieve compatibility with equipment that interfaces with that system.

H. Coordinate supply of conditioned electrical branch circuits for control units and operator workstation.

I. Coordinate equipment with Division 26 Section "Electrical Power Monitoring and Control" to achieve compatibility of communication interfaces.

J. Coordinate equipment with Division 26 Section "Panelboards" to achieve compatibility with starter coils and annunciation devices.

K. Coordinate equipment with Division 26 Section "Motor-Control Centers" to achieve compatibility with motor starters and annunciation devices.

L. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-Place Concrete."

1.09 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Replacement Materials: One replacement diaphragm or relay mechanism for each unique controller, thermostat, and positioning relay.
   2. Maintenance Materials: Two thermostat adjusting key(s).

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.02 CONTROL SYSTEM

A. Manufacturers
   1. Andover Controls Corporation.
   2. Automated Logic Corporation.
   3. Honeywell International Inc.; Home & Building Control.
   4. Johnson Controls, Inc.; Controls Group.
   5. Siemens Building Technologies, Inc.

B. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, and accessories to control mechanical systems.

~~C.Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking environment on token-passing network~~

and programmed to control mechanical systems. An operator workstation permits interface with the network via dynamic color graphics with each mechanical system, building floor plan, and control device depicted by point-and-click graphics.

D.Control system shall include the following:

1.Building intrusion detection system specified in Division 28 Section "Intrusion Detection."
2.Building clock control system specified in Division 27 Section "Clock Systems."
3.Building lighting control system specified in Division 26 Section "Network Lighting Controls."
4.Fire alarm system specified in Division 28 Section "Fire Detection and Alarm."

2.03 DDC EQUIPMENT

A.Operator Workstation: One PC-based microcomputer(s) with minimum configuration as follows

1.Motherboard: With 8 integrated USB 2.0 ports, integrated Intel Pro 10/100 (Ethernet), integrated audio, bios, and hardware monitoring.
2.Processor: [Intel Pentium 4] <Insert name>, <Insert clock speed> MHz.
3.Random-Access Memory: 512 MB.
4.Graphics: Video adapter, minimum 1600 x 1200 pixels, 64-MB video memory, with TV out.
5.Monitor: 17 inches, LCD color.
6.Keyboard: QWERTY, 105 keys in ergonomic shape.
7.Floppy-Disk Drive: 1.44 MB.
8.Hard-Disk Drive: 80 GB.
9.CD-ROM Read/Write Drive: 48x24x48.
10.Mouse: Three button, optical.
11.Uninterruptible Power Supply: 2 kVa.
12.Operating System: Microsoft Windows XP Professional with high-speed Internet access.

a.ASHRAE 135 Compliance: Workstation shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.

b.LonWorks Compliance: Control units shall use LonTalk protocol and communicate using EIA/CEA 709.1 datalink/physical layer protocol.

13.Application Software

a.I/O capability from operator station.
b.System security for each operator via software password and access levels.
c.Automatic system diagnostics; monitor system and report failures.
d.Database creation and support.
e.Automatic and manual database save and restore.
f.Dynamic color graphic displays with up to 10 screen displays at once.
g.Custom graphics generation and graphics library of HVAC equipment and symbols.
h.Alarm processing, messages, and reactions.
i.Trend logs retrievable in spreadsheets and database programs.
j.Alarm and event processing.
k.Object and property status and control.
l.Automatic restart of field equipment on restoration of power.
m.Data collection, reports, and logs. Include standard reports for the following:

1)Current values of all objects.
2)Current alarm summary.
3)Disabled objects.

~~4)Alarm lockout objects.~~
~~5)Logs.~~

~~n.Custom report development.~~
~~o.Utility and weather reports.~~
~~p.Workstation application editors for controllers and schedules.~~
~~q.Maintenance management.~~

~~14.Custom Application Software~~

~~a.English language oriented.~~
~~b.Full-screen character editor/programming environment.~~
~~c.Allow development of independently executing program modules with debugging/simulation capability.~~
~~d.Support conditional statements.~~
~~e.Support floating-point arithmetic with mathematic functions.~~
~~f.Contains predefined time variables.~~

~~B.~~A. Control Units: Modular, comprising processor board with programmable, nonvolatile, random-access memory; local operator access and display panel; integral interface equipment; and backup power source.

1. Units monitor or control each I/O point; process information; execute commands from other control units, devices, and operator stations; and download from or upload to operator workstation or diagnostic terminal unit.
2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
   a. Global communications.
   b. Discrete/digital, analog, and pulse I/O.
   c. Monitoring, controlling, or addressing data points.
   d. Software applications, scheduling, and alarm processing.
   e. Testing and developing control algorithms without disrupting field hardware and controlled environment.
3. Standard Application Programs
   a. Electric Control Programs: Demand limiting, duty cycling, automatic time scheduling, start/stop time optimization, night setback/setup, on-off control with differential sequencing, staggered start, antishort cycling, PID control, DDC with fine tuning, and trend logging.
   b. HVAC Control Programs: Optimal run time, supply-air reset, and enthalpy switchover.
   c. Programming Application Features: Include trend point; alarm processing and messaging; weekly, monthly, and annual scheduling; energy calculations; run-time totalization; and security access.
   d. Remote communications.
   e. Maintenance management.
   f. Units of Measure: Inch-pound and SI (metric).
4. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
5. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.

~~6.LonWorks Compliance: Control units shall use LonTalk protocol and communicate using EIA/CEA 709.1 datalink/physical layer protocol.~~

~~C.~~B. Local Control Units: Modular, comprising processor board with electronically programmable, nonvolatile, read-only memory; and backup power source.

1. Units monitor or control each I/O point, process information, and download from or upload to operator workstation or diagnostic terminal unit.
2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
   a. Global communications.
   b. Discrete/digital, analog, and pulse I/O.
   c. Monitoring, controlling, or addressing data points.
3. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
4. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.

~~5.LonWorks Compliance: Control units shall use LonTalk protocol and communicate using EIA/CEA 709.1 datalink/physical layer protocol.~~

~~D.~~C. I/O Interface: Hardwired inputs and outputs may tie into system through controllers. Protect points so that shorting will cause no damage to controllers.

1. Binary Inputs: Allow monitoring of on-off signals without external power.
2. Pulse Accumulation Inputs: Accept up to 10 pulses per second.
3. Analog Inputs: Allow monitoring of low-voltage (0- to 10-V dc), current (4 to 20 mA), or resistance signals.
4. Binary Outputs: Provide on-off or pulsed low-voltage signal, selectable for normally open or normally closed operation with three-position (on-off-auto) override switches and status lights.
5. Analog Outputs: Provide modulating signal, either low voltage (0- to 10-V dc) or current (4 to 20 mA) with status lights, two-position (auto-manual) switch, and manually adjustable potentiometer.
6. Tri-State Outputs: Provide two coordinated binary outputs for control of three-point, floating-type electronic actuators.
7. Universal I/Os: Provide software selectable binary or analog outputs.

~~E.~~D. Power Supplies: Transformers with Class 2 current-limiting type or overcurrent protection; limit connected loads to 80 percent of rated capacity. DC power supply shall match output current and voltage requirements and be full-wave rectifier type with the following:

1. Output ripple of 5.0 mV maximum peak to peak.
2. Combined 1 percent line and load regulation with 100-mic.sec. response time for 50 percent load changes.
3. Built-in overvoltage and overcurrent protection and be able to withstand 150 percent overload for at least 3 seconds without failure.

~~F.~~E. Power Line Filtering: Internal or external transient voltage and surge suppression for workstations or controllers with the following:

1. Minimum dielectric strength of 1000 V.
2. Maximum response time of 10 nanoseconds.
3. Minimum transverse-mode noise attenuation of 65 dB.
4. Minimum common-mode noise attenuation of 150 dB at 40 to 100 Hz.

2.04 UNITARY CONTROLLERS

A. Unitized, capable of stand-alone operation with sufficient memory to support its operating system, database, and programming requirements, and with sufficient I/O capacity for the application.

1. Configuration: Local keypad and display; diagnostic LEDs for power, communication, and processor; wiring termination to terminal strip or card connected with ribbon cable; memory with bios; and 72-hour battery backup.
2. Operating System: Manage I/O communication to allow distributed controllers to share real and virtual object information and allow central monitoring and alarms. Perform scheduling with real-time clock. Perform automatic system diagnostics; monitor system and report failures.
3. ASHRAE 135 Compliance: Communicate using read (execute and initiate) and write (execute and initiate) property services defined in ASHRAE 135. Reside on network using MS/TP datalink/physical layer protocol and have service communication port for connection to diagnostic terminal unit.

~~4.LonWorks Compliance: Communicate using EIA/CEA 709.1 datalink/physical layer protocol using LonTalk protocol.~~

~~5.~~4. Enclosure: Dustproof rated for operation at 32 to 120 deg F.

~~6.~~5. Enclosure: Waterproof rated for operation at 40 to 150 deg F.

2.05 ANALOG CONTROLLERS

A. Step Controllers: 6- or 10-stage type, with heavy-duty switching rated to handle loads and operated by electric motor.

B. Electric, Outdoor-Reset Controllers: Remote-bulb or bimetal rod-and-tube type, proportioning action with adjustable throttling range, adjustable set point, scale range minus 10 to plus 70 deg F, and single- or double-pole contacts.

C. Electronic Controllers: Wheatstone-bridge-amplifier type, in steel enclosure with provision for remote-resistance readjustment. Identify adjustments on controllers, including proportional band and authority.

1. Single controllers can be integral with control motor if provided with accessible control readjustment potentiometer.

D. Fan-Speed Controllers: Solid-state model providing field-adjustable proportional control of motor speed from maximum to minimum of 55 percent and on-off action below minimum fan speed. Controller shall briefly apply full voltage, when motor is started, to rapidly bring motor up to minimum speed. Equip with filtered circuit to eliminate radio interference.

E. Receiver Controllers: Single- or multiple-input models with control-point adjustment, direct or reverse acting with mechanical set-point adjustment with locking device, proportional band adjustment, authority adjustment, and proportional control mode.

1. Remote-control-point adjustment shall be plus or minus 20 percent of sensor span, input signal of 3 to 13 psig.
2. Proportional band shall extend from 2 to 20 percent for 5 psig.
3. Authority shall be 20 to 200 percent.
4. Air-supply pressure of 18 psig, input signal of 3 to 15 psig, and output signal of zero to supply pressure.
5. Gages: 3-1/2 inches in diameter, 2.5 percent wide-scale accuracy, and range to match transmitter input or output pressure.

2.06 TIME CLOCKS

A. Manufacturers

1. ATC-Diversified Electronics
2. Paragon Electric Co., Inc.
3. SSAC Inc.; ABB USA
4. TCS/Basys Controls
5. Time Mark Corporation

B. Seven-day, programming-switch timer with synchronous-timing motor and seven-day dial; continuously charged, nickel-cadmium-battery-driven, eight-hour, power-failure carryover; multiple-switch trippers; minimum of two and maximum of eight signals per day with two normally open and two normally closed output contacts.

C. Solid-state, programmable time control with 8 separate programs each with up to 100 on-off operations; 1-second resolution; lithium battery backup; keyboard interface and manual override; individual on-off-auto switches for each program; 365-day calendar with 20 programmable holidays; choice of fail-safe operation for each program; system fault alarm; and communications package allowing networking of time controls and programming from PC.

2.07 ELECTRONIC SENSORS

A. Description: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.

B. Thermistor Temperature Sensors and Transmitters

1. Manufacturers

a. BEC Controls Corporation
b. Ebtron, Inc.
c. Heat-Timer Corporation
d. MAMAC Systems, Inc.
e. RDF Corporation

2. Accuracy: Plus or minus 0.5 degrees F at calibration point.
3. Wire: Twisted, shielded-pair cable.
4. Insertion Elements in Ducts: Single point, 8 inches long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft.
5. Averaging Elements in Ducts: 36 inches long, flexible; use where prone to temperature stratification or where ducts are larger than 10 sq. ft.
6. Insertion Elements for Liquids: Brass or stainless-steel socket with minimum insertion length of 2-1/2 inches.
7. Room Sensor Cover Construction: Manufacturer's standard locking covers.
8. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
9. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.

C. RTDs and Transmitters

1. Manufacturers

a. BEC Controls Corporation.
b. MAMAC Systems, Inc.
c. RDF Corporation.

2. Accuracy: Plus or minus 0.2 percent at calibration point.
3. Wire: Twisted, shielded-pair cable.
4. Insertion Elements in Ducts: Single point, 8 inches long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft..
5. Averaging Elements in Ducts: 18 inches long, rigid; use where prone to temperature stratification or where ducts are larger than 9 sq. ft.; length as required.
6. Insertion Elements for Liquids: Brass socket with minimum insertion length of 2-1/2 inches.
7. Room Sensor Cover Construction: Manufacturer's standard locking covers.
8. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
9. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.

D. Humidity Sensors: Bulk polymer sensor element.

1. Manufacturers
   a. BEC Controls Corporation
   b. General Eastern Instruments
   c. MAMAC Systems, Inc.
   d. ROTRONIC Instrument Corp.
   e. TCS/Basys Controls
   f. Vaisala
2. Accuracy: 5 percent full range with linear output.
3. Room Sensor Range: 20 to 80 percent relative humidity.
4. Room Sensor Cover Construction: Manufacturer's standard locking covers.
5. Duct Sensor: 20 to 80 percent relative humidity range with element guard and mounting plate.
6. Outside-Air Sensor: 20 to 80 percent relative humidity range with mounting enclosure, suitable for operation at outdoor temperatures of 32 to 120 deg F.
7. Duct and Sensors: With element guard and mounting plate, range of 0 to 100 percent relative humidity.

E. Pressure Transmitters/Transducers

1. Manufacturers
   a. BEC Controls Corporation
   b. General Eastern Instruments
   c. MAMAC Systems, Inc.
   d. TCS/Basys Controls
   e. Vaisala
2. Static-Pressure Transmitter: Nondirectional sensor with suitable range for expected input, and temperature compensated.
   a. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
   b. Output: 4 to 20 mA.
   c. Building Static-Pressure Range: 0- to 0.25-inch wg.
   d. Duct Static-Pressure Range: 0- to 5-inch wg.
3. Water Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig operating pressure; linear output 4 to 20 mA.
4. Water Differential-Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig operating pressure and tested to 300-psig; linear output 4 to 20 mA.
5. Differential-Pressure Switch (Air or Water): Snap acting, with pilot-duty rating and with suitable scale range and differential.

6. Pressure Transmitters: Direct acting for gas, liquid, or steam service; range suitable for system; linear output 4 to 20 mA.

F. Room Sensor Cover Construction: Manufacturer's standard locking covers.

G. Room sensor accessories include the following:

1. Insulating Bases: For sensors located on exterior walls.
2. Guards: Locking, solid metal, ventilated.
3. Adjusting Key: As required for calibration and cover screws.

2.08 STATUS SENSORS

A. Status Inputs for Fans: Differential-pressure switch with pilot-duty rating and with adjustable range of 0- to 5-inch wg.

B. Status Inputs for Pumps: Differential-pressure switch with pilot-duty rating and with adjustable pressure-differential range of 8 to 60 psig, piped across pump.

C. Status Inputs for Electric Motors: Comply with ISA 50.00.01, current-sensing fixed- or split-core transformers with self-powered transmitter, adjustable and suitable for 175 percent of rated motor current.

D. Voltage Transmitter (100- to 600-V ac): Comply with ISA 50.00.01, single-loop, self-powered transmitter, adjustable, with suitable range and 1 percent full-scale accuracy.

E. Power Monitor: 3-phase type with disconnect/shorting switch assembly, listed voltage and current transformers, with pulse kilowatt hour output and 4- to 20-mA kW output, with maximum 2 percent error at 1.0 power factor and 2.5 percent error at 0.5 power factor.

F. Current Switches: Self-powered, solid-state with adjustable trip current, selected to match current and system output requirements.

G. Electronic Valve/Damper Position Indicator: Visual scale indicating percent of travel and 2- to 10-V dc, feedback signal.

H. Water-Flow Switches: Bellows-actuated mercury or snap-acting type with pilot-duty rating, stainless-steel or bronze paddle, with appropriate range and differential adjustment, in NEMA 250, Type 1 enclosure.

1. Manufacturers

a. BEC Controls Corporation
b. I.T.M. Instruments Inc.

2.09 THERMOSTATS

A. Manufacturers

1. **Venstar, Model T2900SCH**
~~1. **Or Equal.**Erie Controls~~
~~2.Danfoss Inc.; Air-Conditioning and Refrigeration Div.~~
~~3.Heat-Timer Corporation~~
~~4.Sauter Controls Corporation~~
~~**5.2.** Tekmar Control Systems, Inc.~~

B. Combination Thermostat and Fan Switches: Line-voltage thermostat with push-button or lever-operated fan switch.

1. Label switches ~~["FAN-ON-OFF"] ["FAN-HIGH-LOW-OFF"] [~~"FAN HIGH-MED-LOW-OFF"~~]~~.
2. Mount on single electric switch box.

C. Electric, solid-state, microcomputer-based room thermostat with remote sensor.

1. Automatic switching from heating to cooling.
2. Preferential rate control to minimize overshoot and deviation from set point.
3. Set up for four separate temperatures per day.
4. Instant override of set point for continuous or timed period from 1 hour to 31 days.
5. Short-cycle protection.
6. Programming based on ~~[~~weekday, Saturday, and Sunday~~] [every day of week]~~.
7. Selection features include degree F or degree C display, 12- or 24-hour clock, keyboard disable, remote sensor, and fan on-auto.
8. Battery replacement without program loss.
9. Thermostat display features include the following:
    a. Time of day.
    b. Actual room temperature.
    c. Programmed temperature.
    d. Programmed time.
    e. Duration of timed override.
    f. Day of week.
    g. System mode indications include "heating," "off," "fan auto," and "fan on."

D. Low-Voltage, On-Off Thermostats: NEMA DC 3, 24-V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater, concealed set-point adjustment, 55 to 85 deg F set-point range, and 2 deg F maximum differential.

E. Line-Voltage, On-Off Thermostats: Bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch or equivalent solid-state type, with heat anticipator; listed for electrical rating; with concealed set-point adjustment, 55 to 85 deg F set-point range, and 2 deg F maximum differential.

1. Electric Heating Thermostats: Equip with off position on dial wired to break ungrounded conductors.
2. Selector Switch: Integral, manual on-off-auto.

F. Remote-Bulb Thermostats: On-off or modulating type, liquid filled to compensate for changes in ambient temperature; with copper capillary and bulb, unless otherwise indicated.

1. Bulbs in water lines with separate wells of same material as bulb.
2. Bulbs in air ducts with flanges and shields.
3. Averaging Elements: Copper tubing with either single- or multiple-unit elements, extended to cover full width of duct or unit; adequately supported.
4. Scale settings and differential settings are clearly visible and adjustable from front of instrument.
5. On-Off Thermostat: With precision snap switches and with electrical ratings required by application.
6. Modulating Thermostats: Construct so complete potentiometer coil and wiper assembly is removable for inspection or replacement without disturbing calibration of instrument.

~~G.Immersion Thermostat: Remote-bulb or bimetal rod-and-tube type, proportioning action with adjustable throttling range and adjustable set point.~~

~~H.Airstream Thermostats: Two-pipe, fully proportional, single-temperature type; with adjustable set point in middle of range, adjustable throttling range, plug-in test fitting or permanent pressure gage, remote bulb, bimetal rod and tube, or averaging element.~~

~~I.Electric, Low-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual- or automatic- reset switch that trips if temperature sensed across any 12 inches of bulb length is equal to or below setpoint.~~

~~1.Bulb Length: Minimum 20 feet.~~
~~2.Quantity: One thermostat for every 20 sq. ft. of coil surface.~~

~~J.Electric, High-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual- or automatic- reset switch that trips if temperature sensed across any 12 inches of bulb length is equal to or above set point.~~

~~1.Bulb Length: Minimum 20 feet.~~
~~2.Quantity: One thermostat for every 20 sq. ft. of coil surface.~~

~~K.Heating/Cooling Valve-Top Thermostats: Proportional acting for proportional flow, with molded-rubber diaphragm, remote-bulb liquid-filled element, direct and reverse acting at minimum shutoff pressure of 25 psig, and cast housing with position indicator and adjusting knob.~~

~~2.10HUMIDISTATS~~

~~A.Manufacturers~~

~~1.MAMAC Systems, Inc.~~
~~2.ROTRONIC Instrument Corp.~~

~~B.Pneumatic Room Humidistats: Wall-mounting, proportioning type with adjustable throttling range, 20 to 90 percent operating range, and cover matching room thermostat cover.~~

~~C.Duct-Mounting Humidistats: Electric insertion, 2-position type with adjustable, 2 percent throttling range, 20 to 80 percent operating range, and single- or double-pole contacts.~~

~~2.11~~2.10 ACTUATORS

A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.
   1. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
   2. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
   3. Nonspring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.
   4. Spring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running and breakaway torque of 150 in. x lbf.

5. Nonspring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.
6. Spring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running and breakaway torque of 150 in. x lbf.

B. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.

1. Manufacturers
   a. Belimo Aircontrols (USA), Inc.
2. Valves: Size for torque required for valve close off at maximum pump differential pressure.
3. Dampers: Size for running torque calculated as follows
   a. Parallel-Blade Damper with Edge Seals: 7 inch-lb/sq. ft. of damper.
   b. Opposed-Blade Damper with Edge Seals: 5 inch-lb/sq. ft. of damper.
   c. Parallel-Blade Damper without Edge Seals: 4 inch-lb/sq. ft of damper.
   d. Opposed-Blade Damper without Edge Seals: 3 inch-lb/sq. ft. of damper.
   e. Dampers with 2- to 3-Inch wg of Pressure Drop or Face Velocities of 1000 to 2500 fpm: Increase running torque by 1.5.
   f. Dampers with 3- to 4-Inch wg of Pressure Drop or Face Velocities of 2500 to 3000 fpm: Increase running torque by 2.0.
4. Coupling: V-bolt and V-shaped, toothed cradle.
5. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
6. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.
7. Power Requirements (Two-Position Spring Return): 120-V ac.
8. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
9. Proportional Signal: 2- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
10. Temperature Rating: 40 to 104 deg F.
11. Temperature Rating (Smoke Dampers): Minus 22 to plus 250 deg F.
12. Run Time: 12 seconds open, 5 seconds closed.

~~2.12CONTROL VALVES~~

~~A.Manufacturers~~

~~1.Danfoss Inc.; Air Conditioning & Refrigeration Div.~~
~~2.Erie Controls.~~
~~3.Hayward Industrial Products, Inc.~~
~~4.Magnatrol Valve Corporation.~~
~~5.Pneuline Controls.~~
~~6.Sauter Controls Corporation.~~

~~B.Control Valves: Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.~~

~~C.Hydronic system globe valves shall have the following characteristics~~

~~1.NPS 2 and Smaller: Class 125 bronze body, bronze trim, rising stem, renewable composition disc, and screwed ends with backseating capacity repackable under pressure.~~
~~2.NPS 2-1/2 and Larger: Class 125 iron body, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc.~~
~~3.Internal Construction: Replaceable plugs and stainless-steel or brass seats.~~

~~a.Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom.~~

~~4.Sizing: 3-psig maximum pressure drop at design flow rate or the following:~~

~~a.Two Position: Line size.~~
~~b.Two-Way Modulating: Either the value specified above or twice the load pressure drop, whichever is more.~~
~~c.Three-Way Modulating: Twice the load pressure drop, but not more than value specified above.~~

~~5.Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.~~
~~6.Close-Off (Differential) Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150 percent of total system (pump) head for two-way valves and 100 percent of pressure differential across valve or 100 percent of total system (pump) head.~~

~~D.Butterfly Valves: 200-psig, 150-psig maximum pressure differential, ASTM A 126 cast-iron or ASTM A 536 ductile-iron body and bonnet, extended neck, stainless-steel stem, field-replaceable EPDM or Buna N sleeve and stem seals.~~

~~1.Body Style: Wafer.~~
~~2.Disc Type: Epoxy-coated ductile iron.~~
~~3.Sizing: 1-psig maximum pressure drop at design flow rate.~~

~~E.Terminal Unit Control Valves: Bronze body, bronze trim, two or three ports as indicated, replaceable plugs and seats, and union and threaded ends.~~

~~1.Rating: Class 125 for service at 125 psig and 250 deg F operating conditions.~~
~~2.Sizing: 3-psig maximum pressure drop at design flow rate, to close against pump shutoff head.~~
~~3.Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.~~

~~2.13~~2.11 DAMPERS

A. Manufacturers

1. Air Balance Inc.
2. Don Park Inc.; Autodamp Div.
3. TAMCO (T. A. Morrison & Co. Inc.).
4. United Enertech Corp.
5. Vent Products Company, Inc.

B. Dampers: AMCA-rated, opposed-blade design; 0.108-inch-minimum thick, galvanized-steel or 0.125-inch-minimum thick, extruded-aluminum frames with holes for duct mounting; damper blades shall not be less than 0.064-inch-thick galvanized steel with maximum blade width of 8 inches and length of 48 inches.

1. Secure blades to 1/2-inch-diameter, zinc-plated axles using zinc-plated hardware, with oil-impregnated sintered bronze blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
2. Operating Temperature Range: From minus 40 to plus 200 deg F.
3. Edge Seals, Standard Pressure Applications: Closed-cell neoprene.

~~2.1~~2.12 CONTROL CABLE

A. Electronic and fiber-optic cables for control wiring are specified in Division 27 Section "Communications Horizontal Cabling."

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that power supply is available to control units and operator workstation.

~~B.Verify that pneumatic piping and duct-, pipe-, and equipment-mounted devices are installed before proceeding with installation.~~

3.02 INSTALLATION

A. Install software in control units~~ and operator workstation(s)~~. Implement all features of programs to specified requirements and as appropriate to sequence of operation.

B. Connect and configure equipment and software to achieve sequence of operation specified.

C. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices 48 inches above the floor.

1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.
2. **Coordinate mounting heights of thermostats with light switches, both devices shall be mounted at the same height.**

D. Install guards on thermostats in the following locations

1. Entrances.
2. Public areas.

E. Install automatic dampers according to Division 23 Section "Air Duct Accessories."

F. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.

G. Install labels and nameplates to identify control components according to Division 23 Section "Identification for HVAC Piping and Equipment."

~~H.Install hydronic instrument wells, valves, and other accessories according to Division 23 Section "Hydronic Piping."~~

~~I.~~H. Install refrigerant instrument wells, valves, and other accessories according to Division 23 Section "Refrigerant Piping."

~~J.~~I. Install duct volume-control dampers according to Division 23 Sections specifying air ducts.

~~K.~~J. Install electronic and fiber-optic cables according to Division 27 Section "Communications Horizontal Cabling."

3.03 ELECTRICAL WIRING AND CONNECTION INSTALLATION

A. Install raceways, boxes, and cabinets according to Division 26 Section "Raceway and Boxes for Electrical Systems."

B. Install building wire and cable according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

C. Install signal and communication cable according to Division 27 Section "Communications Horizontal Cabling."

1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
2. Install exposed cable in raceway.
3. Install concealed cable in raceway.
4. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.
5. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
6. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
7. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment.

D. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.

E. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
2. Test and adjust controls and safeties.
3. Test calibration of electronic controllers by disconnecting input sensors and stimulating operation with compatible signal generator.
4. Test each point through its full operating range to verify that safety and operating control set points are as required.
5. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.
6. Test each system for compliance with sequence of operation.
7. Test software and hardware interlocks.

C. DDC Verification

1. Verify that instruments are installed before calibration, testing, and loop or leak checks.
2. Check instruments for proper location and accessibility.

3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
4. Check instrument tubing for proper fittings, slope, material, and support.
5. Check installation of air supply for each instrument.
6. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.
7. Check pressure instruments, piping slope, installation of valve manifold, and self-contained pressure regulators.
8. Check temperature instruments and material and length of sensing elements.
9. Check control valves. Verify that they are in correct direction.
10. Check air-operated dampers. Verify that pressure gages are provided and that proper blade alignment, either parallel or opposed, has been provided.
11. ~~Check DDC system as follows~~

    a. ~~Verify that DDC controller power supply is from emergency power supply, if applicable.~~
    b. ~~Verify that wires at control panels are tagged with their service designation and approved tagging system.~~
    c. ~~Verify that spare I/O capacity has been provided.~~
    d. ~~Verify that DDC controllers are protected from power supply surges.~~

D. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

3.05 ADJUSTING

A. Calibrating and Adjusting

1. Calibrate instruments.
2. Make three-point calibration test for both linearity and accuracy for each analog instrument.
3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
4. Control System Inputs and Outputs
    a. Check analog inputs at 0, 50, and 100 percent of span.
    b. Check analog outputs using milliampere meter at 0, 50, and 100 percent output.
    c. Check digital inputs using jumper wire.
    d. Check digital outputs using ohmmeter to test for contact making or breaking.
    e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.
5. Flow
    a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
    b. Manually operate flow switches to verify that they make or break contact.
6. Pressure
    a. Calibrate pressure transmitters at 0, 50, and 100 percent of span.
    b. Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.
7. Temperature
    a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
    b. Calibrate temperature switches to make or break contacts.

8. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
9. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
10. Provide diagnostic and test instruments for calibration and adjustment of system.
11. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.

B. Adjust initial temperature and humidity set points.

C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three visits to Project during other than normal occupancy hours for this purpose.

3.06 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain HVAC instrumentation and controls. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 23 09 00

SECTION 23 09 60

SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

A. General

B. System Startup

C. Exhaust Fans with Schedule Control

D. Supply Fans with Temperature Control

E. Fan Coil Units

F. **100% Outside Air, Constant Volume Gas Fired Heating Unit**

G. Constant Volume Gas Fired Heating Unit

1.03 RELATED SECTIONS

A. Section 23 08 00 – Mechanical Systems Commissioning

B. Section 01 91 13 – Commissioning Requirements

1.04 SYSTEM DESCRIPTION

A. This Section defines the manner and method by which the controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other Sections.

1.05 SUBMITTALS

A. Submit under provisions of Section 23 05 00 and Division 1.

B. Submit diagrams indicating the mechanical system controlled and all control system components. Label with settings, adjustable range of control and limits. Include written description of control sequence referencing all labeled devices and equipment.

C. Include flow diagrams for each control system, graphically depicting control logic.

D. Meet with the District's appointed representative to support the graphic representation of the control systems and displayed information. As a minimum, the mechanical system components, control system components, and controlled function status and values shall be displayed.

1.06 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01770.

B. Accurately record actual setpoints and settings of controls, including changes to sequences made after submission of shop drawings. Record drawings shall indicate all control device locations.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

~~3.01GENERAL~~

~~A.The EMCS shall monitor the following items of equipment:~~

~~1.Standby Generator through the local control panel contacts for activation of generator.~~

~~3.02~~3.01 SYSTEM STARTUP

A. After a power outage the equipment shall be reenergized based on a predetermined schedule.

B. Sufficient time delay shall be allowed between each phase of the start-up to prevent overload of the electrical system.

~~3.03~~3.02 VENTILATION SEQUENCES

A. Gravity Roof Ventilator: Occupancy sensor Room thermostat opens dampers.

~~3.04~~3.03 EXHAUST FANS

A. The exhaust fans shall be energized through the EMCS on a scheduled basis.

B. The fan status shall be monitored through current sensing relay mounted in the fan starter bucket.

~~3.05~~3.04 FANS WITH TEMPERATURE CONTROL

A. The exhaust fans shall be energized through the EMCS to maintain the space temperature setpoint of 78 degrees F (adj.)

B. The fan status shall be monitored through current sensing relay mounted in the fan starter bucket.

~~3.06~~3.05 SPLIT SYSTEM UNITS

A. Operation

~~1.FCU-2 serves occupied spaces and shall be energized through the energy management control system (EMCS) in the automatic mode based on the following adjustable schedule:~~

~~a.Monday to Friday 7 a.m. to 4 p.m. Occupied~~
~~b.Temporary 12 a.m. Unoccupied & 11:59 a.m. Unoccupied~~
~~c.Holiday 12 a.m. Unoccupied & 11:59 a.m. Unoccupied~~
~~d.Weekday 12 a.m. Unoccupied & 11:59 a.m. Unoccupied~~
~~e.Weekend 12 a.m. Unoccupied & 11:59 a.m. Unoccupied~~

~~2.~~1. The unit shall cycle with the space load to maintain the space temperature setpoint. The unit shall be able to operate 24 hours a day.

B. **Fan Control:**

1. All fan coil units serving process spaces such as electrical and tele-data rooms shall cycle with the space load to maintain the space temperature setpoint. The units shall have cooling and be able to operate 24 hours a day.

C. Temperature control

1. FCU 1-1: Unit shall cycle with the loads to maintain the space temperature set point - 72℉ (adj.)
2. **FCU 1-2: Unit shall cycle with the loads to maintain the space temperature set point 85℉ (adj.)**

3.06 100% OUTSIDE AIR, CONSTANT VOLUME GAS FIRED HEATING UNIT (HV 2-3)

A. Each unit shall consist of supply fan, final filters, gas fired furnace, and plenum box.

B. Each unit shall be energized through the energy management control system (EMCS) in the automatic mode based on the following adjustable schedule:

1. Monday to Friday: 7.a.m to 11p.m Occupied
2. Temporary: 12.a.m Unoccupied & 11.59p.m Unoccupied
3. Holiday: 12.a.m Unoccupied & 11.59p.m Unoccupied
4. Weekday: 7.a.m to 11p.m Occupied
5. Weekend 12 a.m. Unoccupied & 11:59 a.m. Unoccupied

C. Provide capability for a time based override of 3 hrs (adj.). The override time shall be variable between 1 and 4 hours.Upon receiving an override signal from a zone thermostat, the unit shall operate in override mode for the scheduled override time (3 hrs, adj.).

D. Fan status shall be monitored through a current sensor mounted in the fan motor starter.

E. A high pressure safety cutout located in the unit shall deactivate to unit upon a static pressure of 2" w.c. (adj.) being detected in the cabinet.

F. Supply Air Temperature Control

1. **When the space thermostat is calling for heating, the gas furnace shall be staged to maintained the space temperature setpoint of 68℉ (adj.).**
2. **Supply air discharge temperature shall be monitored by the EMCS.**

G. Supply Fan Control

1. **Supply fan shall operate at constant speed to deliver the airflow listed in the equipment schedules.**

H. Morning Flush

1. **Prior to occupancy the air handling unit shall operate in a 1 hour purge mode followed by a warm up mode.**
2. **In the purge mode the unit shall supply 100% OSA and the minimum supply temperature shall be 65℉.**

I. Morning Warm-Up:

1. **Morning warm-up shall run when the indoor air temperature is less than 65℉ (adj.)**
2. **The unit heating discharge temperature shall be controlled to 85℉ (adj.) leaving air temperature.**
3. **System shall operate in this mode until internal temperatures set points are met.**
4. **The unit shall continue to operate in full recirculation until all zones are satisfied or normal occupancy time period is reached.**

J. Fire Alarm Control

1. **Smoke detectors located in the supply air duct shall indicate an alarm at the EMCS workstation when an alarm condition is detected for secondary monitoring. The wiring and conduit for secondary monitoring, from the duct smoke detector's auxiliary contact to the EMCS shall be provided. The wiring and conduit from the duct detector for fan shut down shall be provided.**

K. A differential pressure sensor monitoring pressure drop across the filter bank shall indicate an alarm at the EMCS workstation if pressure setpoint, 1" W.C. (adj.) are exceeded.

3.07 CONSTANT VOLUME GAS FIRED HEATING UNIT (HV 2-1, 2-2)

A. Each unit shall consist of supply fan, final filters, gas fired furnace, and economizer mixing box.

B. Each unit shall be energized through the energy management control system (EMCS) in the automatic mode based on the following adjustable schedule:

1.	**Monday to Friday:**	**7.a.m to 11p.m Occupied**
2.	**Temporary:**	**12.a.m Unoccupied & 11.59p.m Unoccupied**
3.	**Holiday:**	**12.a.m Unoccupied & 11.59p.m Unoccupied**
4.	**Weekday:**	**7.a.m to 11 p.m Occupied**
5.	**Weekend**	**12 a.m. Unoccupied & 11:59 a.m. Unoccupied**

C. Provide capability for a time based override of 3 hrs (adj.). The override time shall be variable between 1 and 4 hours. Upon receiving an override signal from a zone thermostat, the air handling unit shall operate in override mode for the scheduled override time (3 hrs, adj.).

D. A high pressure safety cutout located in the unit shall deactivate to unit upon a static pressure of 2" w.c. (adj.) being detected in the cabinet.

E. Supply Air Temperature Control

1. **When the space thermostat is calling for heating, the gas furnace shall be staged to maintained the space temperature setpoint of 68℉ (adj.)**
2. **Supply air discharge temperature shall be monitored by the EMCS.**

F. Economizer Control

1. **The EMCS shall calculate the outside and return air enthalpy from the OSA relative humidity and temperature and the return air relative humidity and temperature respectively.**
2. **When outside air enthalpy is less than return air enthalpy, the economizer dampers shall be positioned for maximum "free cooling" using outside air to maintain mixed air temperature set point. Once the outside air enthalpy is greater than the return air enthalpy the modulating economizer outside air damper shall fully close. The outside air shall not drop below the minimum level as detected by the OSA flow sensor. The minimum OSA damper shall remain open to maintain the minimum OSA flow setpoint as detected by OSA flow sensor.**

G. CO_2 Level Control

1. **The return air carbon dioxide level will be monitored by the EMCS.**
2. **If the return air carbon dioxide level reaches 800 ppm (adj.) and is greater than the outside air CO_2 levels, the modulating OSA damper shall begin to open and modulate towards fully open as the CO_2 level continues to increase.**
3. **The OSA damper shall be fully open once the return air CO_2 level reaches 1000 ppm and shall remain open until it drops below 700 ppm.**
4. **Once the level drops to 700 ppm the normal controls will operate.**

H. Supply Fan Control

1. **Supply fan shall operate at constant speed to deliver the airflow listed in the equipment schedules.**

I. Morning Flush

1. **Prior to occupancy the air handling unit shall operate in a 1 hour purge mode followed by a warm up mode.**
2. **The unit shall supply the minimum ventilation air and a minimum supply temperature of 65℉ shall be maintained**

J. Morning Warm-Up:

1. **Morning warm-up shall run when the indoor air temperature is less than 65℉ (adj.)**
2. **The system shall be set to full recirculation and both outside air dampers shall be closed. The unit heating discharge temperature shall be controlled to 85℉ (adj.) leaving air temperature.**
3. **System shall operate in this mode until internal temperatures set points are met.**
4. **The unit shall continue to operate in full recirculation until all zones are satisfied or normal occupancy time period is reached.**

K. Fire Alarm Control

1. **Smoke detectors located in the supply air duct shall indicate an alarm at the EMCS workstation when an alarm condition is detected for secondary monitoring. The wiring and conduit for secondary monitoring, from the duct smoke detector's auxiliary contact to the EMCS shall be provided. The wiring and conduit from the duct detector for fan shut down shall be provided.**

~~1.~~ **A differential pressure sensor monitoring pressure drop across the filter bank shall indicate an alarm at the EMCS workstation if pressure setpoint, 1" W.C. (adj.) are** ~~The supply fan shall be energized through the EMCS. Fan status shall be monitored through current sensing relay mounted in the fan starter bucket.~~

~~2.Discharge air sensor shall modulate chilled water control valve, and where applicable, the hot water control valve, in sequence, to maintain room temperature setpoint. HP-1: cooling, 74+/-4 degrees F, heating, 68+/-4 degrees F, HP-2: cooling only, 78+/-4 degrees F.~~

~~3.Upon detection of moisture in the primary drain pan by the moisture sensor mounted in the unit, the EMCS shall de-energize the fan coil unit and raise an alarm.~~

~~F~~.L. ~~End-switches shall be provided at all operable windows in the space. The EMCS shall monitor the end-switches and de-activate the unit if a window is open.~~

END OF SECTION 23 09 60